CAR MODEL SECTION

In presenting the information on car models all unnecessary reading matter has been eliminated. The facts needed by service men are presented briefly — by means of diagrams and tabulated specifications.

NOTE: Whenever the data on a car model is not completed on one page, it is always carried over onto the opposite page, placing all the data on any car directly before the eyes.

AJAX

1925-26

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L. Type 3-HVX-5X, 6 volt. The negative (—) terminal is grounded. The starting capacity is 105 amperes for 20 minutes. Lighting capacity is 5 amperes for 18.4 hours. The battery is 7 7/16 by 9¾ by 9⅛ inches.

IGNITION:—Coil Model IG-4061. Distributor Model IG-4110. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine flat jeweler's file. The surface of the contacts should be flat and parallel. The distributor is of the full automatic type. Automatic advance begins at 200 R.P.M. of the distributor and reaches a maximum of 15° (distributor) at 1200 R.P.M. This is equivalent to a flywheel advance of 30°.

Oiling:—Refill the grease cup under the distributor head with medium cup grease and turn down one turn every two weeks. Put one drop of light engine oil on the breaker arm hinge and place a small amount of vaseline on the face of the breaker cam every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing:—Breaker contacts begin to separate when piston entering power stroke reaches top dead center with the breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

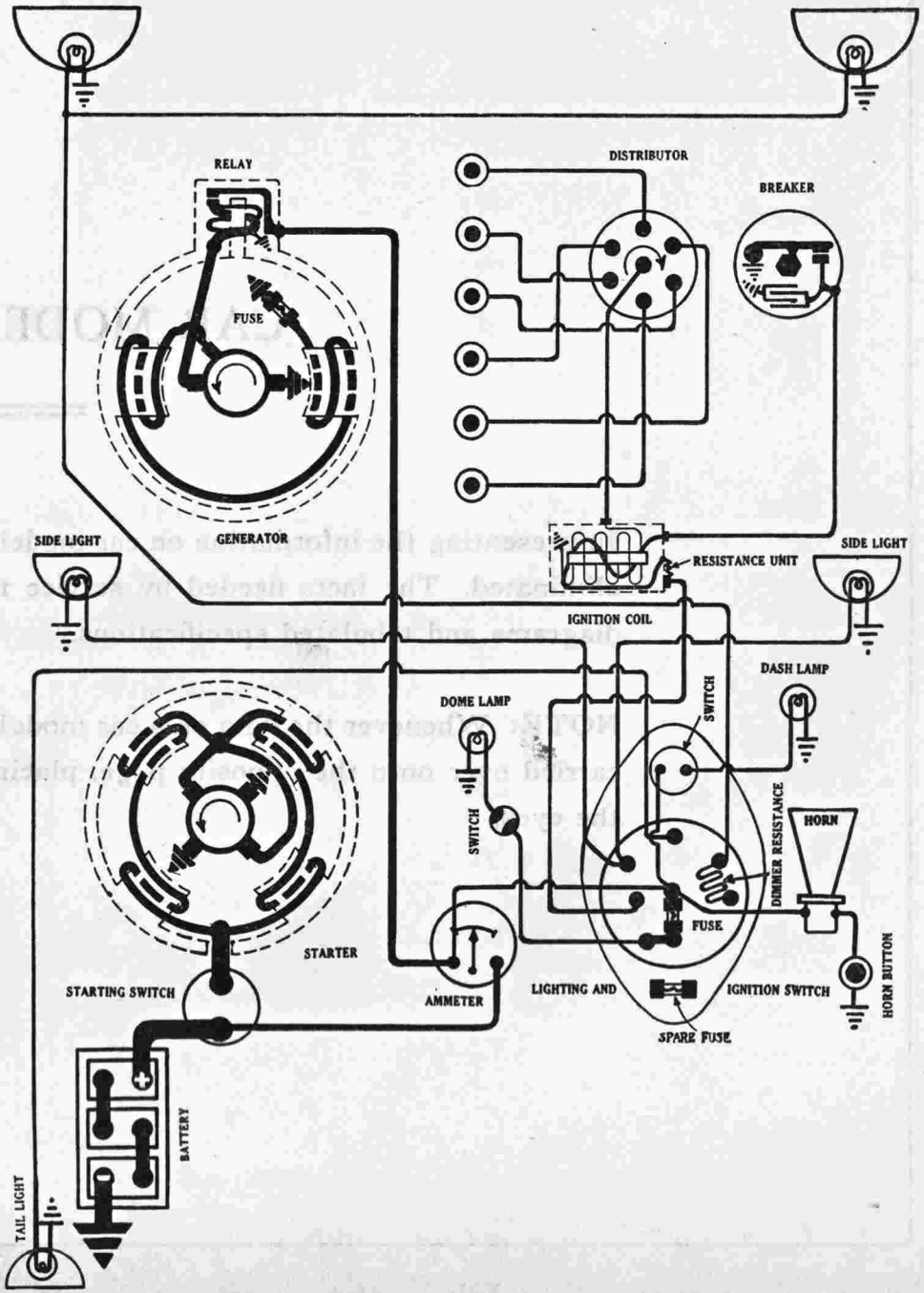
STARTER.—Model MP-4101. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 185 R.P.M., taking 140 amperes at 4.8 volts The starter brush tension should be 1½-1¾ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	5.5	75
1 lb. ft.	2800	5.25	150
2 lb. ft.	2000	5.0	200
4 lb. ft.	1250	4.5	300
5 lb. ft.	1000	4.2	350
12 lb. ft.	Lock	3.	650

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the drive end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month. The commutator end bearing is of the self-lubricating type and requires no attention.

GENERATOR.—Model GTB-4004. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the charging rate, remove the commutator band and loosen the nut under the third brush holder. Then shift the third brush in the direction of generator rotation to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the nut after making the adjustment. The maximum output of 14 amperes is reached at 1700 R.P.M. of the armature or 22 M.P.H.



AJAX

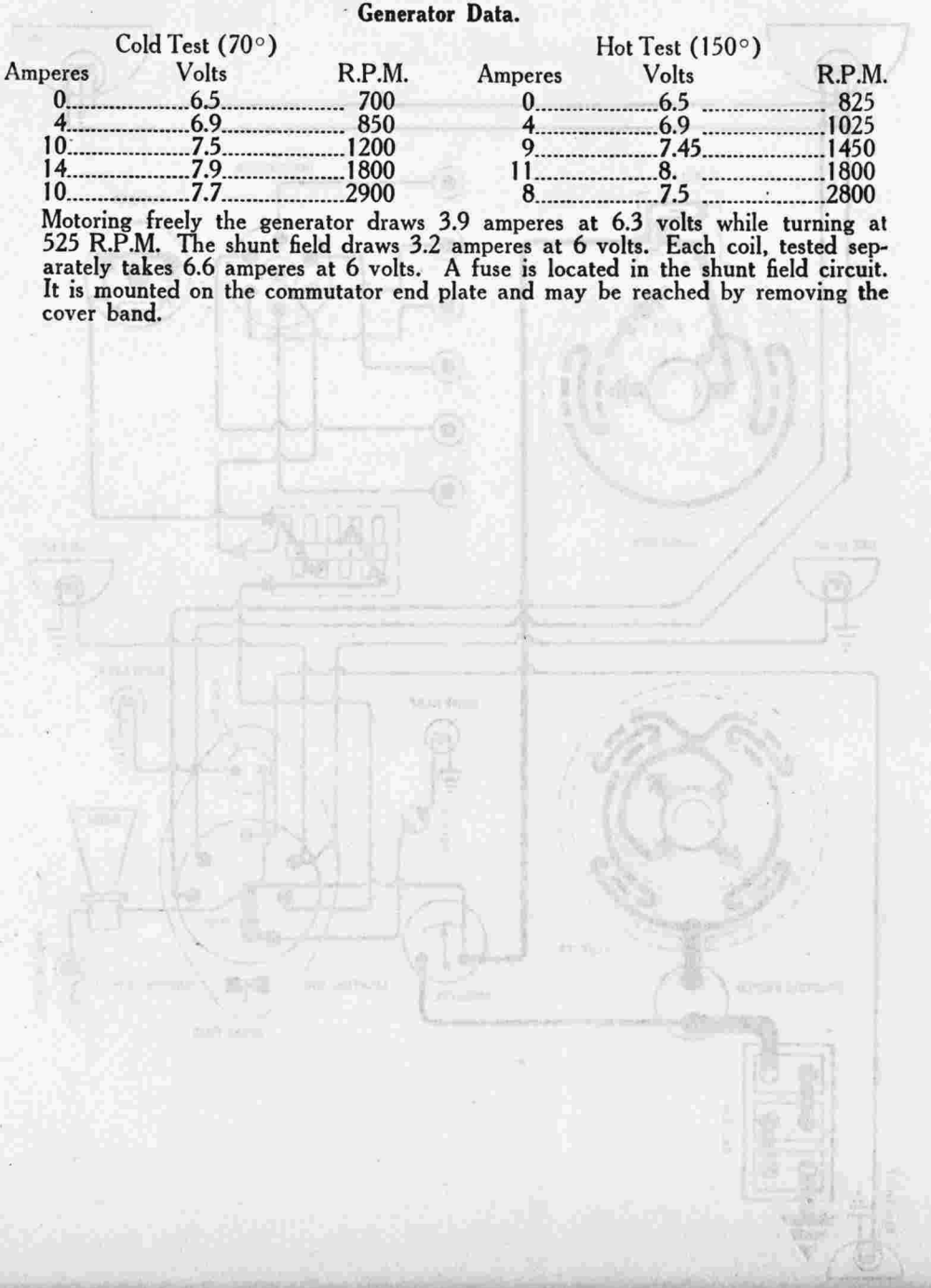
1925-26

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

Generator Data.

Cold Test (70°)			Hot Test (150°)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	700	0	6.5	825
4	6.9	850	4	6.9	1025
10	7.5	1200	9	7.45	1450
14	7.9	1800	11	8.	1800
10	7.7	2900	8	7.5	2800

Motoring freely the generator draws 3.9 amperes at 6.3 volts while turning at 525 R.P.M. The shunt field draws 3.2 amperes at 6 volts. Each coil, tested separately takes 6.6 amperes at 6 volts. A fuse is located in the shunt field circuit. It is mounted on the commutator end plate and may be reached by removing the cover band.



Oiling:—Put 3 or 4 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY.—Model CB-4007. Relay contacts close at 700 R.P.M. of the generator armature or 10 M.P.H. with a generator voltage of 6.5 volts, and open at 650 R.P.M. with a discharge current of 0-1 ampere. Charging current at closing of relay is 1-2 amperes. Relay contacts separate .050 inch. Air gap between relay armature and coil core is .030 inch, contacts closed.

LIGHTING.—Switch Model B & S Type 39890. Head lamps are 6-8-volt, 21 cp. S. C. Cowl and tail lamps are 6-8-volt, 3 cp. S. C. dash lamp is 6-8-volt, 2cp. S. C. dome lamp is 6-8-volt, 4cp. S. C.

FUSES:—Generator field fuse is 5 amperes.

AJAX

AFTER APRIL FIRST (1926)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY.—U. S. L. Type 3-HVX-5X, 6 volt. The negative (—) terminal is grounded. The starting capacity is 105 amperes for 20 minutes. Lighting capacity is 5 amperes for 18.4 hours. The battery is 7 7/16 by 9¾ by 9⅛ inches.

IGNITION.—Coil Model IG-4065. Distributor Model IG-4110. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine flat jeweler's file. The surface of the contacts should be flat and parallel. The distributor is of the full automatic type. Automatic advance begins at 200 R.P.M. of the distributor and reaches a maximum of 15° (distributor) at 1200 R.P.M. This is equivalent to a flywheel advance of 30° at 2400 R.P.M. of the engine.

Oiling.—Refill the grease cup under the distributor head with medium cup grease and turn down one turn every two weeks. Put one drop of light engine oil on the breaker arm hinge and place a small amount of vaseline on the face of the breaker cam every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing.—Breaker contacts begin to separate when piston entering power stroke reaches top dead center with the breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plug.—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

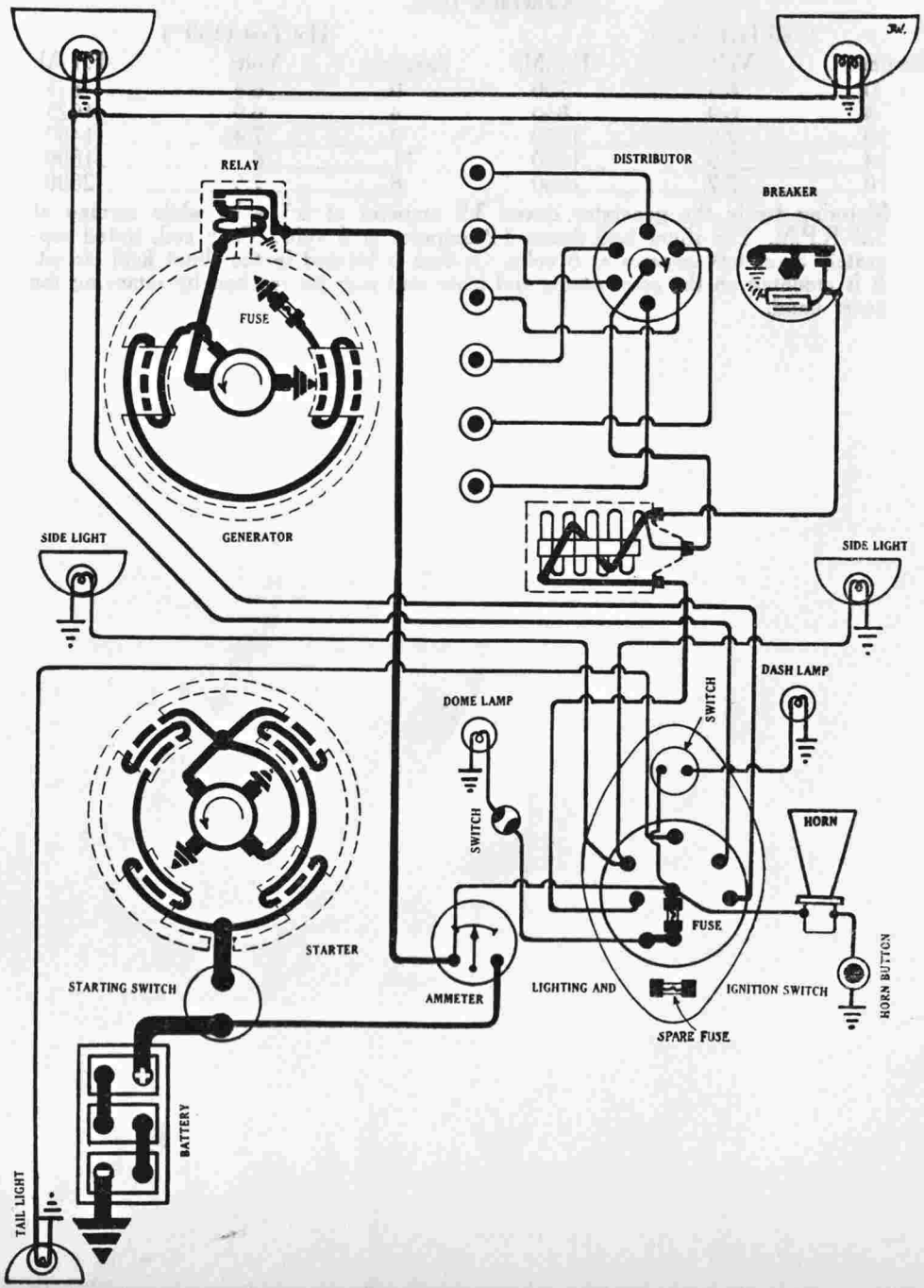
STARTER.—Model MN-4108. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 184 R.P.M. taking 160 amperes at 4.7 volts. Starter brush tension should be 1¼-1½ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	Free	5.5	45	(Without Bendix)
0 "	Free	5.5	50	(With Bendix)
.6 "	2700	5.5	100	
2.5 "	1500	5	200	
5 "	850	4.5	300	
7.5 "	650	4	400	
11.5 "	Lock	3	540	

Oiling.—Put 4 or 5 drops of light engine oil in oiler on the drive end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month. The commutator end bearing is of the self-lubricating type and requires no attention.

GENERATOR.—Model GYA-4201. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, remove the commutator cover band and shift the third brush mounting bracket by tapping the third brush mounting stud with a screwdriver. Shifting the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. The mounting bracket is held in any desired position by friction between the third brush mounting stud and the generator end plate.



AJAX

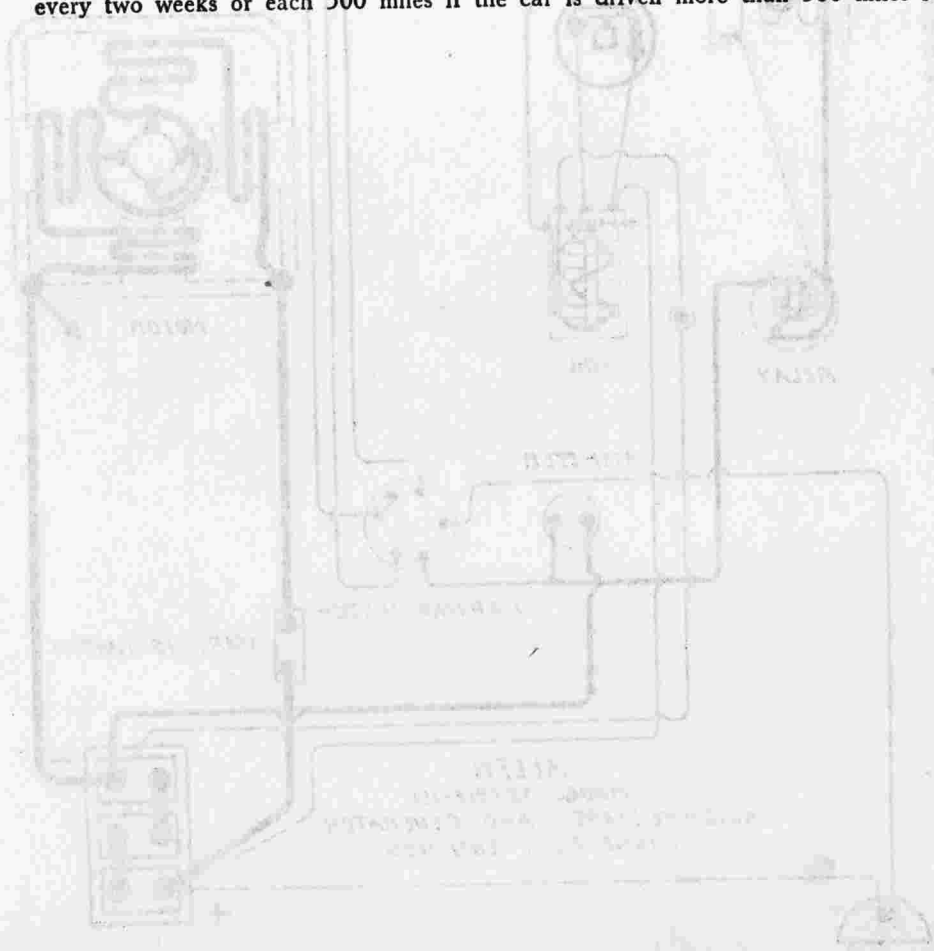
AFTER APRIL FIRST (1926)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
2	6.6	620	2	....	700
5	7	700	5	....	840
10	7.3	860	10	....	1100
14	7.7	1050	14	....	1600
16	7.9	1200			
19	8	1300			

Motoring freely, generator draws 5 amperes at 6 volts. Shunt field current is 3.8 amperes at 6.2 volts. Generator brush spring tension is 1¼-1½ pounds each.

Oiling.—Put 3 or 4 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.



RELAY.—Model CB-4007. Relay is mounted on top of the generator. Relay contacts close when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of .5-2.5 amperes. Contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING.—Switch B & S Type 39890. Head lamps are each 6-8 volt, 21 cp. Double filament using second 21 cp. filament for dimming. Dash lamp is 6-8 volt, 2 cp. S. C. Dome lamp is 6-8 volt, 4 cp. S. C. Side and tail lamps are each 6-8 volt, 3 cp. S. C.

FUSES.—Generator field fuse is 5 ampere.

Allen

Model 35 (1914-15)
Auto-Lite Starting and Lighting System
Connecticut Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded at the starting motor.

Ignition.—Breaker contacts should separate .018 inch to .022 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 2, 4, 3.

Spark Plug Gaps.—Spark plug gaps should be about .027 inch.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

Starter.—Starter is connected to the engine through a Bendix drive. It should crank the engine at about 125 R. P. M., taking about 250 amperes. Cold engine, tight bearings, heavy oil or other obstructions will cause a greater current flow and reduce the speed. When running free, Model M armature should revolve at about 1800 R. P. M., taking 60 amperes, and Model MC at about 4200 R. P. M., taking 50-55 amperes. Greater speed indicates grounded, short circuited or damp field windings. Greater current or vibrating of the ammeter needle indicates grounded or short circuited armature coils or commutator. Damp armature windings will cause high current or slow speed.

STARTER DATA, MODEL MC.

Torque	R. P. M.	Amperes
1 lb. ft.	2650	100
2 lb. ft.	1900	145-150
3 lb. ft.	1600	185-190
4 lb. ft.	1400	225
5 lb. ft.	1250	250-255
6 lb. ft.	1000	290-300
16 lb. ft.	Lock	450-460

Oiling.—Clean and repack starter bearings with soft cup grease every six months. Put in one or two drops of oil every month to keep grease soft. Do not oil the Bendix drive. Should pinion stick, clean shaft with gasoline.

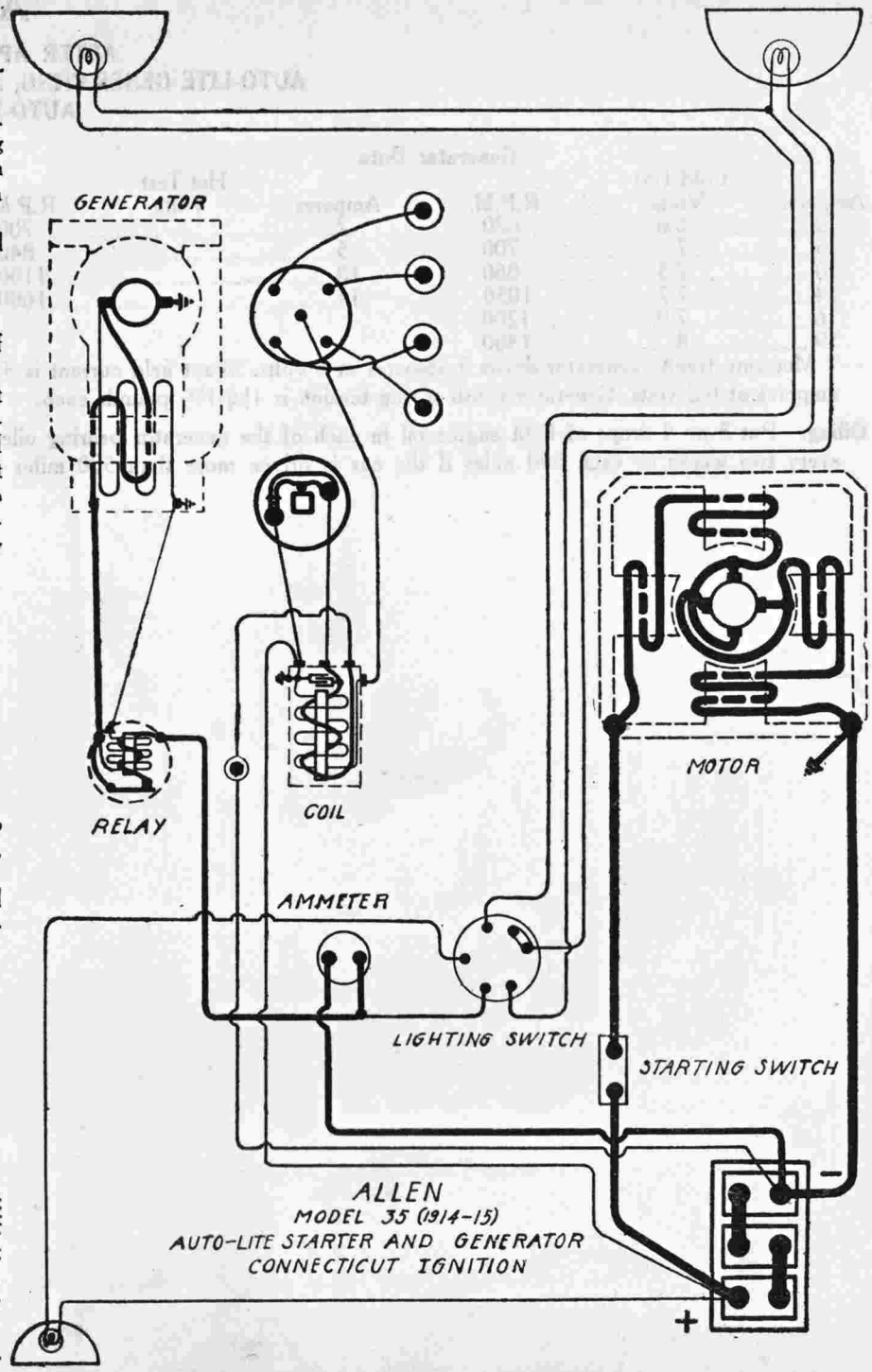
Generator.—Generator current regulation is by reverse series field. Relay should close at 8-10 and open at 6-8 miles per hour. Charging current should be .6 to 1.5 amperes at closing and discharge current 0 to 1 ampere at opening.

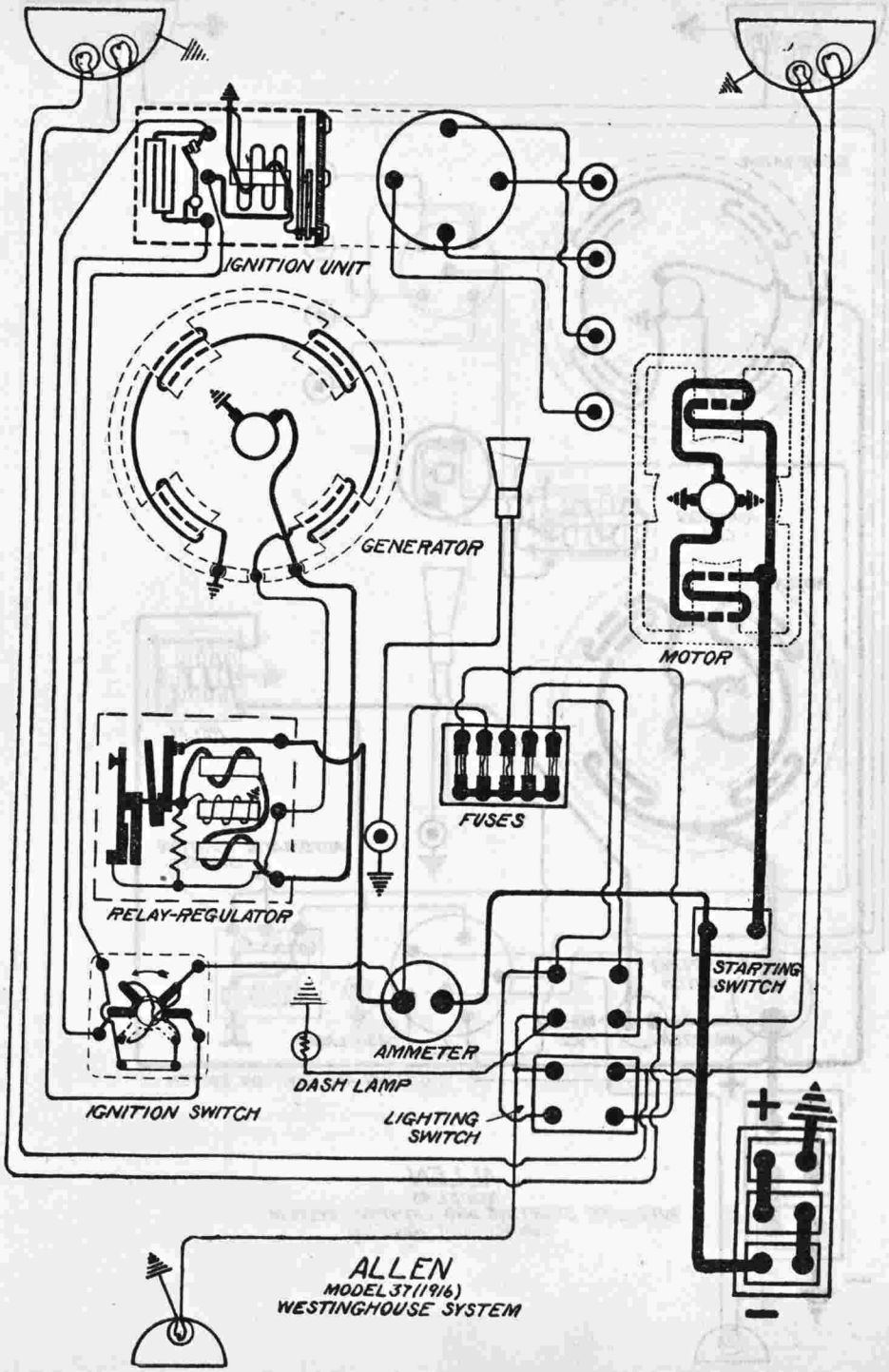
GENERATOR DATA.

Model G		Model GA	
Amperes	R. P. M.	Amperes	R. P. M.
Neutral	200	Neutral	260- 300
5.0	520	5.0	430- 490
10	710	10	730- 780
12.5	1150	12.5	1120-1370
16	2000	15	1475-1810
12 -14	2200	17 -19	2400-2800

A variation of 1.5 amperes from these rates is allowable. The output may be varied somewhat by adjusting the brush pressure on the commutator. The pressure should be 1 to 1¼ pounds. If operated freely as a motor, the Model G generator should take 2 amperes, armature revolving at 200 R. P. M. Shunt field should take .9 ampere. The Model GA generator should take 1.8 amperes, armature revolving at 200 R. P. M. Shunt field should take 1 ampere. Much higher speed indicates damp, grounded or short circuited field coils. Greater current or lower speed indicates tight bearings or damp, grounded or short circuited armature windings or commutator. Periodic swinging of ammeter needle indicates grounded or short circuited armature coils or commutator bars.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.





ALLEN

Model 37 (1916) And Classic Model (1917)

Westinghouse Starting and Lighting System

Westinghouse Ignition

Battery.—Battery is 6 volt, 85 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate .006 inch to .008 inch. Should they become burned or pitted, resurface them with a fine, flat jeweler's file. The springs should exert just enough pressure on the distributor brushes to force them ¼ inch past the top of the holder when the distributor cap is removed, but should retain them firmly so that they do not tend to fall out. Brushes must move freely in their holders. Be sure that both brushes are in place when replacing the rotor. (There is a brush on both the top and bottom side of the rotor.)

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 2, 4, 3.

Spark Plug Gaps.—Spark plug gaps should be about .023 inch.

Ballast Resistor.—There is a ballast resistor in the ignition switch. A fuse must not be permanently substituted for this resistor. In case it is necessary to operate the car with the ballast defective, a 5 ampere fuse may be used temporarily, but the ballast must be replaced as soon as possible, as continued operation without it will result in serious burning of the timer contacts.

Oiling.—Put 2 or 3 drops of light machine oil in the oiler at the side of breaker assembly every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

Starter.—Starter is connected to the engine through a Bendix drive. It should run at 1500 R. P. M., when delivering 2 pound-feet torque. It should develop 11.5 pound-feet lock torque, taking about 400 amperes.

Oiling.—Refill the oil cups under the starter bearings with light machine oil every three months.

Generator.—Generator voltage regulation is by third brush system. Generator should deliver 16 amperes at 7.5 volts. Higher voltage indicates damp, grounded or short circuited field coils, dirty commutator, defective brushes, defective connection in field circuits, or defective armature. Relay contacts should separate .013 inch to .017 inch. Air gap between relay armature (moving member) and coil core should be .027 inch to .030 inch. Adjust regulator by bending the brass prongs. Clean relay contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface them with a piece of well worn No. 00 sand paper, drawing a piece of unglazed paper between them, to remove all grit, and adjust before again putting into service. Charging current should be 1 to 1.5 amperes at closing and .5 to 1.5 amperes at opening of relay contacts.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 15 cp. Dimmer lamps are 6-8 volts, 5 cp. Dash and tail lamps are each 6-8 volt, 2 cp. On the Classic Model head lamps ore 6-8 volt, 17 cp. Some of the Model 37 cars used a dimmer resistance instead of dimmer bulbs.

FUSES:—Fuses are 15 ampere.

ALLEN

MODEL 43 (1920)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—U, S. L., Type HDN-311X, 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .020 inch. When the condition of the contacts affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 2, 4, 3.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model MG-1015. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 96 R.P.M., taking 175 amperes.

Starter Data

Torque	R.P.M.	Amperes
2 lb. ft.	1280	135
4 lb. ft.	900	210
6 lb. ft.	600	275
8 lb. ft.	400	335
10 lb. ft.	180	390
13 lb. ft.	Lock	500

OILING.—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month.

GENERATOR.—Model GJ-1024. Generator current regulation is by third brush system. Maximum current output is 12-16 amperes, reached at 1700 R.P.M. of the armature or 22 miles per hour.

Generator Data

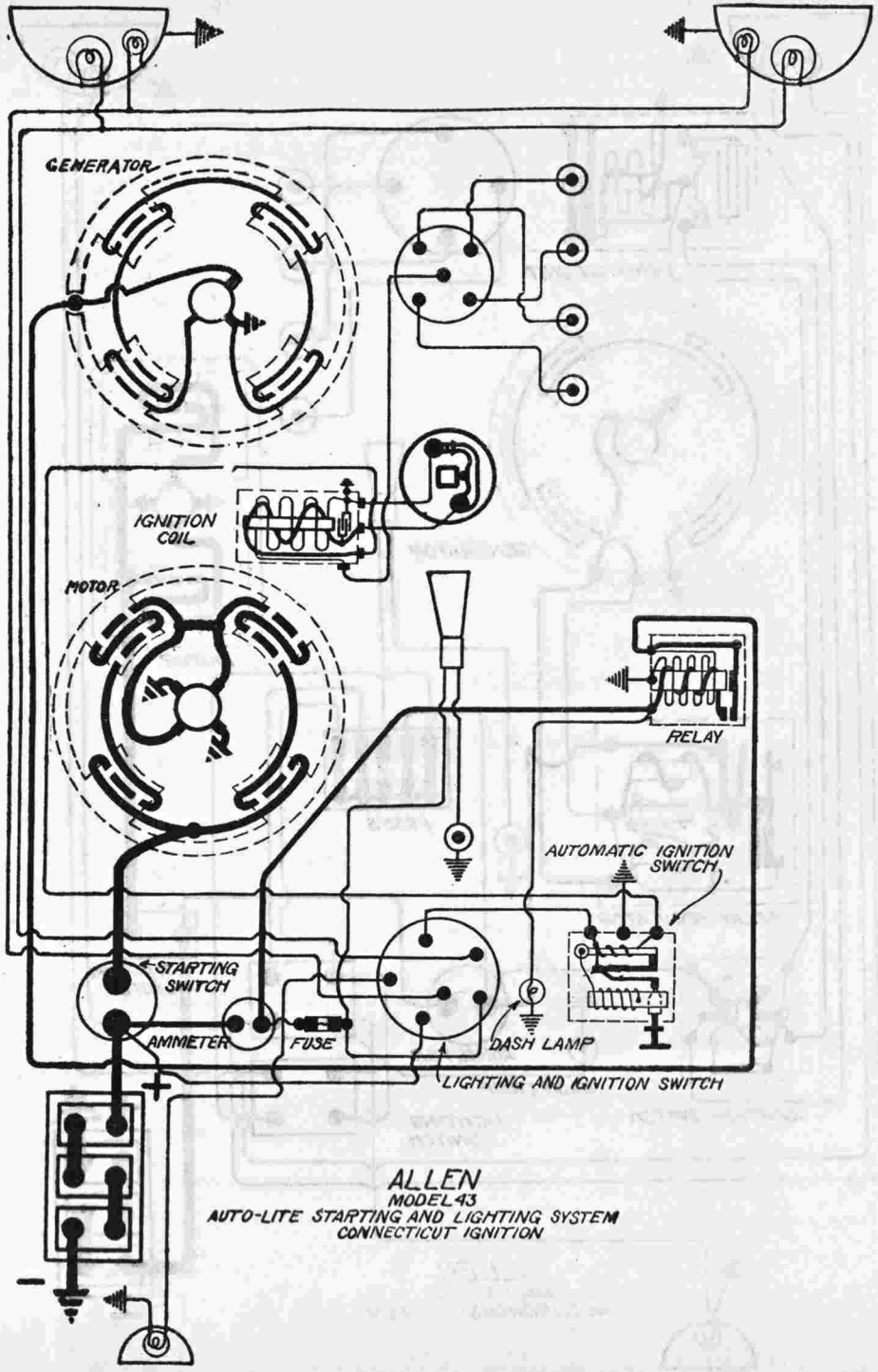
Cold Test Amperes	Cold Test R.P.M.	Hot Test Amperes	Hot Test R.P.M.
0	500	0	460
8	750	6	840
12	960	9	1050
16	1400	12	1360
16.5	1700	12.7	1700
12	3400	10	3400

Above readings are obtained with generator charging a battery of 1300 solution.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 9 miles per hour or 580 R.P.M. of armature and opens at 7 miles per hour or 360 R.P.M. of armature. Relay contacts separate .030 to .045 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are 6-8 volt, 2 cp.



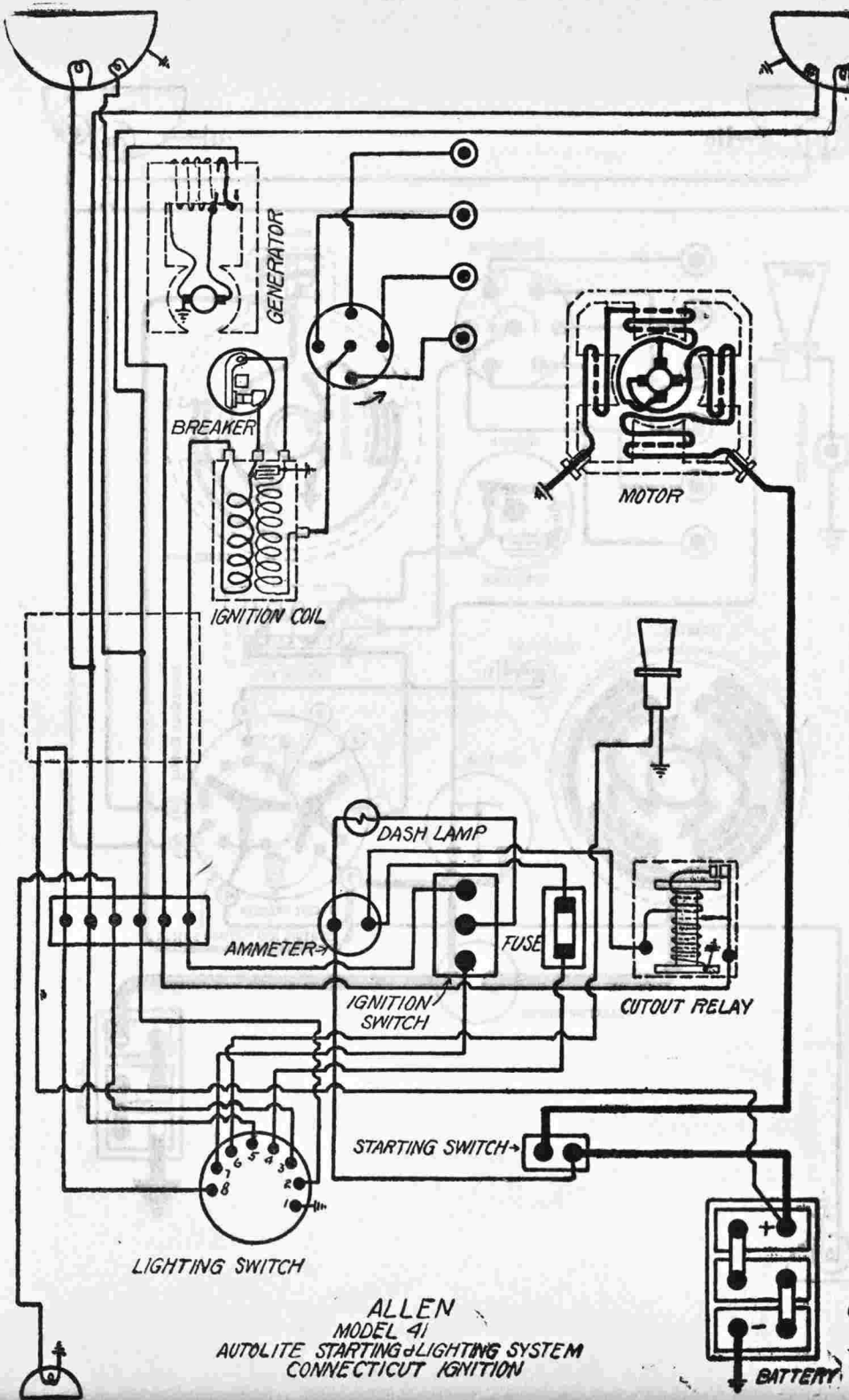
ALLEN
MODEL 43
AUTO-LITE STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

ALLEN

Series 41 (1918-19)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

Connecticut Ignition



Battery.—Battery is 6 volt, 85 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts should separate .018 inch to .020 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Breaker contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 2, 4, 3.

Spark Plug Gaps.— Spark plug gaps should be .027 inch to .030 inch.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than a 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Starter.—Starter is connected to engine through a Bendix drive. When running free, armature should turn at about 4200 R. P. M., taking 50-55 amperes. Much greater speed indicates grounded, short circuited or damp field windings. Greater current or vibrating of the ammeter needle indicates grounded or short circuited armature coils or commutator. Damp armature windings will cause high current or slow speed.

STARTER DATA, MODEL MC

Torque	R. P. M.	Amperes
1 lb. ft	2650	100
2 lb. ft	1900	145-150
3 lb. ft	1600	185-190
4 lb. ft	1400	225
5 lb. ft	1250	250-255
6 lb. ft	1000	290-300

Starter develops 16 pound-feet lock torque, taking 450-460 amperes at 3.8 to 4.2 volts.

Oiling.—Clean and repack starter bearings with soft cup grease every six months. Put in one or two drops of oil every month to keep grease soft.

Generator.—Generator current regulation is by either third brush or reverse series field. Relay should close at 8 to 10 and open at 6 to 8 miles per hour. Should it ever be necessary to to operate the generator with the battery disconnected, the terminals must be short circuited to prevent the burning out of the windings or lamps.

GENERATOR DATA

Model GH (Third Brush Regulation		Reverse Series Field Regulation	
Amperes	R. P. M.	Amperes.	R. P. M.
5	760- 820	5	495- 575
10	1020-1100	10	850-1035
12.5	1200-1300	12.5	1120-1770
15	1460-1675	15	1475-1810
15-16	1950-2250	17-19	2400-2800

Although generator output may be varied by adjustment of the third brush, the above rates will give satisfaction under average conditions. If operated freely as a motor, armature should revolve at 450 R. P. M., taking 2.7 amperes on the GH type and at 200 R. P. M, taking 1.8 amperes on the GA type. On GA generators, a variation of 1.5 amperes from these rates given is allowable. Output may be varied by adjusting brush pressure. Pressure should be 1 to 1¼ pounds. Much higher speed indicates damp, grounded or short circuited field coils. Greater current or lower speed indicates tight bearings or damp, grounded or short circuited armature windings or commutator. Periodic swinging of ammeter needle indicates grounded or short circuited armature coils or commutator bars. Bearings must be in proper condition when testing generator. Shunt field should take 1 ampere on the type GA generators and 1.7 amperes on the type GH generators.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 15 cp. Dimmer lamps are 6-8 volts, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp. S.C.

AMBASSADOR

MODEL D1 (1925-26)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Vesta, Type R6-DJ-13Y Form 235. 6 volt. Starting capacity is 105 amperes for 20 minutes. Lighting capacity is 5 amperes for 12 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model 2182. Distributor Model 5278. Distributor is mounted on the generator. Breaker contacts separate .015-.0225 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone or with a fine, flat jeweler's file. The tension of the breaker arm spring should be 13-16 ounces.

Oiling.—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

Timing.—Breaker contacts begin to separate when piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position. To set timing, retard spark lever and crank engine until piston No. 1 reaches this position. Then loosen the adjustment nut on the side of the distributor housing and rotate the distributor until breaker contacts begin to separate. Then tighten the nut. Make certain that the rotor is under the segment connected to the spark plug in cylinder No. 1.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER.—Model 286 and 313. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 2¼-2½ pounds each. Starter switch is Model 1953.

Model 286 Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	4	60
8 "	Lock	3	450

Model 313 Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	4	60
11 "	Lock	3	450

Oiling.—Starter bearings are self oiling. They require no attention.

GENERATOR.—Model 301 and 312. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the generator output, loosen the generator cover band and shift the third brush mounting plate by means of the handle on the plate. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. The brush spring tension should be 1¼-1¾ pounds each.

Model 301 and 312 Generator Data (Hot)

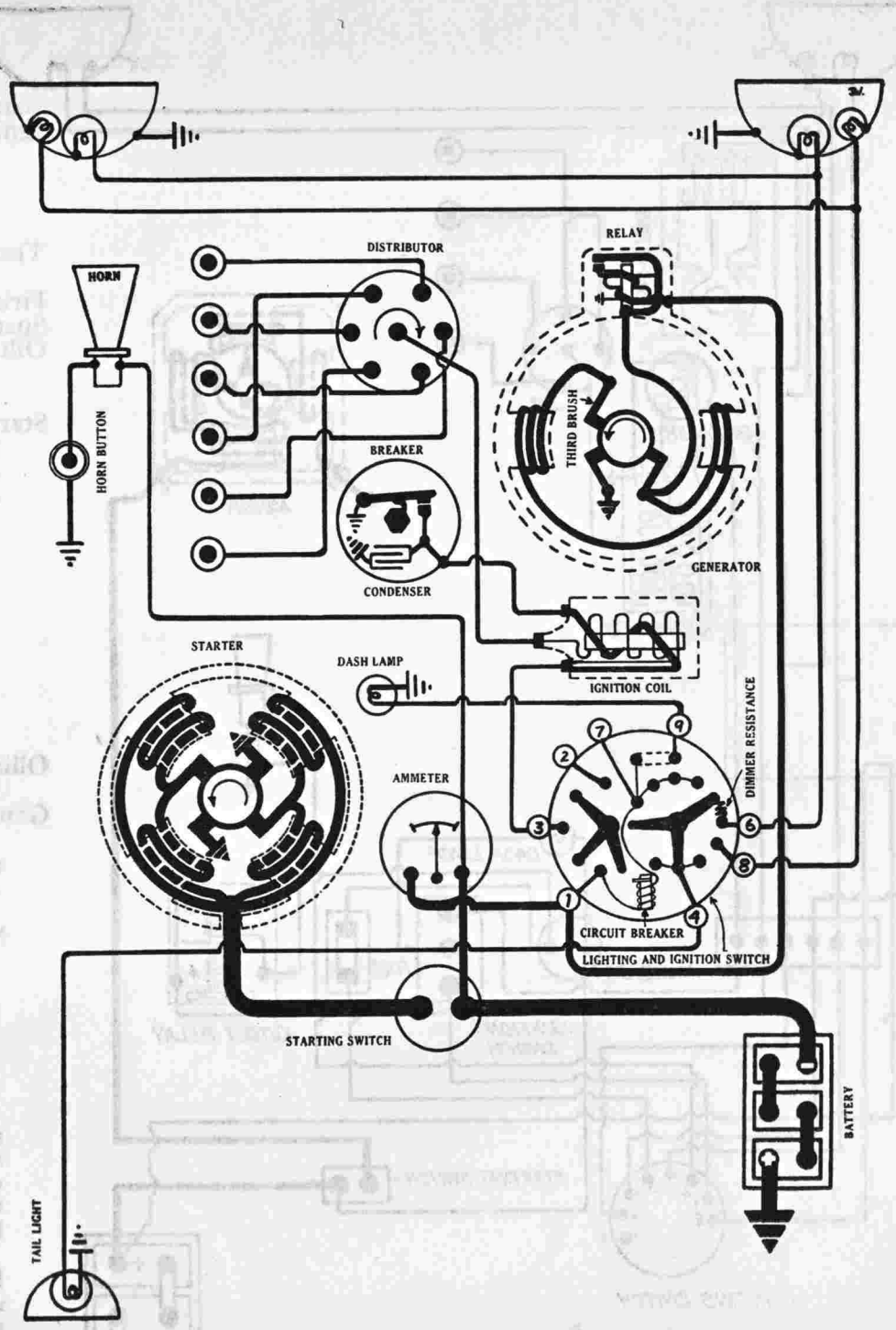
Amperes	R.P.M.
5	800
15 min.	1600

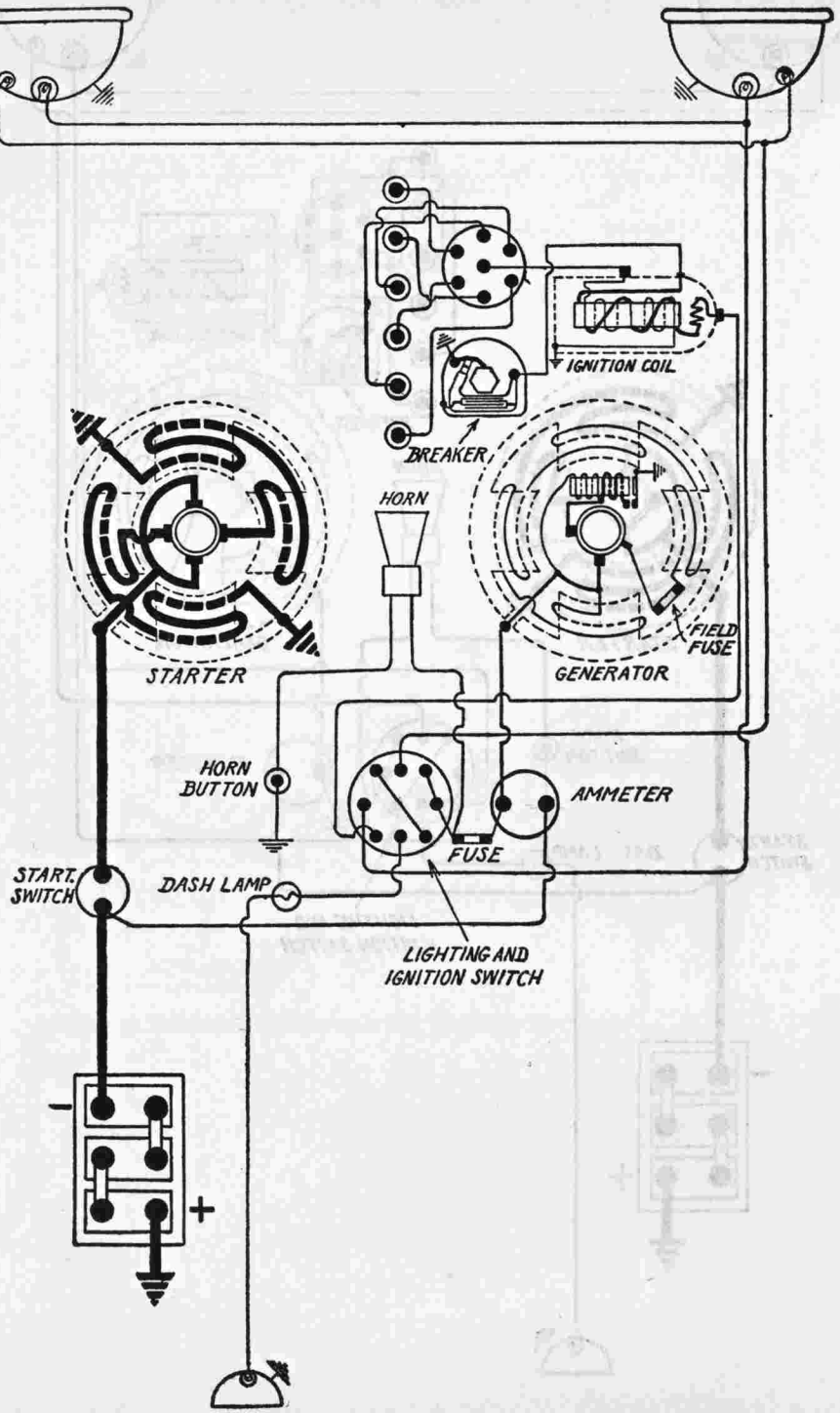
Oiling.—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY.—Relay is mounted on top of the generator. Relay contacts close when the voltage of the generator reaches 6.75-7.5 volts and open with a discharge current of 1-3 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .015-.020 inch, contacts closed.

LIGHTING.—Switch Model 1276. Head and stop lamps are 6-8 volt, 21 cp. S. C. Side lamps are 6-8 volt, 4 cp. S. C. Tail and dash lamps are each 6-8 volt, 2 cp. S. C.

CIRCUIT BREAKER.—A vibrating circuit breaker is mounted on the back of the switch. A current of 25-30 amperes causes this device to vibrate. While operating the current is 10-15 amperes.





American Six

Model A (1917-18)

Westinghouse Starting and Lighting System
Atwater-Kent Ignition

Battery.—Battery is 6 volt, 110 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate .010 inch to .012 inch. They are made of tungsten. They will operate properly even though quite irregular. Should they be badly burned or corroded, affecting the ignition, resurface them by drawing across a piece of fine emery cloth laid on a very flat surface, as on the bed of a drill press, finishing on a hard oil stone.

Timing.—Contacts should begin to separate when the piston entering power stroke is just over top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be about .023 inch.

Oiling.—Put several drops of light engine oil in the oil hole beside the shaft every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Starter.—Starter is connected to the engine through a Bendix drive. It should run at 1250 R. P. M., when delivering 2.5 pound-feet torque. It should develop 16 pound-feet lock torque, taking 525 amperes.

Oiling.—Put 4 or 5 drops of light engine oil in each of the starter oilers every month.

Generator.—Generator current regulation is by third brush system. The normal output should be 15-17 amperes at 7.5 volts, reached at 1100 to 1500 R. P. M. If operated freely as a motor, generator should take 3.5 to 5 amperes, at 6 volts. Greater current indicates damp, grounded or short circuited armature windings or commutator bars or tight bearings. Shunt field should take 1.5 to 2.4 amperes. Relay contacts should separate .013 inch to .018 inch. The air gap between the relay armature (moving member) and coil core should be .027 inch to .031 inch. Adjust relay by bending brass prongs. Charging current should be 1 to 5 amperes at closing and the discharge current .75 to 1.25 amperes at opening of relay contacts. Clean contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface them with a piece of well worn No. 00 sand paper, drawing a piece of unglazed paper between them, to remove all grit, before again putting into service.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 15 cp. Dimmer lamps are 6-8 volts, 4 cp. Dash and tail lamps are in series. They are each 3-4 volts, 2 cp.

Fuse.—Fuse is 20 ampere.

Model Numbers.—Generator is Frame No. 760. Starter is Frame No. 711.

AMERICAN

MODEL B (1919-20)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM

ATWATER KENT IGNITION

BATTERY.—Battery is 6 volt, 110 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type CC. Breaker contacts separate .006 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone. Ignition coil takes 3¼ to 4 amperes, engine idle, breaker contacts and ignition switch closed.

OILING.—Every two weeks remove the distributer cap and put several drops of light engine oil in the oil hole exposed. Put a small amount of vaseline on the cam, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Frame No. 100. Starter is connected to the engine through a Bendix drive. Torque is 1¾ pound-feet at 1600 R. P. M. Lock torque is 12 pound-feet, current 475 amperes. Starter cranks the engine at 125 R.P.M., taking 250 amperes.

OILING.—Put 5 or 6 drops of light engine oil in each of starter bearing oilers every month.

GENERATOR:—Frame 760. Generator current regulation is by third brush shunt field. To adjust charging rate, loosen commutator cover band and loosen nut on endplate holding third brush. Then shift third brush in direction of rotation to increase the charging rate.

Generator Data

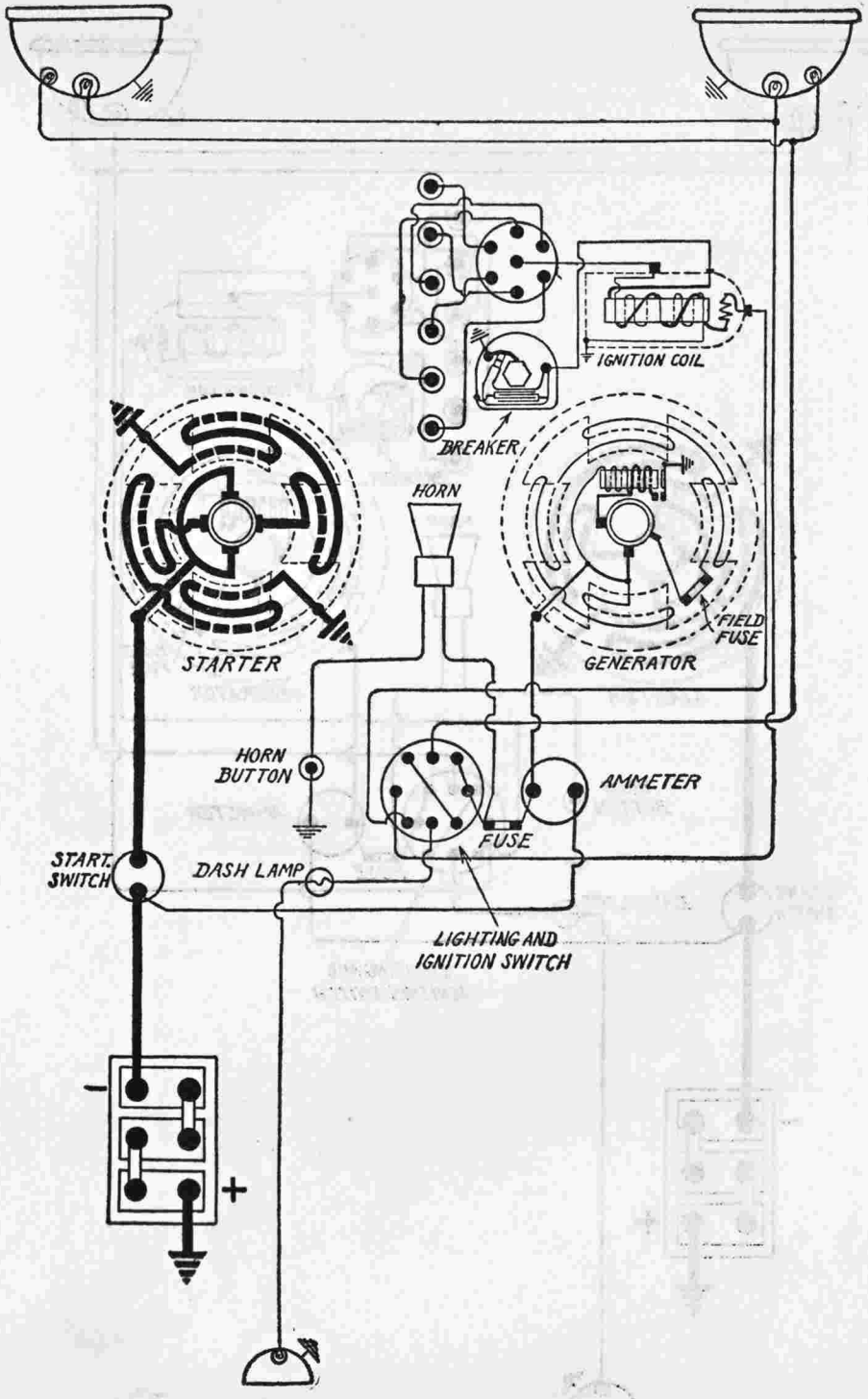
Amperes	Volts	R.P.M.
0	6.5	500
8	6.5	750
14-17	7.5	1100-1500
7-11	6.5-7.5	2500

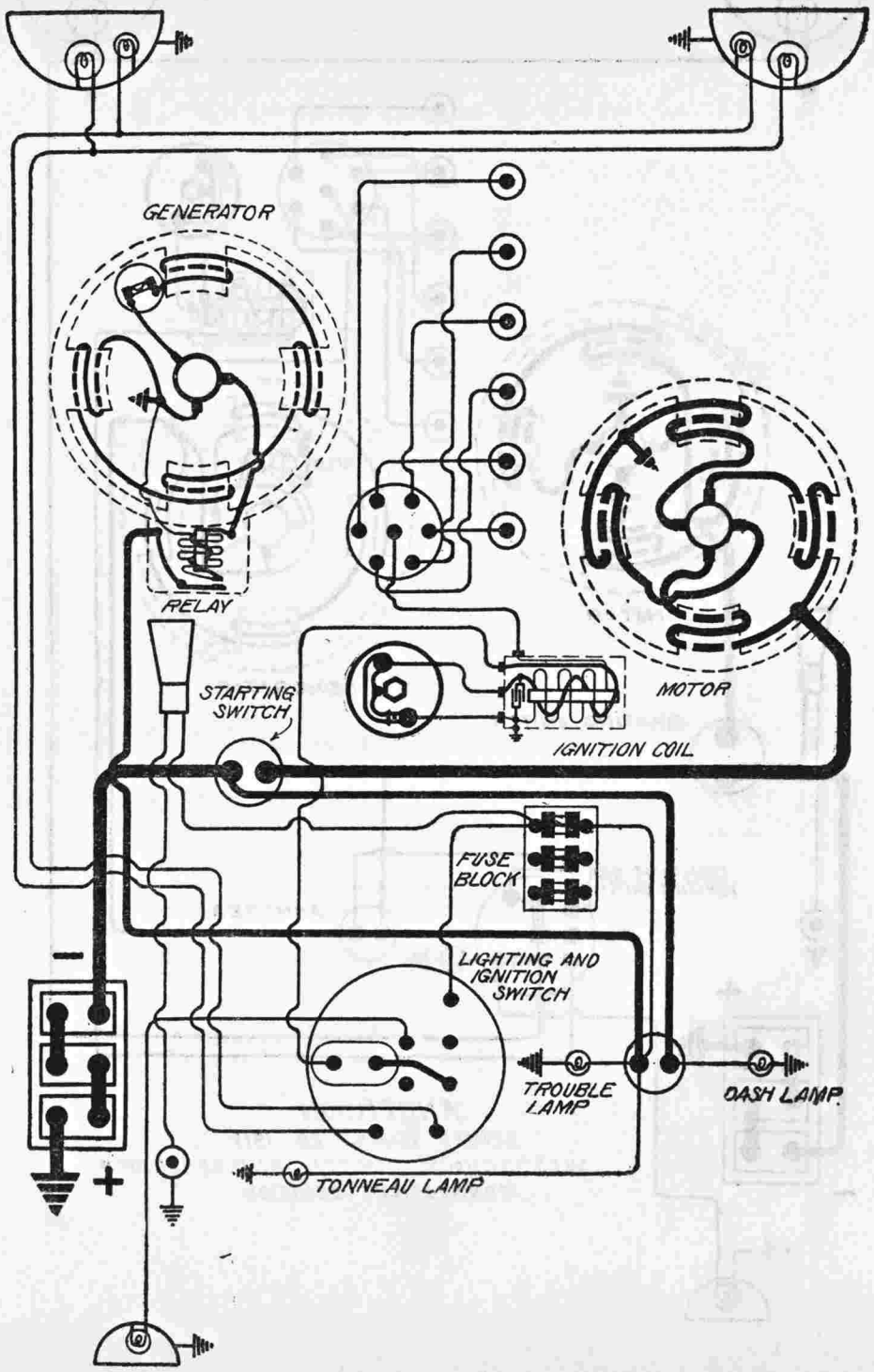
OILING.—Put 5 or 6 drops of light engine oil in each of generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks the oiling must be done every 500 miles.

RELAY.—Relay closes at 7-8 miles per hour or 500 R.P.M. of armature, and opens at 5-6 miles per hour or 450 R.P.M. of armature. Relay contacts separate .064 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are each 3-4 volt, 2 cp.

FUSE.—Main fuse is 15 ampere. Field fuse is 5 ampere.





AMERICAN

MODEL C-6 (1920-21)

GRAY & DAVIS GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATT ERY.—Willard, 6 volt, 90 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .018 to .024 inch. They are made of tungsten. When the condition of the contacts affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts begn to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

SPARK PLUGS.—Diameter, 7/8 inch. Spark gaps are .025 to .030 inch.

STARTER:—Model No. 515, 521. Rotation is counter-clockwise, looking at commutator end. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 150-225 R.P.M., taking 150 amperes. Lock torque is 15 pound-feet at 3.5 volts.

Starter Data

Torque	R.P.M.	Amperes
0 lb. ft.	4500	45
1 lb. ft.	2100	100
2 lb. ft.	1600	135
6 lb. ft.	900	260
8 lb. ft.	650	320

Pressure of the brushes on the commutator is 2.5 to 3.5 pounds.

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR:—Model No. 605, 619, 621. Rotation is counter-clockwise, looking at commutator end. Generator current regulation is by the third brush system. Maximum charging rate is 15 amperes, reached at 1400 R.P.M. of the armature, or 25 miles per hour.

Generator Data

Amperes	R.P.M.
0	460
4	580
8	720
10	820
12	940
15	1400
12	2600

Charging rate is varied by adjustment of the third brush setting. Adjustment is made by turning the pinion screw, located between the fuse and relay at the front end of the generator. Turn the adjusting screw to the left (facing commutator end of the generator) to increase the charging rate and to the right to decrease the charging rate. Shunt field winding takes 2.6 amperes at 6 volts. Pressure of brushes on the commutator. Pressure of brushes on the commutator is 1¼ to 2¼ pounds.

OILING.—Put 5 or 6 drops of light engine oil in the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 460-500 R.P.M. of the armature or 10 miles per hour and opens at 420-460 R.P.M. of the armature or 8 miles per hour. Relay contacts separate .015 to .018 inch. Air gap between relay armature and coil core is .030 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Fuses are 20 amperes.

ANDERSON

SERIES 18 AND 20 (1918-19-20-21)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY.— Willard, Type SJWN-4, 6 volt, 113 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model No. 284B. Distributor Model No. 366C. Breaker contacts separate .022 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is ½ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER:—Frame 710 or 711. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes
0 lb. ft.	4000	40
4 lb. ft.	1400	120
8 lb. ft.	700	280
14 lb. ft.	Lock	450

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Frame 760. Generator current regulation is by third brush system. Maximum current output is 15-17 amperes, reached at 1250 R.P.M. of the armature, or 20 miles per hour.

Generator Data

Cold Test Amperes	Cold Test R.P.M.	Hot Test Amperes	Hot Test R.P.M.
0	450	0	500
8	675	6	725
12	840	9	850
15-17	1250	11-13	1250
10	2000	7- 8	2000

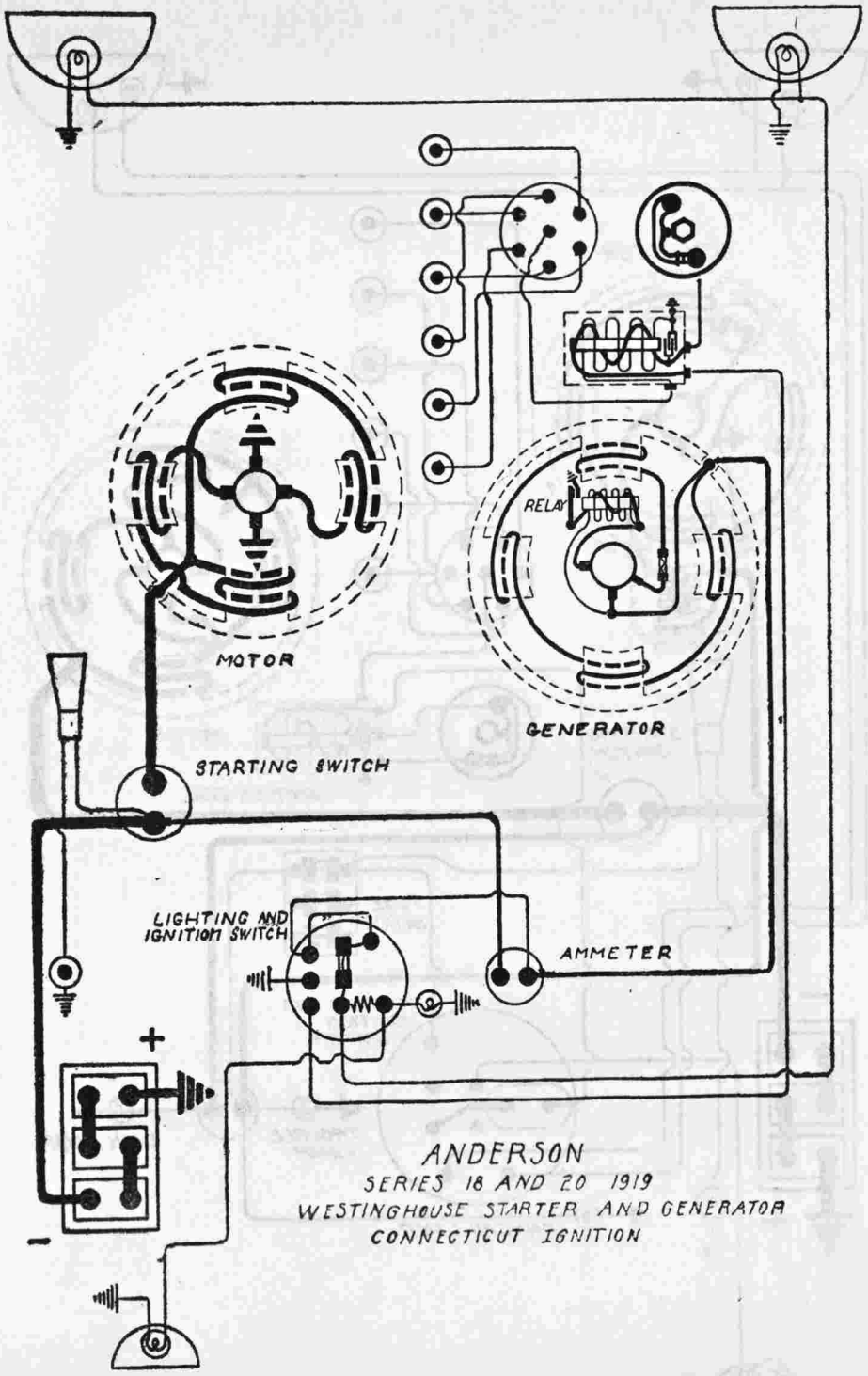
The cold test readings are obtained with a generator temperature under 95°F. The hot test readings are obtained after the generator has been operated one hour at 1800 R.P.M., charging a half-charged battery. The shunt field current is 2.8 to 3.25 amperes when 6 volts pressure is applied. When generator is operating freely as a motor, the current is 3.5 to 5 amperes at 6 to 6.6 volts.

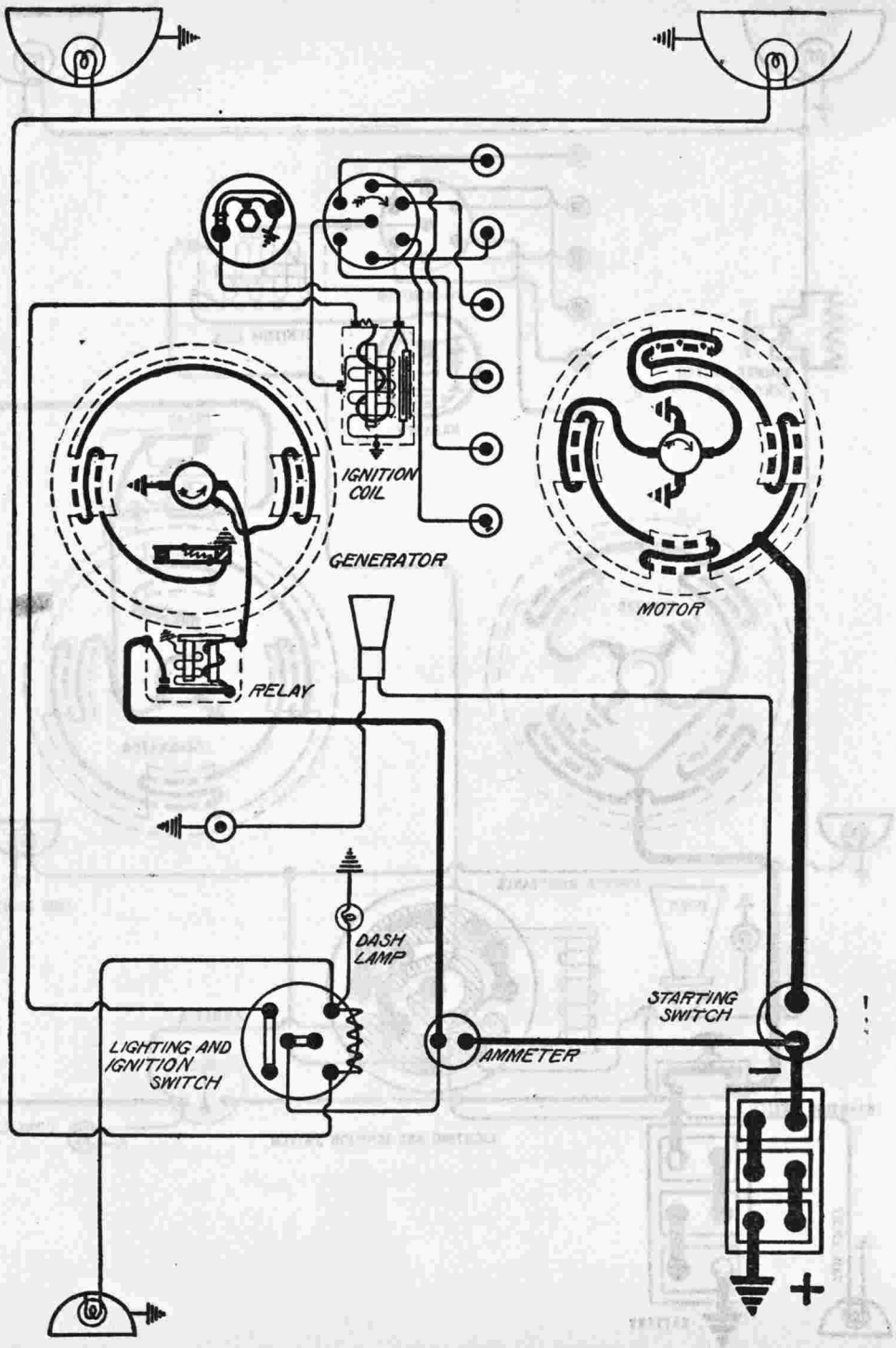
OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in generator frame. Relay closes at 500-550 R.P.M. of the generator armature or 8-9 miles per hour and opens at 450-500 R.P.M. of the armature or 7-8 miles per hour. Charging current is 1-2 amperes at closing, and the discharge current 0-2 amperes at the opening of relay contacts. Air gap between relay armature (moving member) and coil core is .031 inch, contacts separated. Contacts separate .013 to .018 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Fuses are 5 ampere.





ANDERSON

SERIES 30 (1920)
SERIES 40 (1921-22) 50 (1923-24-25)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY:—**1920-21 Willard, Type SJW-N4,** 6 volt, 111 ampere hour. **1922, Willard Type SJRN-4,** 6 volt, 111 ampere hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .022 inch. When the condition of the contacts affects the ignition, resurface with a fine flat, jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is ½ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER.—Model No. 705-A. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 250 R.P.M.

Starter Data

Torque	R.P.M.	Amperes	Volts
0 lb. ft.	10000	65	5.0
1 lb. ft.	3000	145	5.4
4 lb. ft.	1000	310	4.5
5 lb. ft.	800	350	4.4
12 lb. ft.	Lock	600	3.0

Above tests are made without the reduction gears.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Model No. 234-E. Generator current regulation is by the third brush system. A thermostat, located in the brush rigging of the generator, cuts a resistance into the field circuit at a temperature of 175°F., reducing the charging rate 6 amperes. The thermostat is intended to change the charging rate as the demands of seasons or car operation requires. Never touch the thermostat points. Maximum current output is reached at 2000 R.P.M. of the armature or 28 miles per hour.

Generator Data

Amperes	R.P.M.	Volts
0	525	6.4
7	780	7.1-7.2
19.5-20.5	1680	8.6
14	1100	7.8
19.0-20.0	2000	8.6
13.0-15.0	3000	8.0

Field winding takes 5 amperes at 6.4 volts. Pressure of main brushes on commutator is 17-20 ounces. Pressure of the third brush is 13-17 ounces. Position of third brush is adjusted by turning a screw exposed in the commutator end plate. Move the third brush in the direction of armature rotation to increase the charging rate, and in the opposite direction to decrease the charging rate. Reseat the brush after adjusting position.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 525-575 R.P.M. of the armature and opens at 7-9 miles per hour or 475-525 R.P.M. of the armature. Relay contacts separate .012-.015 inch. Air gap between relay armature and coil core is .012-.015 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt 2 cp. On 1920-21 cars, head lamps are 6-8 volt 20 cp.

FUSES.—Fuses are 5 ampere.

ANDERSON

MODEL 41 (1923-24-25)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WESTINGHOUSE IGNITION

BATTERY.—Willard, Type SJRN-4, 6 volts, 111 ampere-hours capacity. The positive (+) terminal is grounded.

IGNITION.—Type SC. Coil Model No. 288,761. Distributor Model No. 303,018. Breaker contacts separate .011 to .015 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium oilstone.

Oiling.—Place 4 or 5 drops of light engine oil into the oiler on the outside of the breaker box every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

Timng.—The breaker contacts begin to separate when the top dead center mark on the flywheel is one-half of an inch past indicator. The spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plugs.—The spark plug gaps are .025-.030 inch.

STARTER.—Frame No. 711. Model No. 355,708. The direction of rotation is counter-clockwise, looking at the commutator end. The starter cranks the engine at 140 R.P.M., taking 145 amperes. Lock torque is 17 pound-feet, current being 525 amperes, 4.0 volts.

Starter Test Data

Torque	R.P.M.	Amperes	Volts
2.5 lb. ft.	1250	150	5.5
17.0 lb. ft.	0	525	4.0

Brush tension is 2.5 to 3.0 pounds.

Oiling.—Fill the oil cups with light engine oil every month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 mies.

GENERATOR:—Frame No. 35-ATI, Style No. 355,705. The direction of rotation is counter-clockwise, looking at the commutattor end. The third brush system is employed for current regulation. The maximum charging rate is 16 amperes, reached at 1450 R.P.M. of armature or 28 M.P.H., car speed in high gear.

Generator Test Data

	Hot Test			Cold Test	
Amperes	R.P.M.	Volts	Amperes	R.P.M.	Volts
0	625	6.5	0	475	6.5
7	950	6.6	8	750	8.0
11	1450	7.7	15-16	1450	8.0

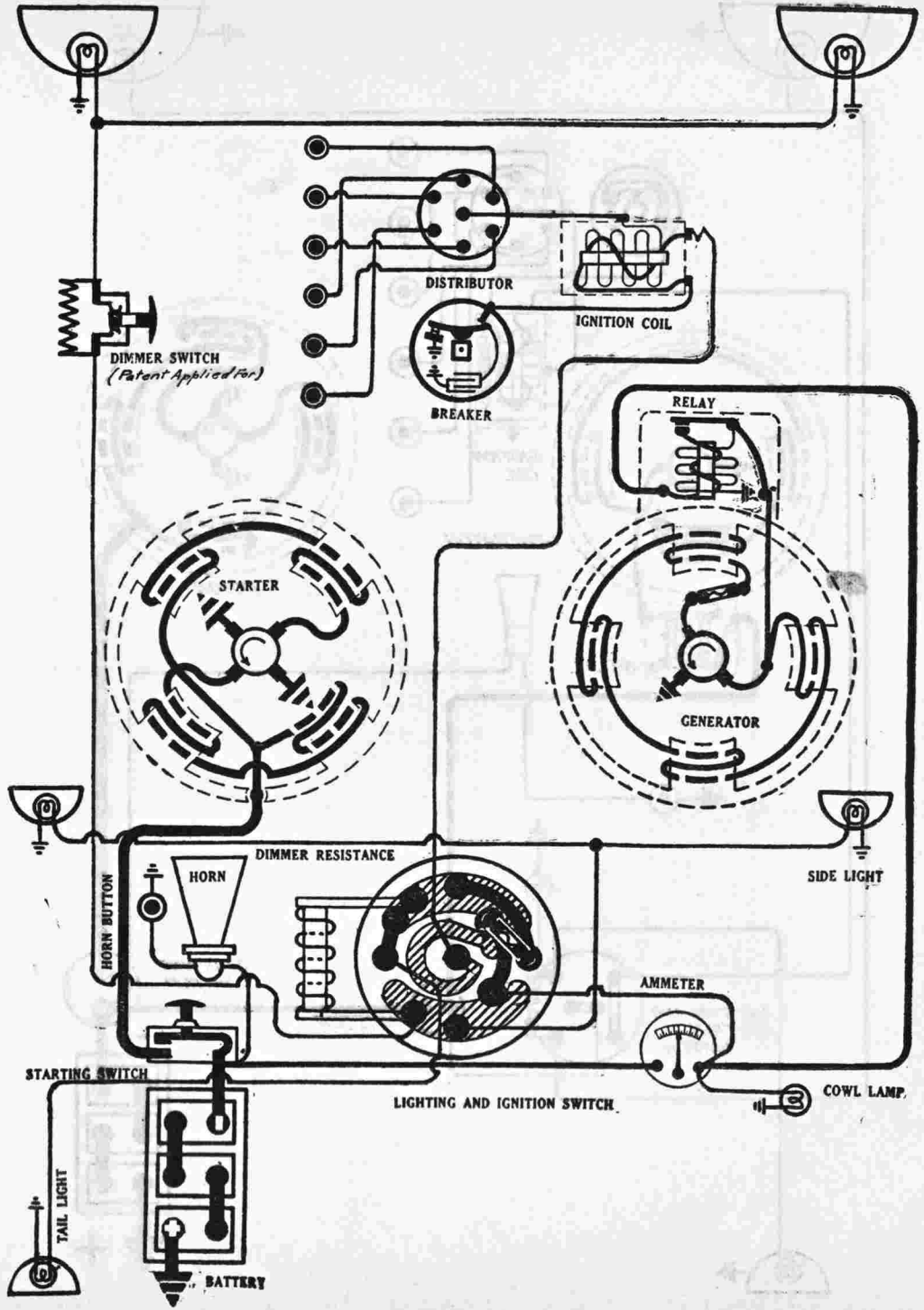
The brush tension is 20-24 ounces. To adjust generator output, loosen the slotted hexagonal bolt on the endplate and shift the third brush in a counter-clockwise direction to increase the charging rate.

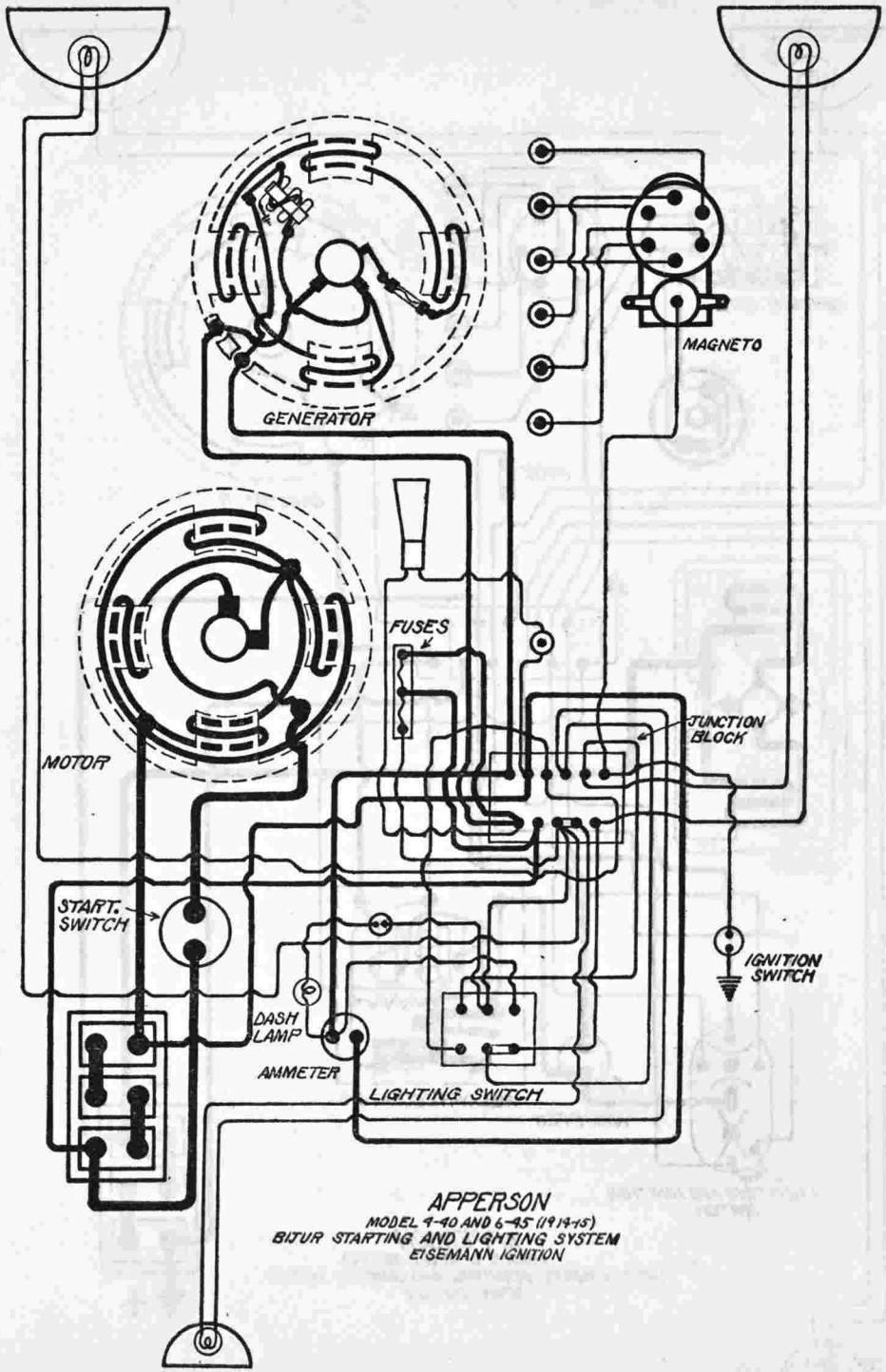
Oiling.—Place 4 or 5 drops of light engine oil in the generator oil cups every two weeks. If the car is driven more than 500 miles in tow weeks, this care must be given every 500 miles.

RELAY.—Model No. 302,210. Relay closes at 7.85 M.P.H., or 475 R.P.M. of armature, and opens at 6.7 M.P.H., or 405 R.P.M. The relay contacts separate .035 to .050 inch. The air gap between armature and coil core is .014 to 017 inch, contacts closed.

LAMPS.—Head lamps are 6-8 volts, 21 cp. A dimmer resistance is used. Dash, tail and dome lamps are 6-8 volts, 2 cp.

FUSES.—Generator fuse is 5 amperes. Lighting fuse is 15 amperes.





Apperson

Models 4-40 and 6-45 (1914-15)
Bijur Starting and Lighting System.
Eisemann Magneto Ignition.

Battery.—Battery is 6 volt, 85 ampere-hour. The two wire system is used.

Ignition.—Magneto breaker contacts should open .014 inch to .018 inch.

Care.—Clean them with gasoline frequently Should the contacts become badly burned or pitted, they should be resurfaced with a very fine, flat jeweler's file or a strip of worn No. 00 sand paper.

Timing.—Contacts should be just beginning to separate when the top dead center mark on the flywheel is ½ inch to 1 inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

Spark Plug Gaps.—The proper spark plug gap is .025 inch to .030 inch.

Oiling.—Put 3 or 4 drops of light machine oil in each of the magneto oilers every two weeks. If the machine is run more than 500 miles in two weeks, the oiling must be done every 500 miles.

Firing Order.—The firing order of the 1914-15 four cylinder cars is 1, 3, 4, 2 The firing order of the six cylinder cars is 1, 5, 3, 6, 2, 4.

Starter.—The starter is connected to the engine by a Bendix drive or what is known as the non-automatic mechanical pinion shift. In the non-automatic mechanical pinion shift type the pinion is carried on a square shaft. When the starting handle is pulled out, the pinion is moved along the square shaft, and the battery is connected to the motor in series with a resistance, causing it to turn slowly, to facilitate the meshing of the gears. After the pinion is meshed with the flywheel gear, the resistance is cut out of the circuit by the moving contact, thus applying full battery pressure to the motor, cranking the engine. When the handle is released a spring demeshes the gears.

Oiling—Every two weeks put 2 or 3 drops of light engine oil in each of the motor oilers and at the same time put a little thin grease on the square shaft. Do not oil the Bendix drive, but clean it with gasoline if the pinion does not work freely.

Generator.—Generator voltage regulation is by third brush system. Relay should close at 10-12 miles per hour.

Output.—The maximum generator output of 14-15 amperes is reached at 17-20 miles per hour. This rate gradually reduces at higher speeds. There is a 20 ampere fuse in the small aluminum cap mounted on the generator.

Fuse.—This fuse is in the shunt field circuit, and will burn out, opening the circuit and rendering the generator inoperative if it is run with the battery disconnected or with a certain amount of resistance in the charging circuit due to loose connections, etc. This fuse should be removed if it is necessary to run the generator with the battery disconnected.

Oiling.—Every two weeks put three or four drops of light engine oil in each of the generator oilers. If the machine is run more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—On the 1914 cars, head lamps are 6-8 volt, 15 cp. Dash lamp is 6-8 volt, 2 cp. Tonneau lamp (when supplied) is 7 volts, 2-4cp. Tail lamp is 6-8 volt, 2 cp. Side lamp is 6-8 volts, 4 cp. On the 1915 cars, head lamps are 6-8 volts, 18-20 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2cp.

APPERSON

MODELS 6-48 AND 6-58 (1915-16-17)
WESTINGHOUSE STARTING AND LIGHTING SYSTEM
REMY IGNITION

Battery.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate .020 inch to .025 inch. Should they become badly burned or pitted, resurface them with a fine, flat jeweler's file or a small strip of worn No. 00 sand paper.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order of the six cylinder car is 1, 5, 3, 6, 2, 4. The firing order of the eight cylinder car is 1, 6, 3, 5, 4, 7, 2, 8, number one cylinder being the one nearest the radiator on the left hand block and number five cylinder being the one nearest the radiator on the right hand block.

Spark Plug Gaps.—Spark plug gaps should be .028 inch to .030 inch.

Oiling.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions should be given every 500 miles.

The brass base of the ignition coil must be well grounded as it acts as one terminal of the primary ignition circuit.

Starter.—Starter is connected to the engine through a Bendix drive. It should crank the engine about 125 R. P. M. It should deliver 2.5 pound-feet torque when running at 1200 R. P. M. It should deliver 12.5 pound-feet lock torque, taking about 400 amperes.

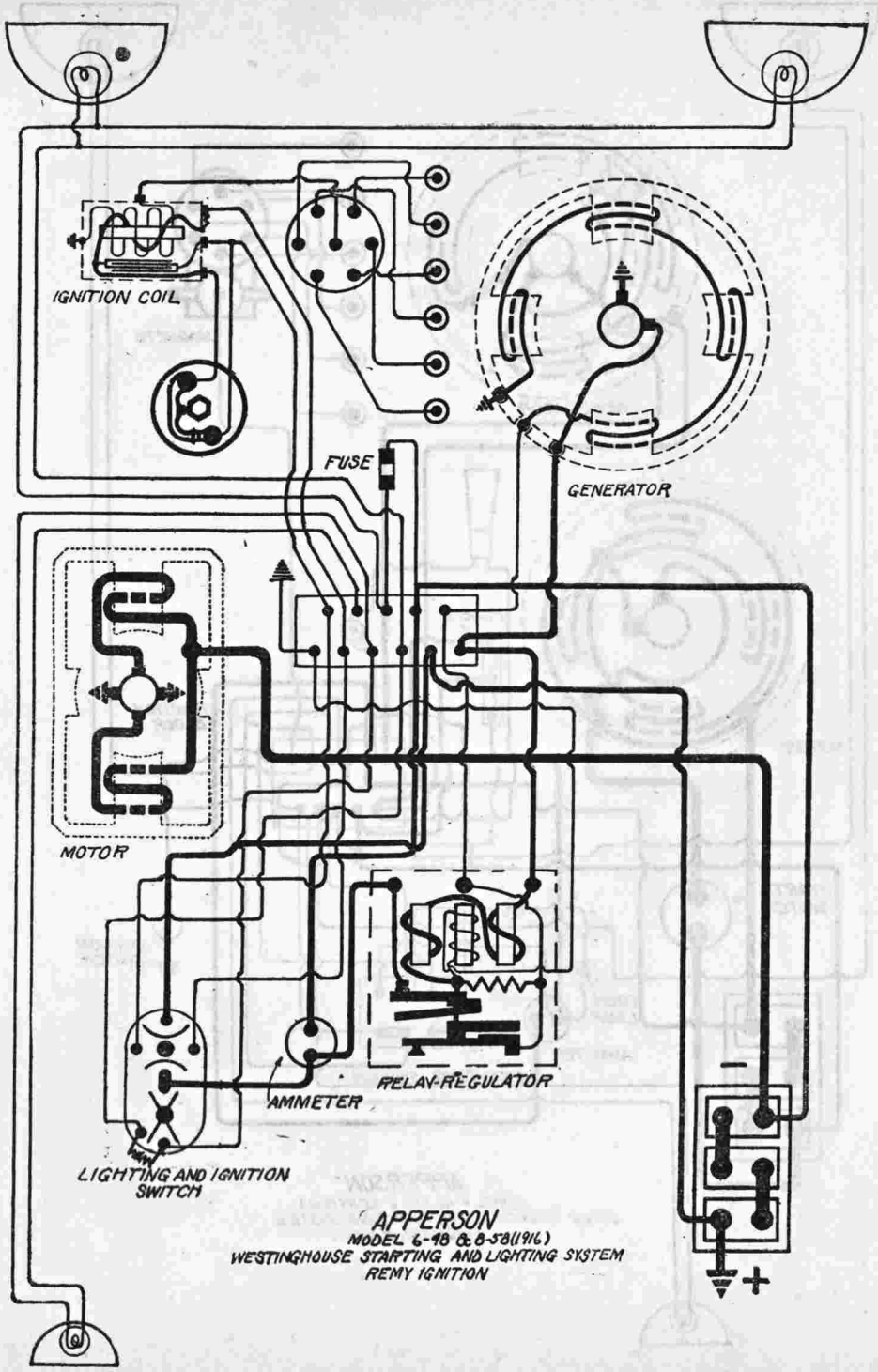
Oiling.—Once every month put several drops of light engine oil in each of the starter oilers.

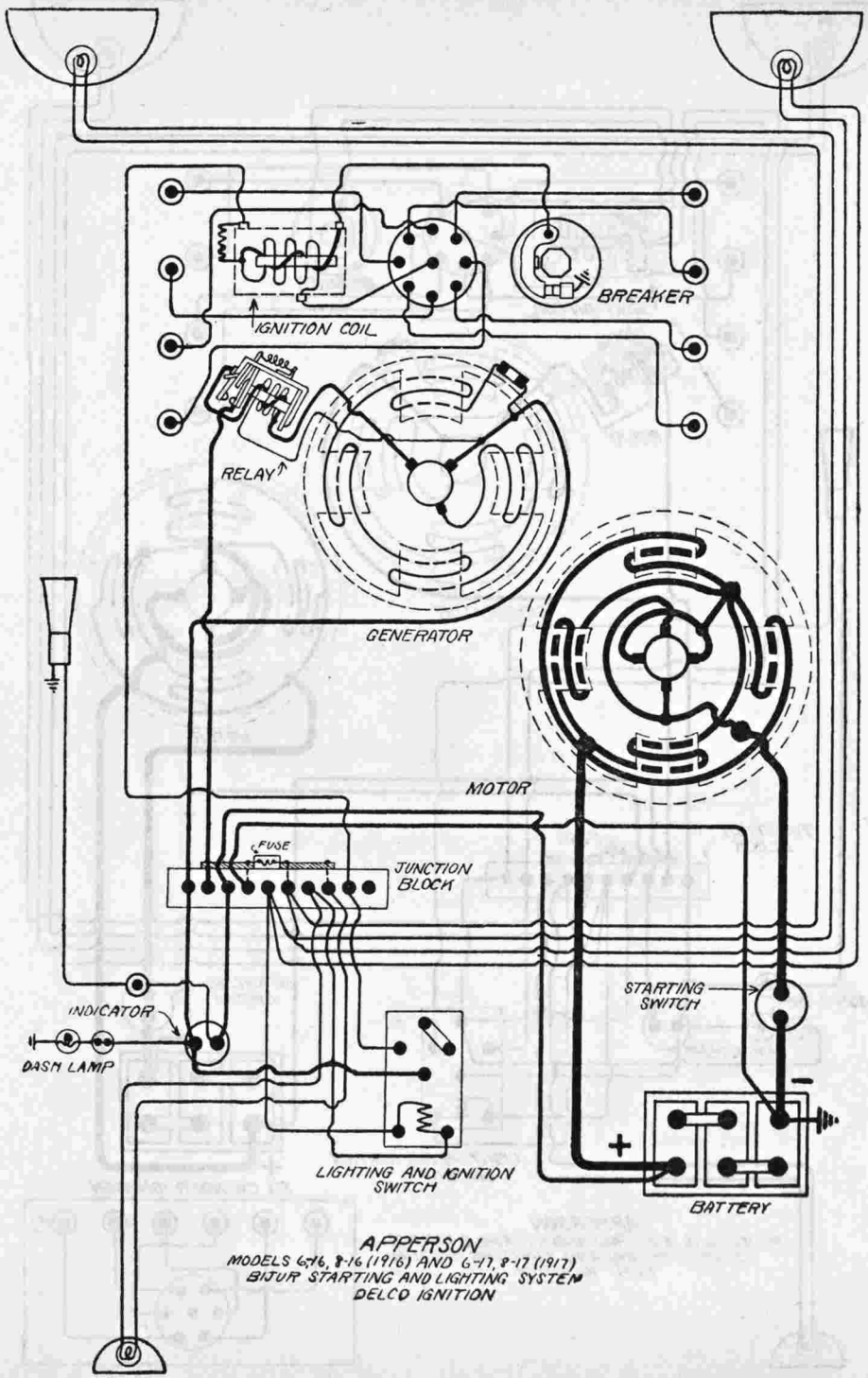
Generator.—Generator voltage regulation is by a vibrating regulator. Relay is combined with the regulator. Relay should close at 10-12 miles per hour and open at about 4 miles per hour. Relay contacts should open .013 inch to .018 inch. Clean relay and regulator contacts by drawing a piece of soft paper between them. If they are badly burned or pitted, they may be resurfaced with a strip of worn No. 00 sand paper. The maximum generator output should be reached at about 25 miles per hour. The charging rate will vary with the state of charge of the battery. It may reach as high as 16-20 amperes when battery is in a badly discharged condition. This rate will gradually decrease to 4 or 5 amperes when the battery is nearly fully charged.

Oiling.—Put 3 or 4 drops of light engine of in each oil the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 18 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.

Fuses.—Lighting fuses are 10 ampere.





APPERSON
MODELS 6-16, 8-16 (1916) AND 6-17, 8-17 (1917)
BIJUR STARTING AND LIGHTING SYSTEM
DELCO IGNITION

APPERSON

MODELS 6-16, 8-16 (1916) AND 6-17, 8-17 (1917)
BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put several drops of light engine oil in timer bearing every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when top dead center mark on flywheel is ½ inch past indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order of the six cylinder cars is 1, 5, 3, 6, 2, 4. The firing order of the eight cylinder cars is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER.—Type E 68 M, 357. Rotation is anti-clockwise, commutator end. Starter is connected to engine through a Bendix drive.

OILING.—Put several drops of light engine oil in each of starter bearing oilers every month.

GENERATOR.—Type L 61 M 303. Rotation is anti-clockwise, commutator end. Generator current regulaiton is by third brush system. Maximum generator output is 12-16 amperes, reached at 20-25 miles per hour, or 1400-1600 R.P.M. of armature. Output is varied by shifting third brush. Third brush is secured to generator by two stud bolts, the nuts of which appear in a recess in the front head of generator. Loosen these nuts with a socket wrench and shift the brush by gently tapping the shank of the wrench. Shifting brush in the direction of armature rotation will increase the output. Shifting brush in the opposite direction will decrease the output. Shifting the brush 1/16 inch will vary the output 2 to 3 amperes. Tighten nuts after adjusting brush. Brush adjustment is made to give the desired rate with generator hot and charging a 3 cell battery reading 1.250 or above. There is a 10 ampere fuse in the small aluminum cap on generator housing to protect generator windings, should excessively high resistance occur in the charging circuits.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Relay closes at 10-12 miles per hour or 500-600 R.P.M. of armature, and opens at 8-10 miles per hour, or 450-500 R.P.M. of armature. The charging current is 1 to 3 amperes at closing, and the discharge current 0 to 1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 20 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

FUSES.—Fuses are 10 ampere.

APPERSON

MODELS 6-16, 8-16 (1916) AND 6-17, 8-17 (1917)
BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The two-wire system is used.

IGNITION.—Breaker contacts separate .020 to .025 inch. When condition of contacts affects ignition, resurface with a fine flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when top dead center mark on flywheel is ½ inch past indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order of the six cylinder cars is 1, 5, 3, 6, 2, 4. The firing order of the eight cylinder cars is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER.—Type E 68 M 357. Rotation is anti-clockwise, commutator end. Starter is connected to engine through a Bendix drive.

OILING.—Put several drops of light engine oil in each of starter bearing oilers every month.

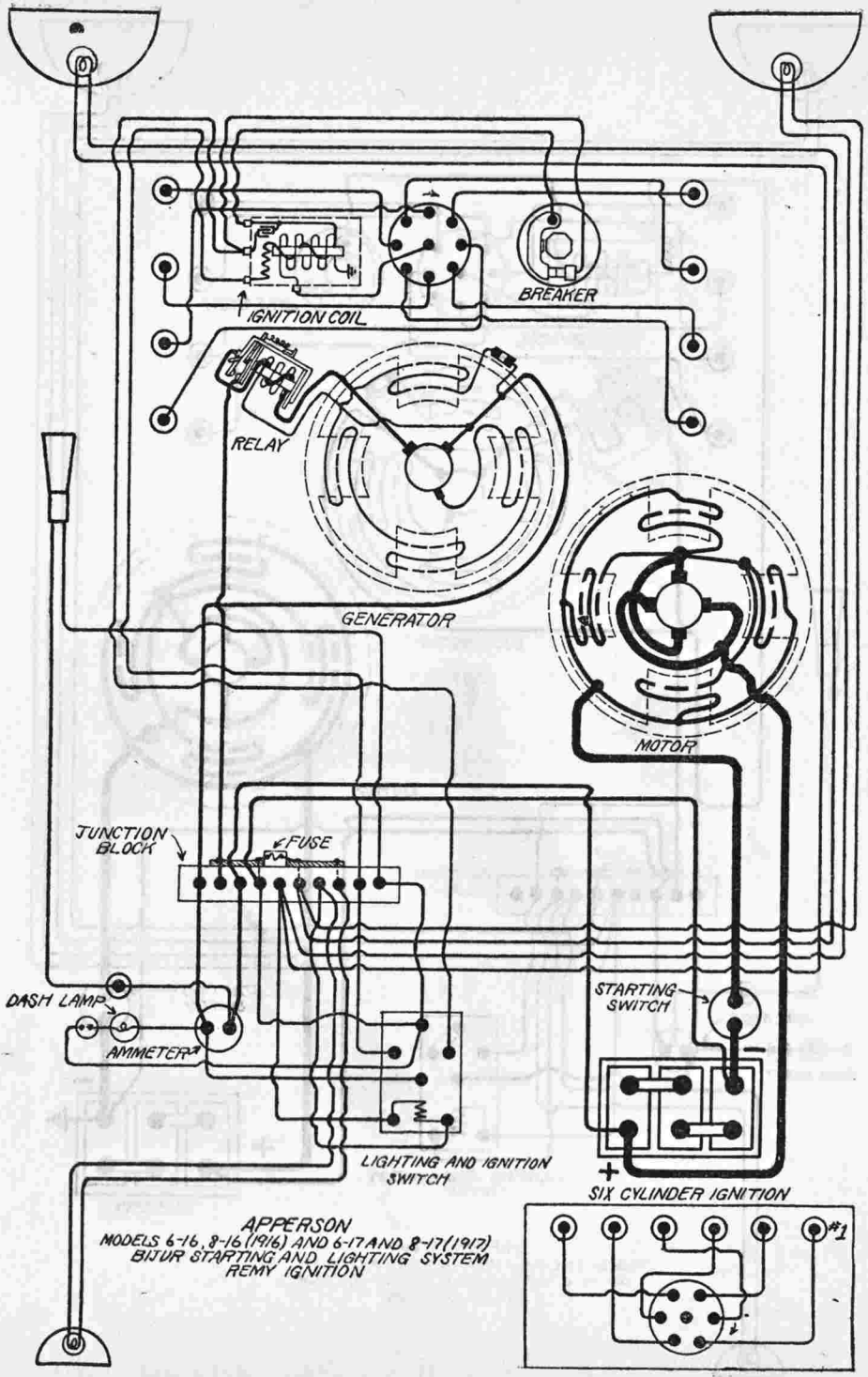
GENERATOR.—Type L 61 M 303. Rotation is anti-clockwise, commutator end. Generator current regulation is by third brush system. Maximum generator output is 12-16 amperes. Output is varied by shifting third brush. Third brush is secured to generator by two stud bolts, the nuts of which appear in a recess in the front head of generator. Loosen these nuts with a socket wrench and shift the brush by gently tapping the shank of the wrench. Shifting brush in the direction of armature rotation will increase the output. Shifting brush in the opposite direction will decrease the output. Shifting the brush 1/16 inch will vary the output 2 to 3 amperes. Tighten nuts after adjusting brush. Brush adjustment is made to give the desired rate with generator hot and charging a 3 cell battery reading 1.250 or above. There is a 20 ampere fuse in the small cap on generator housing to protect generator windings, should excessively high resistance occur in the charging circuits.

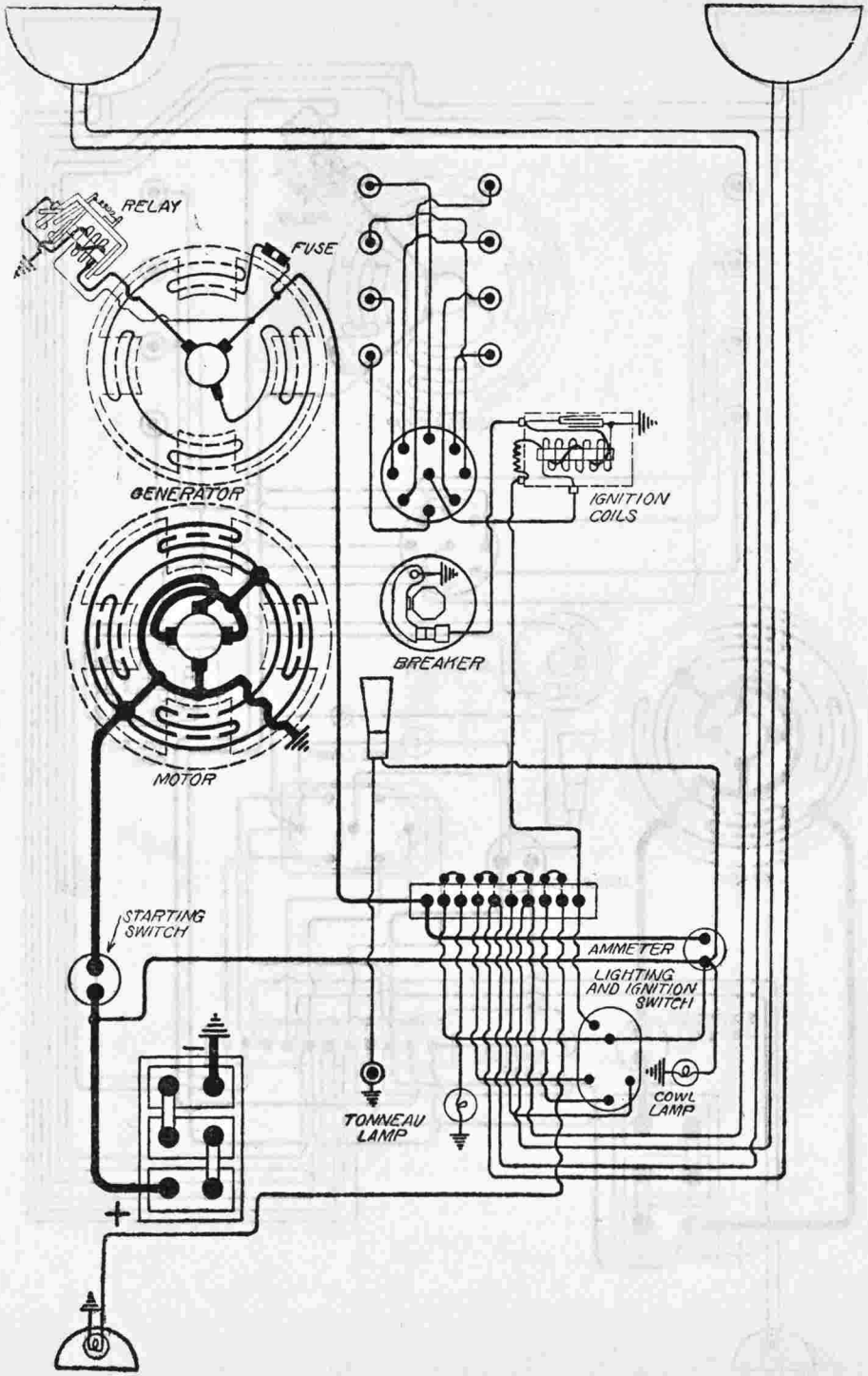
OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Relay closes at 10-12 miles per hour or 500-600 R.P.M. of armature, and opens at 8-10 miles per hour, or 450-500 R.P.M. of armature. The charging current is 1 to 3 amperes at closing, and the discharge current 0 to 1 ampere at opening of relay.

LAMPS.—Head lamps are 6-8 volt, 20 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

FUSES.—Fuses are 10 ampere.





APPERSON

ANNIVERSARY MODEL (1918-19)

BIJUR GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY.—Willard, Type SJWN-3, 6 volt, 102.8 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .022 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper. Ignition current is 4½-5 amperes, engine idle, breaker contacts and ignition switch closed.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is ½ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

FIRING ORDER.—The firing order is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

STARTER.—Type E.D-160, M1114. Rotation is counter clockwise, looking at commutator end. Lock torque is 16.5 pound-feet, current 665 amperes, 3.6 volts. Pressure of brushes on commutator is 25 ounces.

OILING.—Put 5or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Type L-61, M-1193. Rotation is counter-clockwise, looking at commutator end. Generator current regulation is by third brush system. Maximum charging rate is 15 amperes, reached at 20 miles per hour, or 1400 R.P.M. of armature. Charging rate is varied by inserting a special toothed wrench in the adjusting hole in the commutator end plate and shifting the third brush assembly through a ratchet engagement. Turn the adjusting wrench to the right (facing commutator end) to increase the chargng rate, and to the left to decrease the charging rate. Maximum current output must not exceed 15 amperes at 1400-1600 R.P.M. Pressure of brushes on commutator is 14 ounces.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in generator frame. Relay closes at 8-9 miles per hour or 550-600 R.P.M. of armature, and opens at 6-7 miles per hour or 500-550 R.P.M. of armature. Relay contacts separate .045 inch. Air gap between armature (moving member) and coil core is .035 inch, contacts closed. To adjust relay, connect a voltmeter across the main brushes of the generator. Then insert a special socket wrench in the small adjusting hole in commutator end plate and adjust relay spring tension until the contacts close when the voltage reaches 6.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 4 cp. **Dash, tail** and tonneau lamps are 6-8 volt, 2 cp.

FUSES:—Fuses are 10 ampere.

APPERSON

MODELS 8-18 (1918), 8-20 (1919-20-21) 8-22 (1922)

BIJUR GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY:—(8-18 and 8-20), Willard, Type SJWN-3, 6 volt 104.2 Ampere hour **(8-22), Exide, 3-XC-15,** 6 volt, 104.2 ampere hour. The two wire system is used.

IGNITION.—Coil Model No. 284-H. Distributor Model No. 367-C. Breaker contacts separate .022 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper. Ignition current is 4½-5 amperes, engine idle, breaker contacts and ignition switch closed.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is ½ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

FIRING ORDER.—The firing order is 1, 6, 3, 5, 4, 7, 2, 8.

STARTER.—Type E.D.160, M-1114. Rotation is counter-clockwise, looking at commutator end. Lock torque is 16.5 pound-feet, current 665 amperes, 3.6 volts. Pressure of brushes on commutator is 25 ounces.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

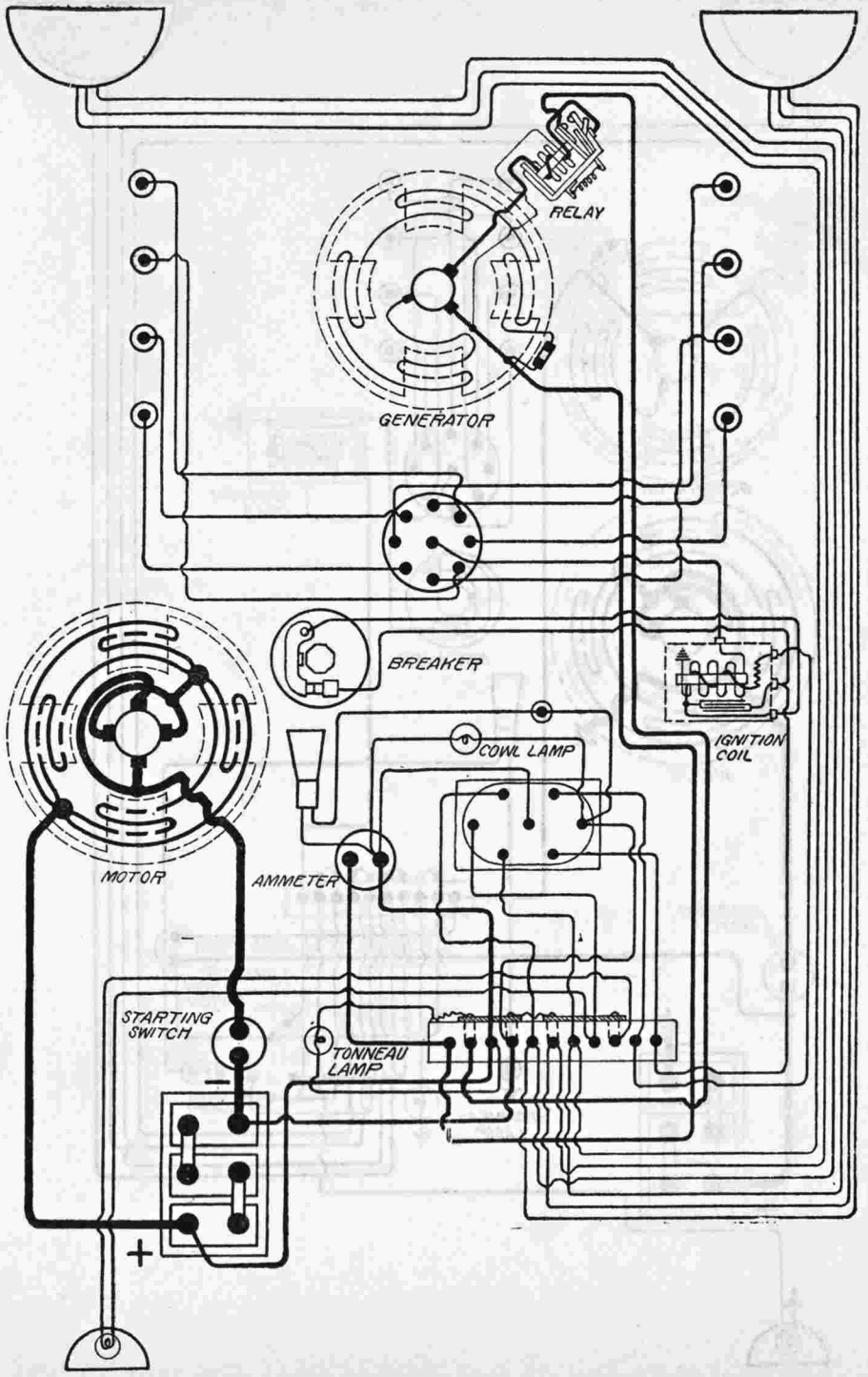
GENERATOR.—Type L-61, M-1193. Rotation is counter-clockwise, looking at commutator end. Generator current regulation is by third brush system. Maximum charging rate is 15 amperes, reached at 20 miles per hour, or 1400 R.P.M. of armature. Charging rate is varied by inserting a special toothed wrench in the adjusting hole in the commutator end plate and shifting the third brush assembly through a ratchet engagement. Turn the adjusting wrench to the right (facing commutator end) to increase the charging rate, and to the left to decrease the charging rate. Maximum current output must not exceed 15 amperes at 1400-1600 R.P.M. Pressure of brushes on commutator is 14 ounces.

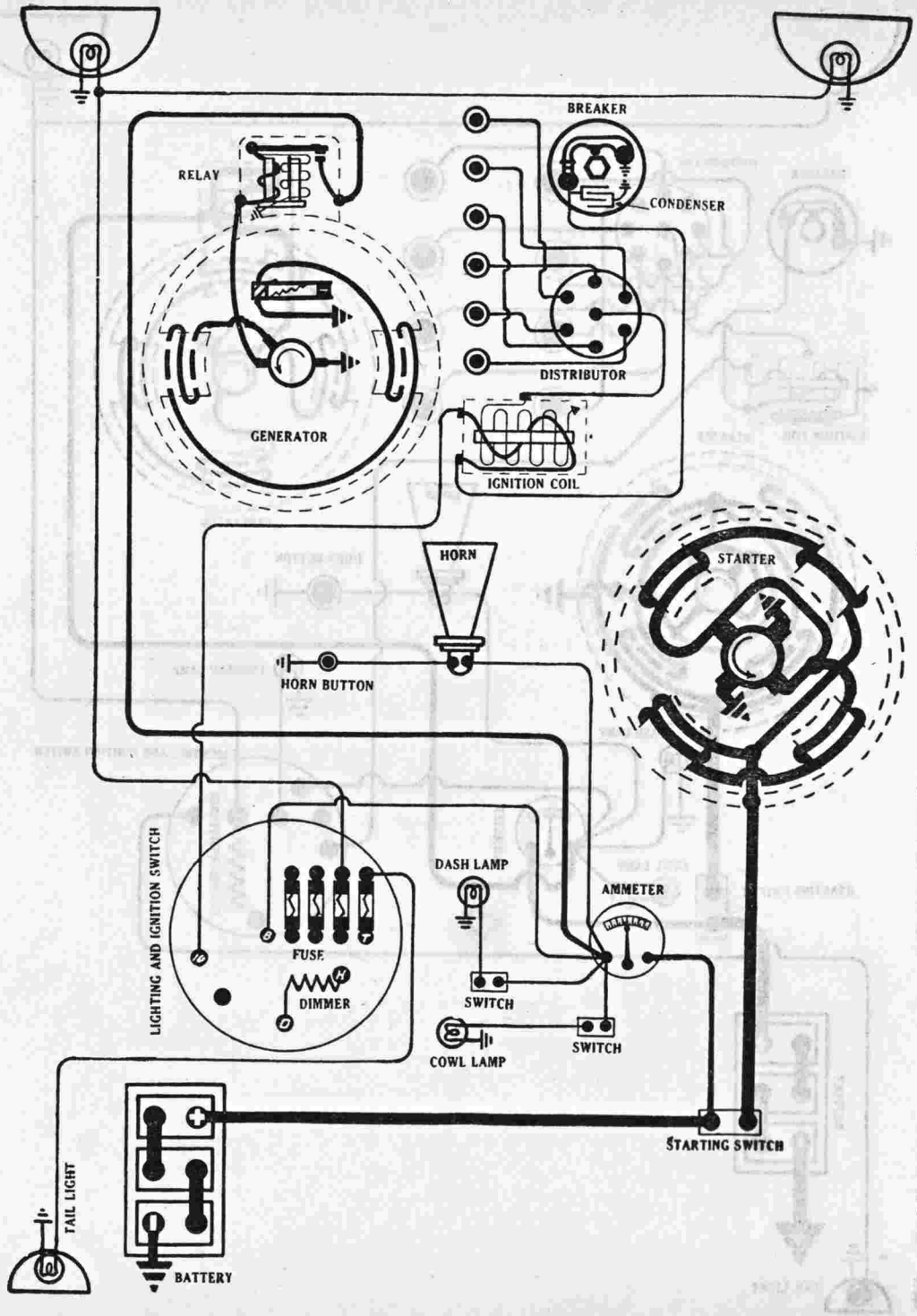
OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in generator frame. Relay closes at 8-9 miles per hour or 550-600 R.P.M. of armature, and opens at 6-7 miles per hour or 500-550 R.P.M. of armature. Relay contacts separate .045 inch. Air gap between armature (moving member) and coil core is .035 inch, contacts closed. To adjust relay, connect a voltmeter across the main brushes of the generator. Then insert a special socket wrench in the small adjusting hole in commutator end plate and adjust relay spring tension until the contacts close when the voltage reaches 6.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash, tail and tonneau lamps are 6-8 volt, 2 cp.

FUSE.—Fuse is 10 ampere.





APPERSON

MODEL 6-23 (1923) 6-24 (1924)

REMY GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY.—Prest-O-Lite, Type 613 S.H.C., 6 volts, 100 ampere-hour capacity. The starting capacity is 130 amperes for 20 minutes. The lighting capacity is 5 amperes for 22.5 hours. The negative (-) terminal is grounded.

IGNITION.—Coil Model No. 284-L. Distributor Model No. 626-H. The breaker contacts separate .020-.025 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone or with a fine jeweler's file. It is not necessary to grind the contact points if they are burned or pitted. Just brighten up the point and remove the raised portion of the opposite point.

Oiling.—Fill grease cups with medium soft cup grease and turn down every two weeks. Apply a very small amount of vaseline on the breaker cam every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

Timing.—Breaker contacts begin to separate when piston No. 1 is at top dead center, on compression stroke, spark control lever and breaker assembly fully retarded, or 15° early before reaching top dead center, measured on flywheel, spark control lever and breaker assembly fully advanced.

Firing Order:—The firing order is 1-4-2-6-3-5 on 1923 cars and 1-5-3-6-2-4 on 1924 cars.

Spark Plugs.—The spark plug gaps are .025-.035 inch.

STARTER.—Model No. 720-L. The starter is connected to the engine by an outboard Bendix drive. The direction of rotation is counter-clockwise, looking at commutator end. The starter is mounted with a No. 2 S. A. E. flange.

Starter Test Data.

Torque	Amperes	Volts	R.P.M.
0 (Running Free)	65	5.00	6000
15 ft. lbs.	570	3.15	0 (Lock)

The brush tension is 20-28 ounces.

Oiling.—Fill the oil cup with light engine oil every month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles. Keep oil off of commutator, and dirt, grit and oil off Bendix drive to insure perfect operation.

GENERATOR.—Model No. 917-L. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system and thermostatic control are used for current regulation. To increase the current output, shift the third brush in the direction of rotation (counter-clockwise). To decrease the generator charging rate, shift the third brush in the opposite direction (clockwise). The thermostat is automatic.

Generator Test Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	——	675 (Relay cut in)			
7	7.0-7.3	850	9-12 (Max.)	——	1800-2000
18-20 (Max.)	8.4	1900			
10-17	——	2500			

The brush tension is 14-18 ounces. The generator field draws a current of 5 amperes at 6 volts.

Oiling.—Fill oil cups at each end of the generator housing every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Model No. 265-A. Relay closes at 9-10 miles per hour, car speed in high gear, or at 675 R. P. M. of armature. The relay contact points separate .010-.016 inch, contacts fully separated. The air gap between relay armature and coil core is .010-.020 inch, relay contacts fully closed. Clean relay contact points by drawing unglazed paper between them. If the same are badly pitted or burned, remove and resurface on a medium hard oilstone.

LIGHTING.—Head lights are each 6-8 volts, 21 cp. Headlights when dimmed are 4 cp. Dash, dome, cowl, tail and tonneau lights are each 6-8 volts, 2 cp.

FUSES.—All fuses are 10 amperes capacity.

APPERSON

MODEL 8-23 & 8-24 (1923-24).
BIJUR GENERATING, STARTING AND LIGHTING SYSTEM.
REMY IGNITION.

BATTERY: — Prest-O-Lite, Type 613-SHC, 6 volt, 100 ampere hour. The starting capacity is 130 amperes for 20 minutes. The lighting capacity is 5 amperes for 22.5 hours. The negative (-) terminal is grounded.

IGNITION — Coil Model No. 284-H. Distributor Model No. 367-C. The breaker contacts separate .025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone or with a fine flat jeweler's file.

OILING: — Fill grease cup with medium soft cup grease and turn down two turns every two weeks. Put a very small amount of vaseline on the surface of the breaker cam every two weeks. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING: — Breaker contacts begin to separate when piston No. 1 is on top dead center on compression stroke, spark control lever and breaker assembly in the fully retarded position; or 15° before reaching top dead center (measured on the flywheel) with the spark control lever and breaker assembly fully advanced.

FIRING ORDER: — The firing order is 1, 6, 3, 5, 4, 7, 2, 8. (Cylinders are numbered 1, 2, 3, 4 from the radiator on the right hand block, viewed from drivers seat, and 5, 6, 7, 8 on the left hand block).

SPARK PLUG GAPS: — The spark plug gaps are .030 inch.

STARTER: — Model ED.-160, M-1729. The starter is connected to the engine by means of a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter running free at 6500 R. P. M. takes 35 amperes at 6 volts.

Starter Test Data.

Torque.	R. P. M.	Volts.	Amperes.
0 lb. ft.	6500	6.	35
2	2000	5.4	125
6	1000	4.8	275
8	700	4.5	350
10	450	4.25	440
16	Lock	3.5	600

The tension of each of the starter brushes should be 24 ounces.

OILING: — Put 5 or 6 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles.

GENERATOR: — Model L-220, M-1731. Generator current regulation is by the third brush system. The direction of rotation is counter-clockwise looking at the commutator end. To adjust the charging rate, remove the commutator cover band and loosen the 8/32 lock nut that holds the third brush bracket stationary. Then shift the third brush bracket in the direction of rotation (counter-clockwise) by means of the screw to increase the charging rate and in the opposite direction to decrease the charging rate. The maximum charging rate is 12-14 amperes reached at 1400 R. P. M. of the generator armature.

Generator Test Data.

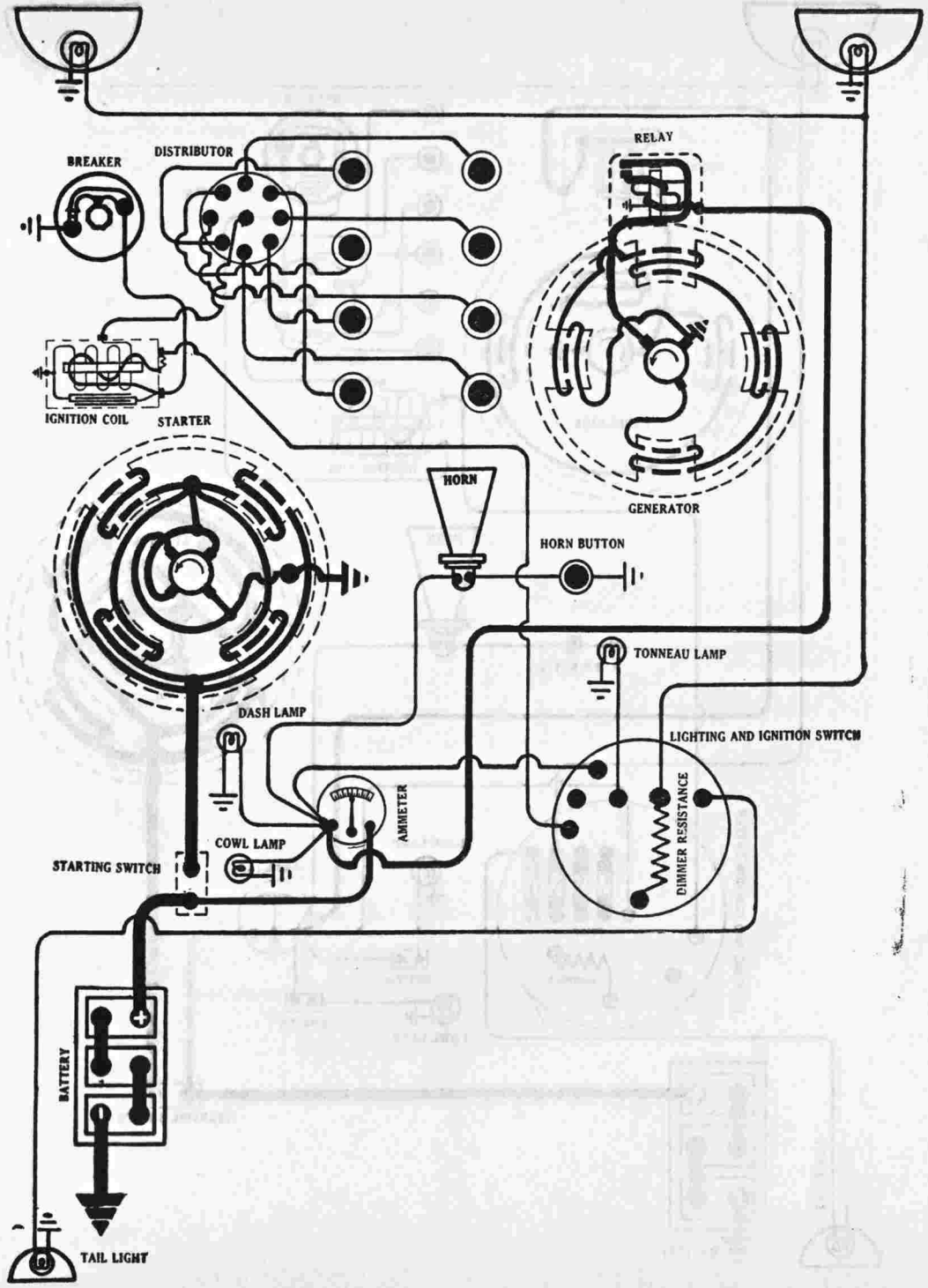
Cold Test (100°F)			Hot Test (200°F)		
Amperes.	Volts.	R. P. M	Amperes.	Volts.	R. P. M.
0	7.5	400	0	7.5	500
6	8.1	625	6	8.1	725
10	8.3	900	10	8.3	1000
12	8.5	1100	12	8.5	1200
7	7.9	3200	7	7.9	3300

Motoring freely the generator makes 380 R. P. M. taking 5-6 amperes at 6.1 volts. The shunt field draws 5.1 amperes at 6.1 volts. The tension of each of the generator brushes should be 20 ounces.

OILING: — Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles.

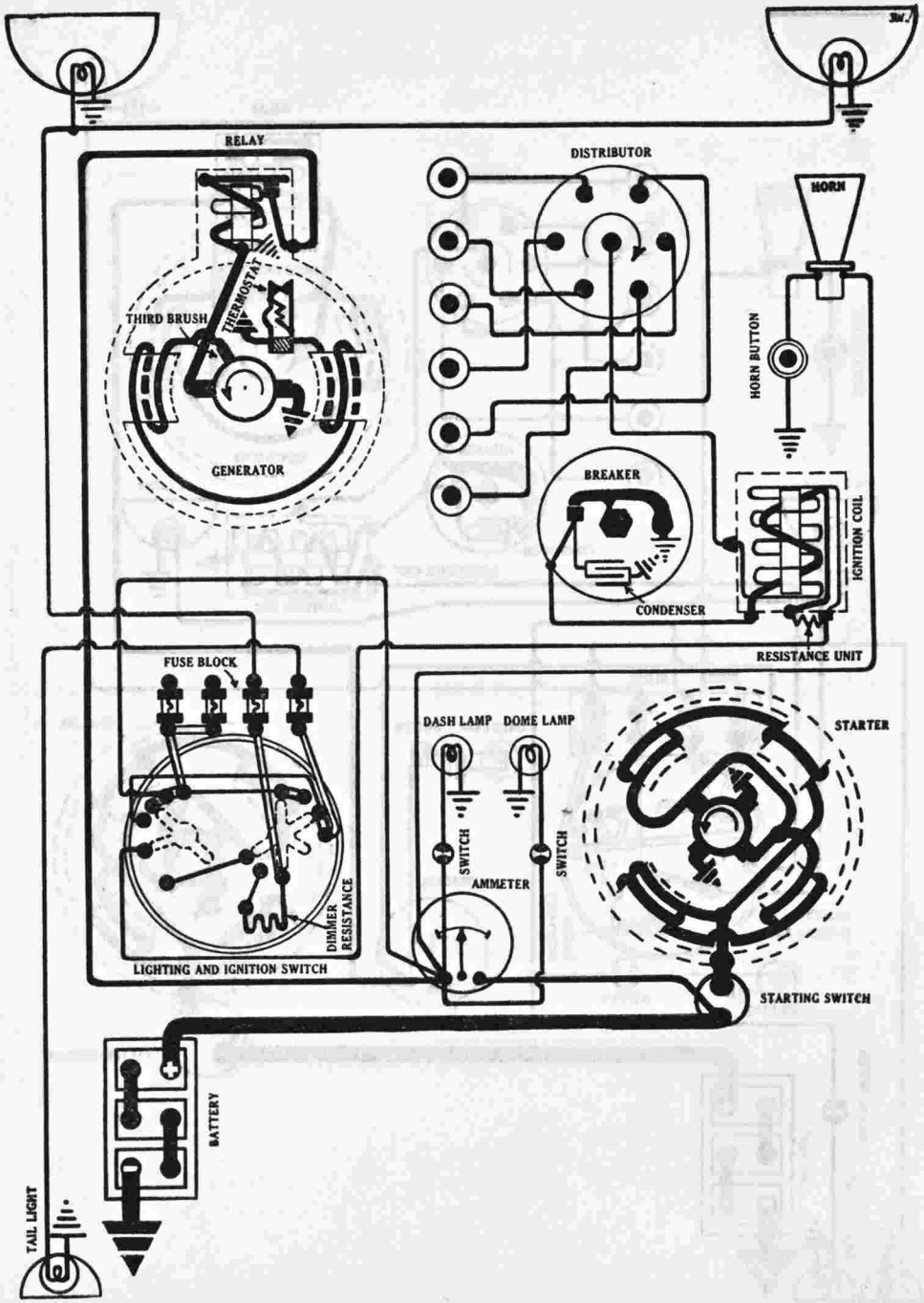
RELAY: — Relay is mounted on top of the generator. Relay contacts close when the voltage of the generator reaches 6.7 volts and open with a discharge current of 2 amperes. Relay contacts separate .020 inch. The air gap between the relay armature (moving member) and coil core is .015 inch, contacts closed.

LIGHTING: — Bijur Switch, Model No. T161-M865. Head lights are 6-8 volt, 21 cp.



APPERSON

MODEL 6-24, 6-25 (1924-25)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION



BATTERY.—Prest-O-Lite, Type 613-SHK. 6 volt. Starting capacity is 130 amperes for 20 minutes. Lighting capacity is 5 amperes for 22.5 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model 284-P. Distributor Model 626-J. Breaker contacts separate .020-.025 inch. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Distributor is of the semi-automatic type. Manual advance is 25°. Automatic advance is 30°.

Oiling.—Fill the grease cup on the side of the distributor housing with medium heavy grease and turn down two turns every two weeks or each 500 miles. Put a small bit of grease on the face of the breaker cam every month.

Timing.—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER.—Model 720-G. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 20-28 ounces. Starter switch is Model 406-A.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Oiling.—Put 5 or 6 drops of light engine oil in the starter oilers every month or each 1000 miles.

GENERATOR.—Model 917-W. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system combined with a thermostat. The thermostat contacts open at approximately 165° F. cutting a resistance into the field circuit and reducing the output 40-50%. To adjust generator output, remove commutator cover band and loosen the third brush adjusting screw on the generator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	7	675			
7	7.2	850	11	7.5	1900
19	8.4	1900			

Shunt field current is 5 amperes at 6 volts. Generator brush tension is 22-28 ounces.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY.—Model 265-B. Relay is mounted on top of the generator. Relay contacts close when the voltage of the generator reaches 7-7.5 volts at approximately 675 R.P.M. of the generator armature and open with a discharge current of 0-3 amperes. Charging current at closing of contacts is 2 amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING.—Switch Model 471-E. Head lamps are 6-8 volt, 21 cp. S. C. With dimmer resistance in circuit head lamps are approximately 4 cp. Dash, dome, side, tonneau and tail lamps are each 6-8 volt, 2 cp.

FUSES.—Lighting fuses are 10 amperes.

APPERSON

SIX (1925-26)

REMY GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY:—Prest-O-Lit, Type 613-SHK, 6 volt. Starting capacity is 130 amperes for 20 minutes. Lighting capacity is 5 amperes for 22.5 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model 284-P. Distributor Models 626-P and 636-D. Breaker contacts separate .020-.025 inch. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Distributor is of the semi-automatic type. Automatic advance is 30°. Manual advance is 15° on the Model 626-P and 25° on the Model 636-D.

Oiling:—Fill the grease cup on the side of the distributor housing with medium heavy grease and turn down two turns every two weeks or each 500 miles. Put a small bit of grease on the face of the breaker cam every month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever and breaker assemgly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER.—Model 720-J. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 20-28 ounces. Starter switch is Model 406-A.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Oiling:—Put 5 or 6 drops of light engine oil in the starter oilers every month or 1000 miles.

GENERATOR.—Model 941-B. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system combined with a thermostat. The thermostat contacts open at approximately 165° F. cutting a resistance into the field circuit and reducing the output 40-50%. To adjust generator output, remove commutator cover band and loosen the third brush adjusting screw on the generator endplate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	7	675			
7	7-7.3	750	11	7.5	1900
21	8.35-8.5	1450			

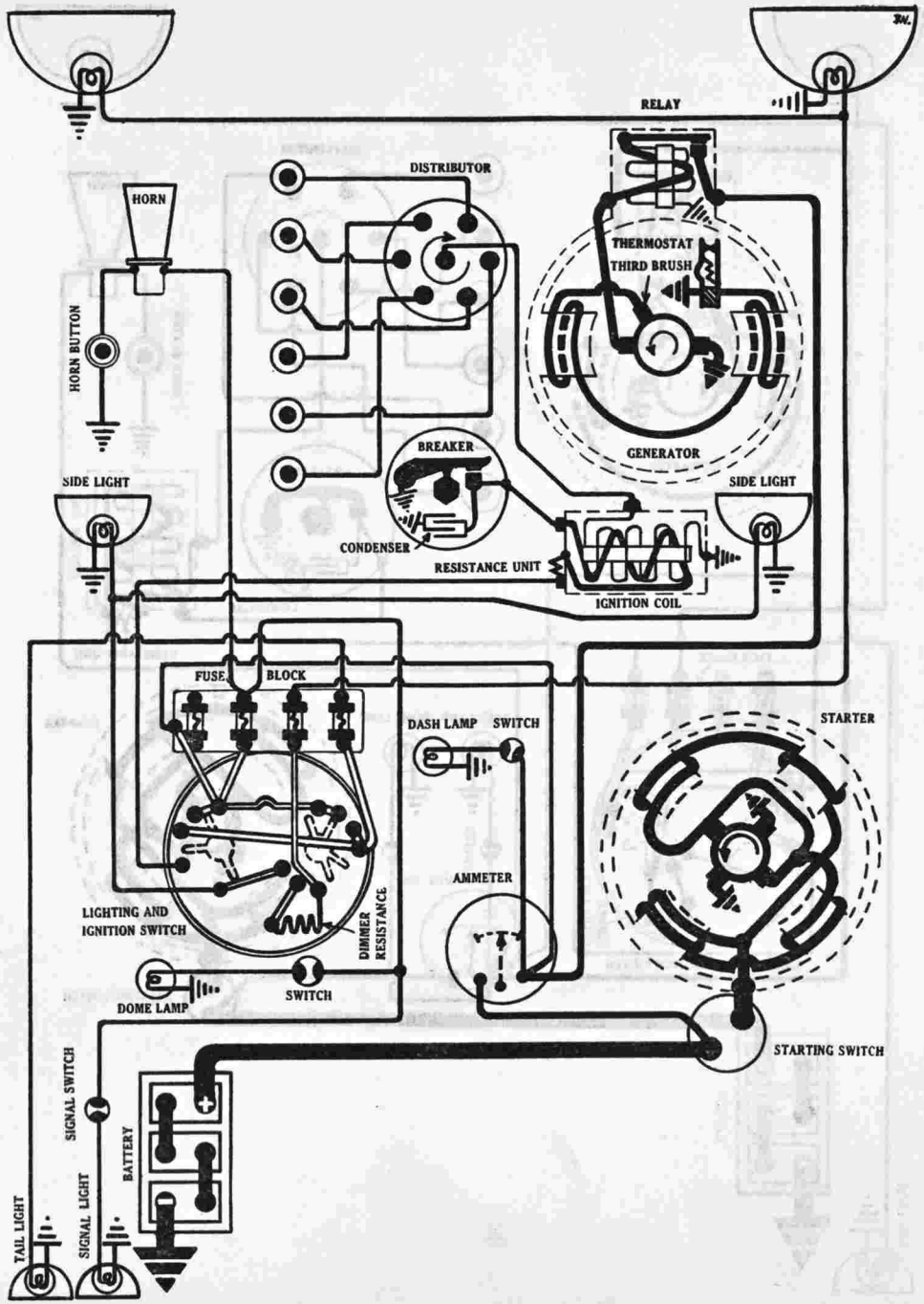
Shunt field current is 5 amperes at 6 volts. Generator brush tension is 22-28 ounces.

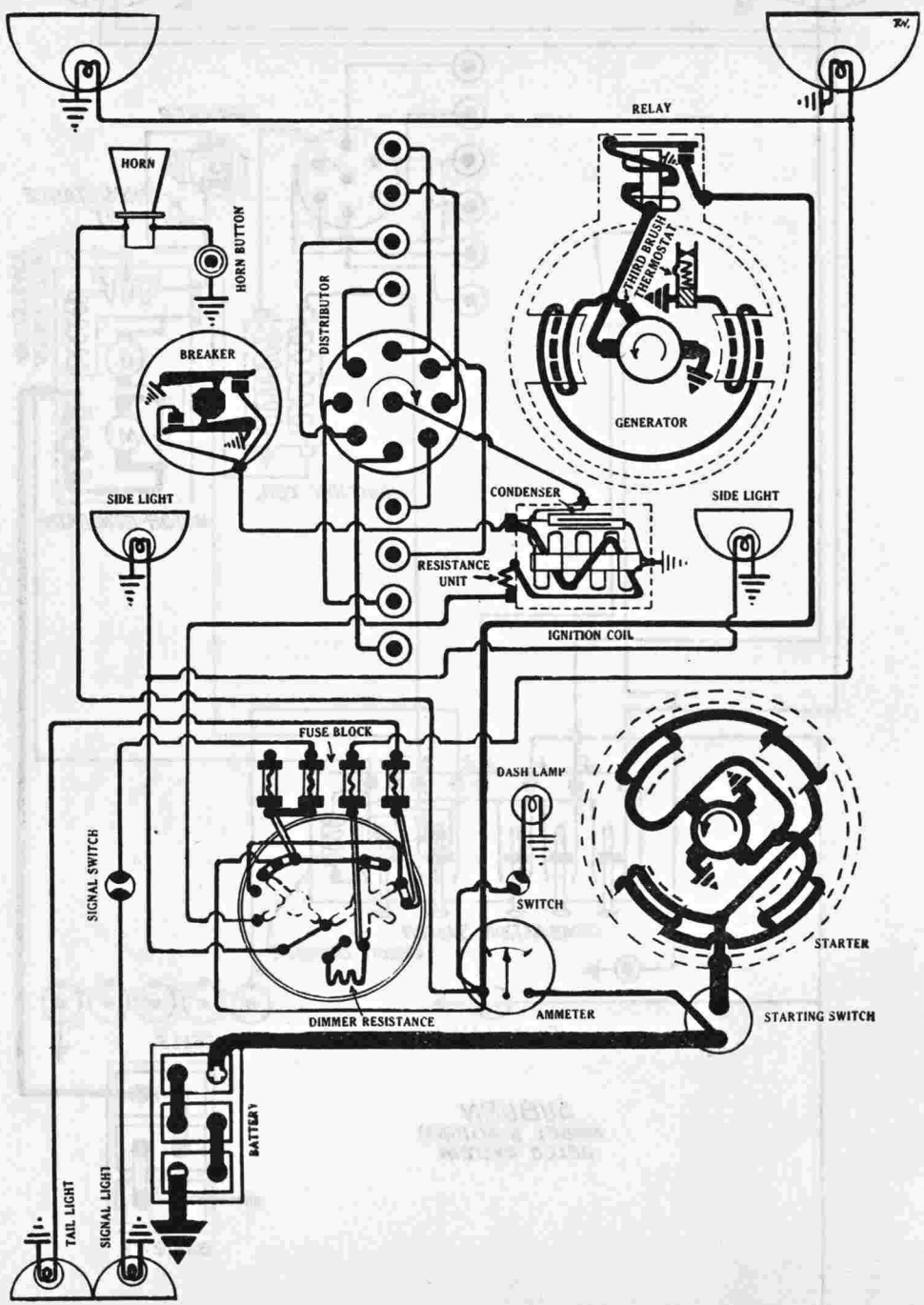
Oiling:—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay contacts close when the voltage of the generator reaches 7-7.5 volts at approximately 675 R.P.M. of the generator armature and open with a discharge current of 0-3 amperes. Charging current at closing of contacts is 2 amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING:—Switch Model 471-E. Head lamps are 6-8 volt, 21 cp. S.C. With dimmer resistance in circuit head lamps are approximately 4 cp. Dash, dome, side, tonneau and tail lamps are each 6-8 volt, 2 cp.

FUSES:—Lighting fuses are 10 amperes.





APPERSON

STRAIGHT AWAY EIGHT (1925-26)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Prest-O-Lite, Type 613-S.H.K. 6 volt. Starting capacity is 130 amperes for 20 minutes. Lighting capacity is 5 amperes for 22.5 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model 284-L. Distributor Model 648-A. Breaker contacts separate .018-.024 inch. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Double contacts are used. They must be synchronized to open at the same instant. Set stationary contacts to open .022 inch with fiber bumper on high point of cam. Then loosen screws holding mounting plate on which other contacts are mounted and shift until contact arm is also on high point of cam. Adjust contact opening keeping gap between limits of .018-.024 inch. Distributor is of the semi-automatic type. Manual advance is 20°. Automatic advance is 15°. The breaker arm spring tension should be 17.5-20.5 ounces.

Oiling.—Fill the grease cup on the side of the distributor housing with medium heavy grease and turn down two turns every month or each 1000 miles. Put a small bit of grease on the face of the breaker cam under the fiber bumper of the contact arm every month.

Timing.—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position. Double contacts are used which must be synchronized to open together.

Firing Order.—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER.—Model 720-J. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 20-28 ounces. Starter switch is Model 406-A.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Oiling.—Put 5 or 6 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR.—Model 917-V. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush combined with a thermostat. Thermostat contacts open at approximately 165° cutting a resistance into the shunt field circuit and reducing the output 40-50%. To adjust generator output remove the commutator cover band and loosen the third brush adjusting screw on the generator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	7	675			
7	7.2	850	11	7.5	1900
19	8.4	1900			

Shunt field current is 5 amperes at 6 volts. Generator brush spring tension should be 22-28 ounces.

Oiling:—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY.—Model 265-B. Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 7-7.5 volts at approximately 675 R.P.M. and open with a discharge current of 0-3 amperes. Charging current when contacts close is 2 amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING.—Switch Model 471-E. Head and stop lamps are 6-8 volt, 21 cp. S. C. Dash, side, dome and tail lamps are each 6-8 volt, 2 cp. S. C.

Auburn

Model 6-40 (1915)

Delco Generating, Starting and Lighting System

Delco Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded. There is also a set of 5 dry cells connected so that they can be switched into the ignition switch should other sources fail.

Ignition.—Breaker contacts should separate .010 inch. When the bumper of the contact spring is on the highest part of the cam the clearance between the stop on the spring and contact blade should be .015 inch. Should contacts become badly burned or pitted resurface them with a fine, flat jeweler's file or a piece of worn No. 00 sand paper.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be .027 inch.

Oiling.—Remove distributor cover and rotor and put 4 or 5 drops of light engine oil in the bearing every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Starter.—Starter is connected to the engine by a set of gears shifted by the operator. Starter should develop at least 16 pound feet, lock torque. When operating free. it should not take over 45 amperes. Starter should be tested with a terminal voltage of 3.5-3.8 volts, current flowing.

Oiling.—The grease cup on the end of the idler gear shaft provides lubrication for the clutch. It should be refilled with soft cup grease, and turned down every month.

Generator.—Generator current regulation is by an automatic field rheostat. This device consists of a coil of nichrome wire in series with the shunt field. There is a movable contact, operated by centrifugal weights on the timer shaft, to regulate the amount of the coil which is in circuit. When the engine is idle the coil is cut out of the circuit. As the engine speeds up the contact is moved along the coil, cutting more and more resistance into the field circuit as the speed increases, thus regulating the output. The output may

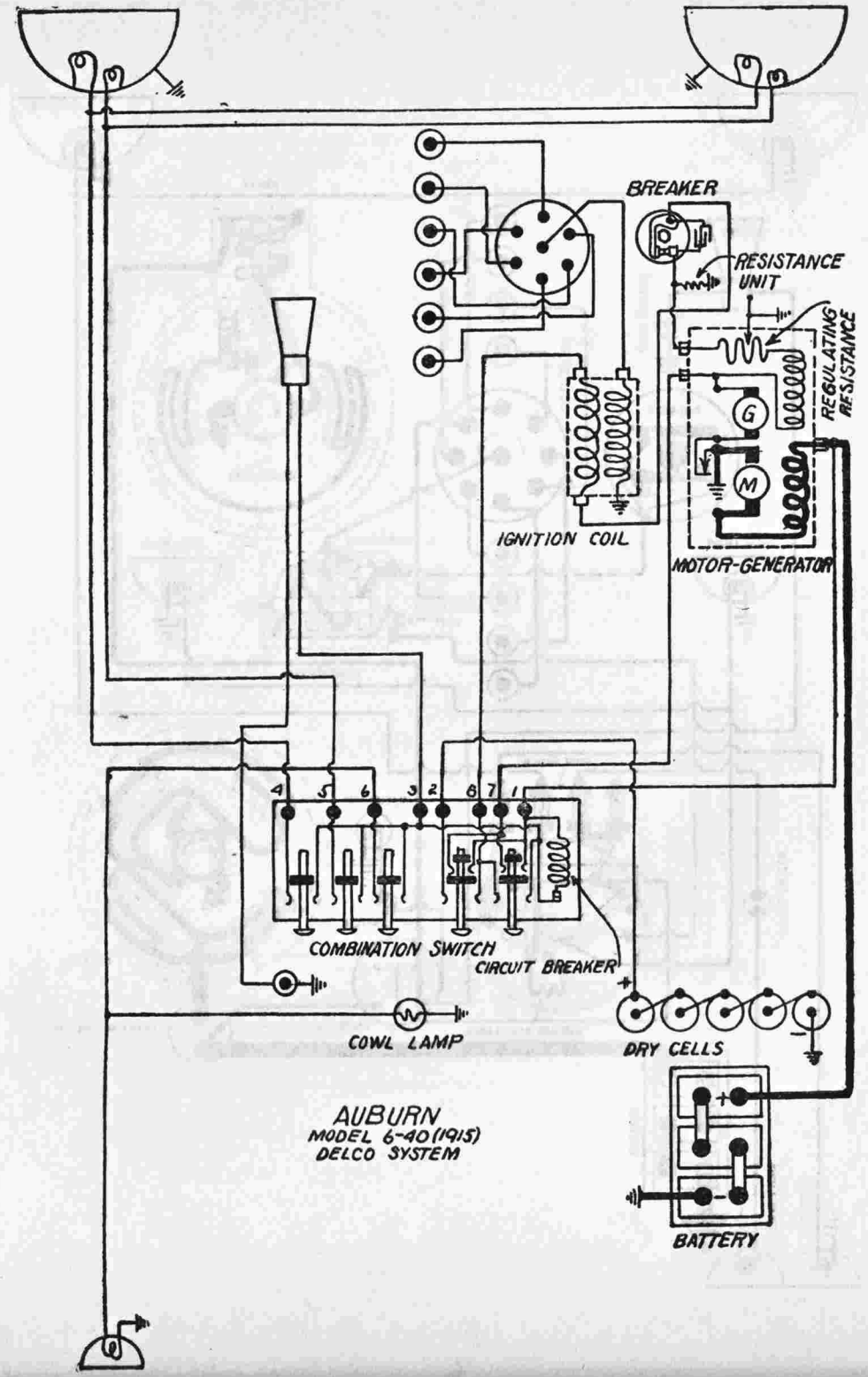
GENERATOR DATA, MOTOR-GENERATOR No. 58

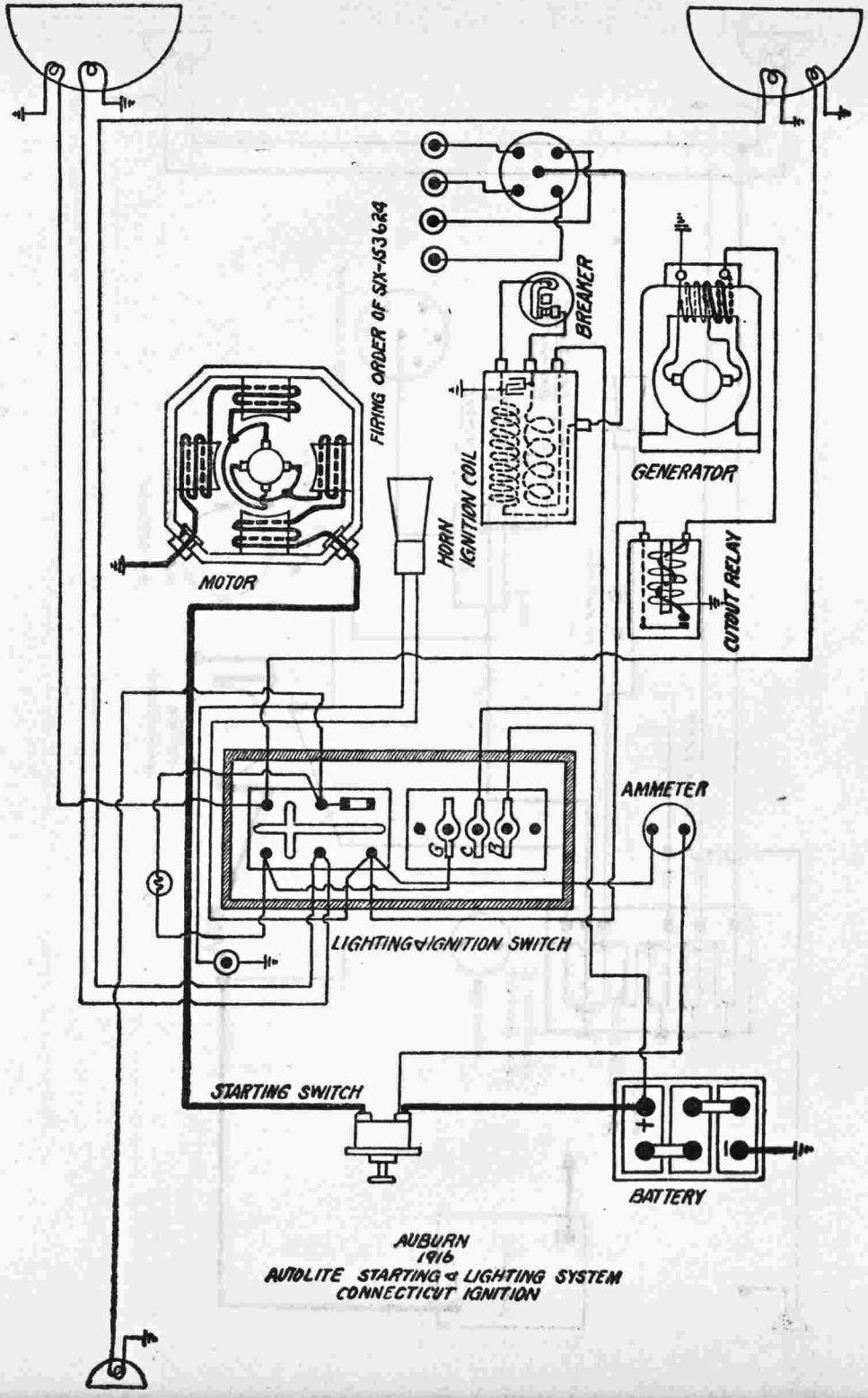
Amperes	R. P. M.
Neutral	510
7-15	750
16-22	1100-1300

The circuit between generator and battery is controlled by the ignition switch, there being no relay. When operating freely as a motor the overrunning clutch as the only retarding force, generator should take 5.5 amperes.

Oiling.—Put 5 or 6 drops of light engine oil in the oil hole in each of generator bearings every two weeks. Thoroughly clean out the distributor driving gear case and repack with soft cup grease several times a season. When oiling bearings, put a few drops of oil in gear case to keep grease soft. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp. Single contact base is used.





AUBURN
1916
AUTOLITE STARTING & LIGHTING SYSTEM
CONNECTICUT IGNITION

AUBURN

MODEL 6-40 (1916) 6-44 (1917-18)
AUTO-LITE STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

Battery.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded at the starting motor.

Ignition.—Breaker contacts should separate .023 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order of the four cylinder cars is 1, 3, 4, 2. The firing order of the six cylinder cars is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—Spark plug gaps should be .023 inch.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Starter.—Starter is connected to engine through a Bendix drive.

STARTER DATA, MODEL MC

Torque	Amperes	R.P.M.
0 lb. ft.	50- 55	4270
1 lb. ft.	100-105	2650
2 lb. ft.	145-150	1900
3 lb. ft.	185-190	1600
4 lb. ft.	225-230	1400
5 lb. ft.	250-255	1250
6 lb. ft.	290-300	1000
16 lb. ft.	450-460	Lock

Starter should deliver 16 pound-feet lock torque, taking 450-460 amperes at 4.2 volts Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current.

Oiling.—Starter bearings are packed with grease. Thoroughly clean out and repack them with soft cup or ball bearing grease every six months. No oil is required.

Generator.—Generator current regulation is by reverse series field.

GENERATOR DATA, MODEL GF

Amperes	R.P.M.
5.0	430- 490
10.0	730- 870
12.5	945-1180
15.0	1225-1660
16.0-19	2400-2800

When operating freely as a motor, generator should take 1.8 amperes, armature revolving at 200 R. P. M. Much higher speed indicates damp, grounded or short circuited field coils. Greater current or lower speed indicates tight bearings or damp, grounded or short circuited armature windings or commutator. Shunt field should take 1 ampere.

Relay.—Relay should close at 230-265 R. P. M., of generator armature. Charging current should be .5 to 1.5 amperes at closing, and discharge current 0 to 1 ampere at opening of relay contacts. Clean contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a strip of worn No. 00 sand paper. Draw a piece of unglazed paper between them to remove all grit. Adjust before putting into service.

Oiling.—Put several drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oil every 500 miles.

Lamps.—Head lamps are 6-8 volts, 15 cp. Dimmer lamps are 6-8 volts, 4 cp. Dash lamp

AUBURN

MODELS 6-40 A (1916) AND 6-44 (1917-18)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .018 to .020 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 2 or 3 drops of light engine oil in each of the distributor bearings every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .027 inch.

STARTER-GENERATOR:—Models No. 73 & 83. Starter & generator are comb. into one frame, but are electrically separate. Starter is connected to the engine through a set of reduction gears meshed by the operator. Lock torque is 16 pound-feet. Running freely, starter draws 40 amperes.

GENERATOR.—Generator current regulation is by third brush system. Maximum current output is reached at 1000 R. P. M. of the armature or 20-25 miles per hour.

Generator Data. Model No. 73	Amperes	R. P. M.
	Neutral	400
	6-10	600
	16-20	1000
	10-15	1500
	9-13	1800

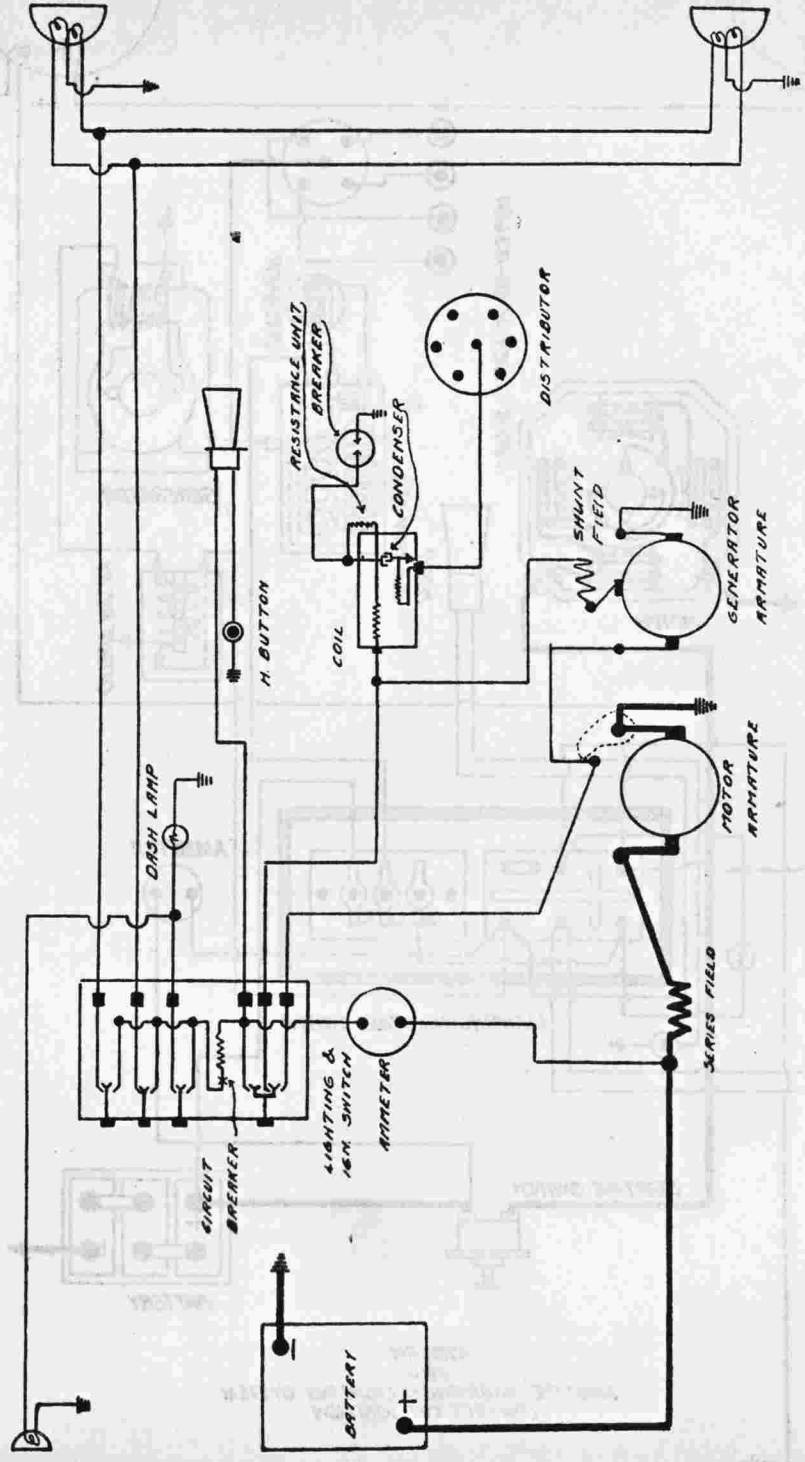
When generator is operating freely as a motor, with the overrunning clutch as the only retarding force, the current is 4.5 amperes. To increase the charging rate move the third brush in the direction of armature rotation. To decrease the charging rate move the third brush in the opposite direction.

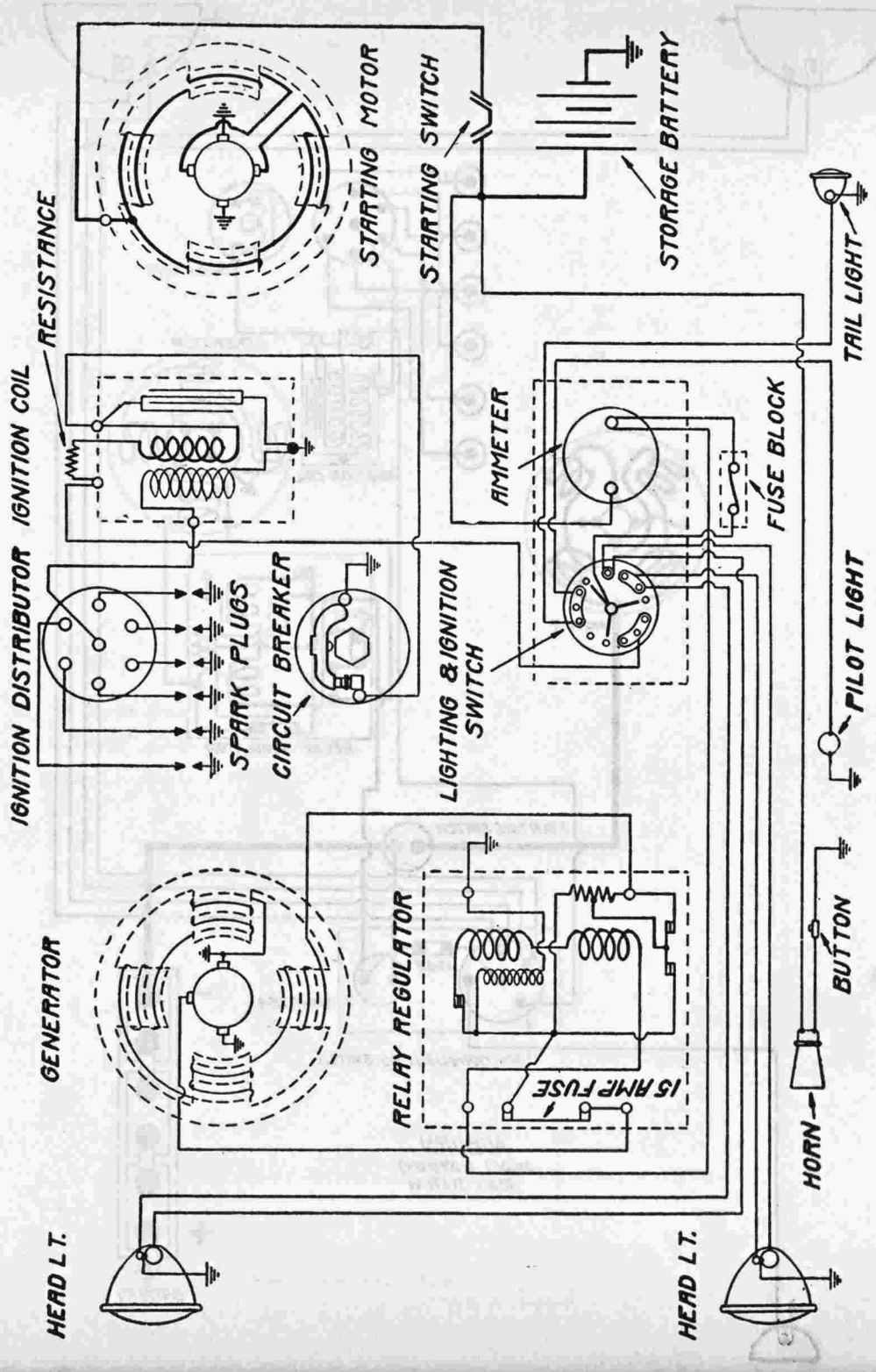
OILING.—Put 4 or 5 drops of light engine oil in each of the starter-generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles. Thoroughly clean out the generator driving clutch compartment and repack with soft cup grease every three months. Put in 2 or 3 drops of oil to keep the grease soft. Refill the grease cup at the end of the idler gear shaft and turn down every month.

RELAY.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Side lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp. On the Model 6-40A. head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 12 cp.

CIRCUIT BREAKER:—A vibrating circuit breaker takes the place of fuses. It requires a current of 25-30 amperes to start this device vibrating. While vibrating the current is 3-5 amperes.





AUBURN

MODEL 6-39, 6-39H, 6-39K (1917-18)

REMY GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .020 to .025 inch. If burned or pitted, affecting the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

TIMING.—Contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

STARTER.—Model No. 292A. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes	Volts
0 lb. ft.	3300	60	6.0
1 lb. ft.	2400	110	5.7
4 lb. ft.	1000	270	4.65
7 lb. ft.	225	395	3.7
9 lb. ft.	50	435	3.6
10-11 lb. ft.	Lock Torque	450	3.6

OILING.—Put several drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Generator current regulation is by a vibrating regulator.

Generator Data

Model 240-A			Model 245-A		
Amperes	R.P.M.	Volts	Amperes	R.P.M.	Volts
0.0	360	6.0-6.4	0.0	600-650	6.0
7.0	500	6.3-6.7	7.0	700-750	6.5
11.0	800	6.5-6.9	13-14	1500	6.9
12.1	1000	6.5-6.7	13-14	3000	6.9
12.5	1500	6.5-6.7			

When operating freely as a motor, Generator No. 240-A should take 3 to 4 amperes at 5.8 volts, armature revolving at 240 R.P.M. Generator No. 245-A should take 6 to 6.5 amperes at 5.8 volts, armature revolving at 470 R.P.M. Shunt field of Generator 240-A should take 2 amperes, and that of Generator 245-A, 3.5 to 4 amperes at 5.9 volts.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every two weeks.

RELAY-REGULATOR.—Relay closes at 8-10 and opens at 6-8 miles per hour. The air gap between relay armature and coil core is .012 to .015 inch, contacts closed. Contacts separate .012 to .015 inch. Increasing spring tension on regulator armature will increase the output. Decreasing the spring tension will decrease the output. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6.8 volt, 17 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Fuse on relay-regulator base is 15 ampere. Use commercial 15 ampere fuse wire in replacing it. Lighting circuit fuse is 25 ampere.

AUBURN
MODEL 6-39 (1917-18-19)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Battery is 6 volt, 117 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .020 inch to .025 inch. If burned or pitted, affecting the ignition, resurface with a very fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER.—Model 292-A. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes	Volts
0 lb. ft.	3300	60	6.0
1 lb. ft.	2400	110	5.7
4 lb. ft.	1000	270	4.6
7 lb. ft.	225	395	3.7
9 lb. ft.	50	435	3.6
10-11 lb. ft.	Lock	450	3.6

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Model 245-D. Generator current regulation is by vibrating regulator.

Generator Data

Amperes	R.P.M.	Volts
0	700	6
7	800	6.5
13-14	1500	7
13.14	3000	7

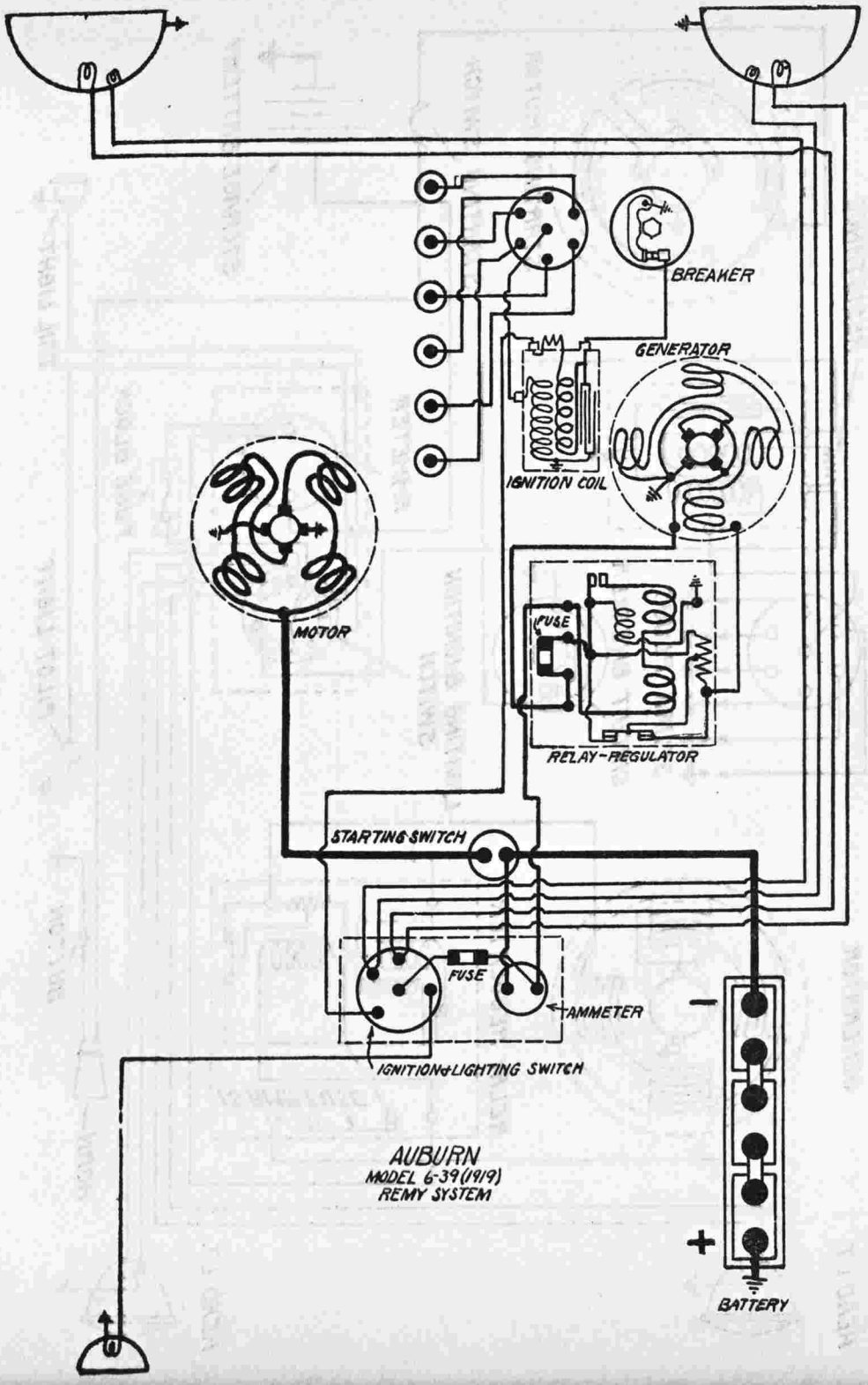
when operating freely as a motor, the current is 5 to 5.5 amperes at 5.8 volts, armature revolving at 400 R.P.M. Shunt field current is 3.5 to 4 amperes at 6 volts.

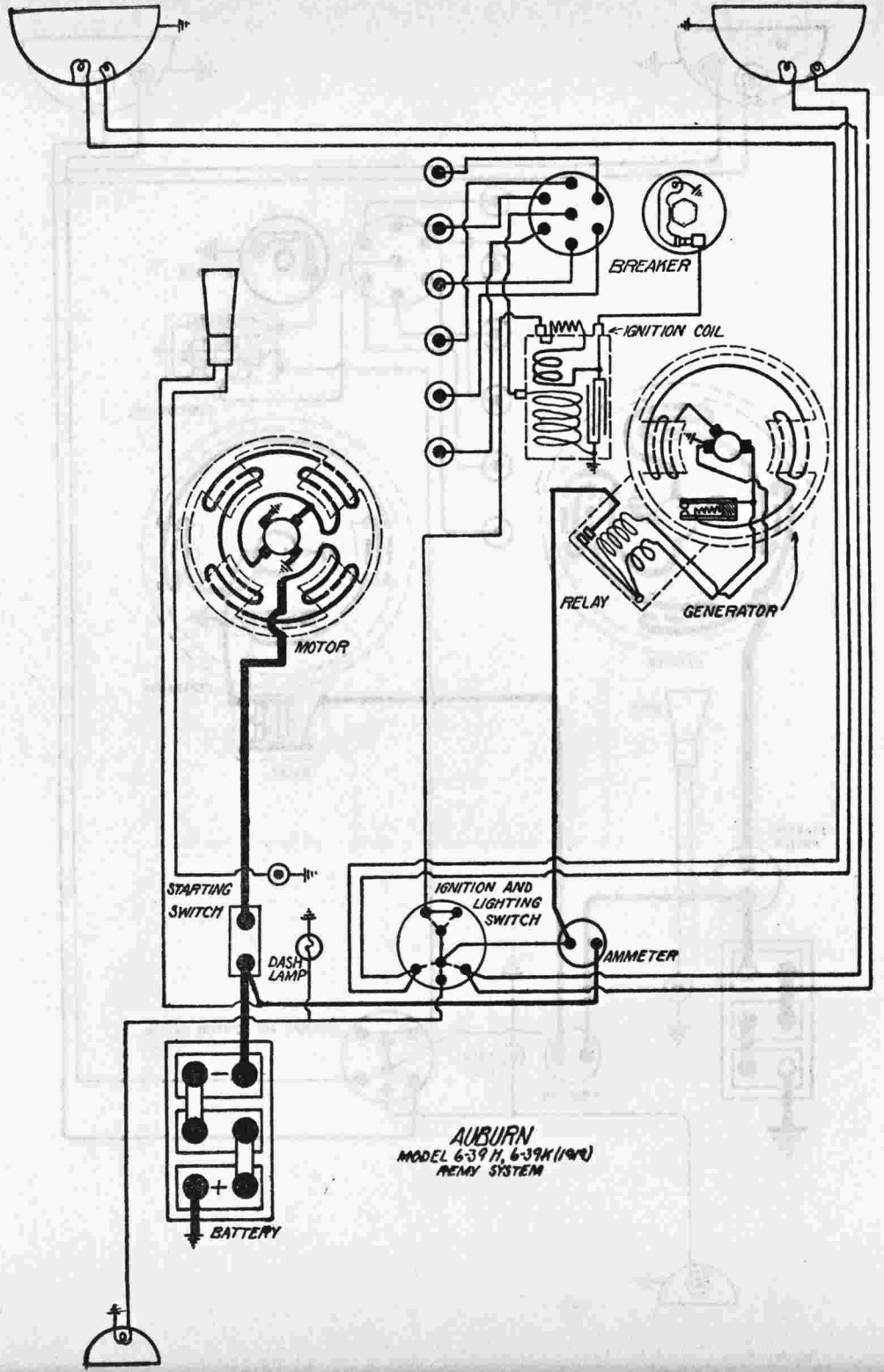
OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY-REGULATOR.—Relay closes at 8-10 miles per hour and opens at 6-8 miles per hour. The air gap between relay armature (moving member) and coil core is .012 to .015 inch, contacts closed. Contacts separate .012 inch to .015 inch. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service. Increasing spring tension on regulator armature increases the output. Decreasing the spring tension decreases the output.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

FUSE.—Fuse is 25 ampere.





AUBURN

MODELS 6-39A, 6-39-H AND 6-39K (1919)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

Battery.—Battery is 6 volt, 117 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts separate .020 inch to. 025 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper.

Timing.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .027 to .030 inch.

Oiling.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions should be given every 500 miles.

Starter.—Starter is connected to engine through a Bendix drive.

STARTER DATA, MODEL 303-A

Torque	R. P. M.	Amperes	Volts
1 lb. ft	1850	110-115	5.3-5.5
2 lb. ft	1400	158-165	5.1-5.3
3 lb. ft	1150	200-210	4.9-5 1
4 lb. ft	850	238-250	4.6-4.8
5 lb. ft	700	275-285	4.4-4.6
15 lb. ft	Lock	550-575	3.3-3.4

Oiling.—Put several drops of light engine oil in each of starter bearings every month.

Generator.—Generator current regulation is by third brush system. A thermostat located in the brush rigging of the generator, cuts in a resistance at a temperature of 175° F., reducing the maximum charging rate 6 amperes. Resistance also acts as a shunt field fuse. The thermostat is intended to change the charging rate as demand of seasons or car operation requires. Never touch the thermostat points.

GENERATOR DATA. MODEL 230-B

Amperes	R. P. M.	Volts
0	515	6.4
7	745	7.1
14	1000	7.9
22	1800	8.6
17	2500	8.2
12.25	3000	7.8

Above tests made with relay in circuit and thermostat contacts closed, and without ignition. Field winding takes 5 amperes at 6.4 volts. Pressure of main brushes on commutator should be 17 to 20 ounces. Pressure of third brush should be 13 to 17 ounces.

Oiling.—Fill generator bearing oil wells with light engine oil every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—Relay closes at 7-10 miles per hour, and opens at 5-8 miles per hour. Air gap between relay contacts is .012 to .015 inch. Air gap between armature (moving member) and coil core is .012 inch to .015 inch, with contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

AUBURN

MODEL 6-39A (1921), 6-51 (1921-22)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Exide, Type 3-XC-15-1, 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model No. 284-B. Distributor Model No. 366-D. Breaker contacts separate .020 to .025 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

Oiling.—Refill the grease cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .030 inch.

STARTER:—Model 705-A, D. Direction of rotation looking at commutator end is clockwise. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 105 R.P.M. Brush spring tension is 16 to 20 ounces.

Starter Data

Torque	R.P.M.	Amperes	Volts
4 lb. ft.	1000	175	5.1
8 lb. ft.	625	280	4.6
12 lb. ft.	350	365	4.3
16 lb. ft.	225	450	3.9
20 lb. ft.	100	510	3.6
24 lb. ft.	Lock	580	3.3

Oiling.—Put 4 or 5 drops of light engine oil in each of the starter oilers about every 2500 miles.

GENERATOR:—Model No. 913-A, B, C, F. Direction of rotation at commutator end is counter-clockwise. Generator current regulation is by third brush system. A thermostat, located in the brush rigging of the generator, cuts a resistance into the shunt field circuit at a temperature of 175° F., reducing the maximum charging rate 9 amperes. The thermostat is intended to regulate the charging rate as demands of the seasons or car operations requires. Never touch the thermostat points. Maximum current output is 21 amperes, reached at 1800 R.P.M. of the armature or 25 miles per hour.

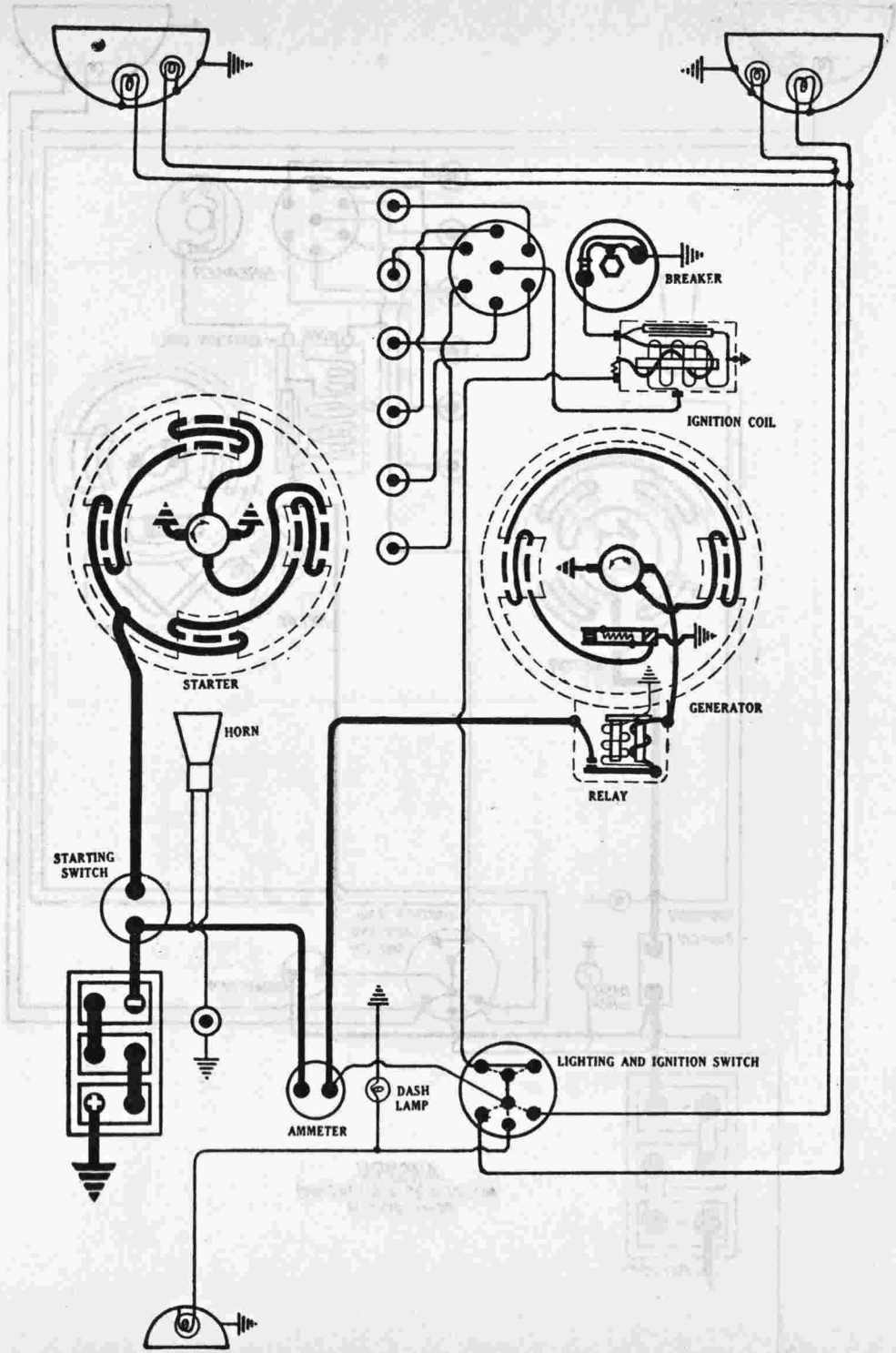
Hot Test			**Generator Data.—913 F.**	Cold Test		
7.0	1100	7.1		7.00	825	7.1
10.0	1800	7.5		19-21	1800	8.5
9.0	2500	7.4		18.5 Max.	2500	8.4

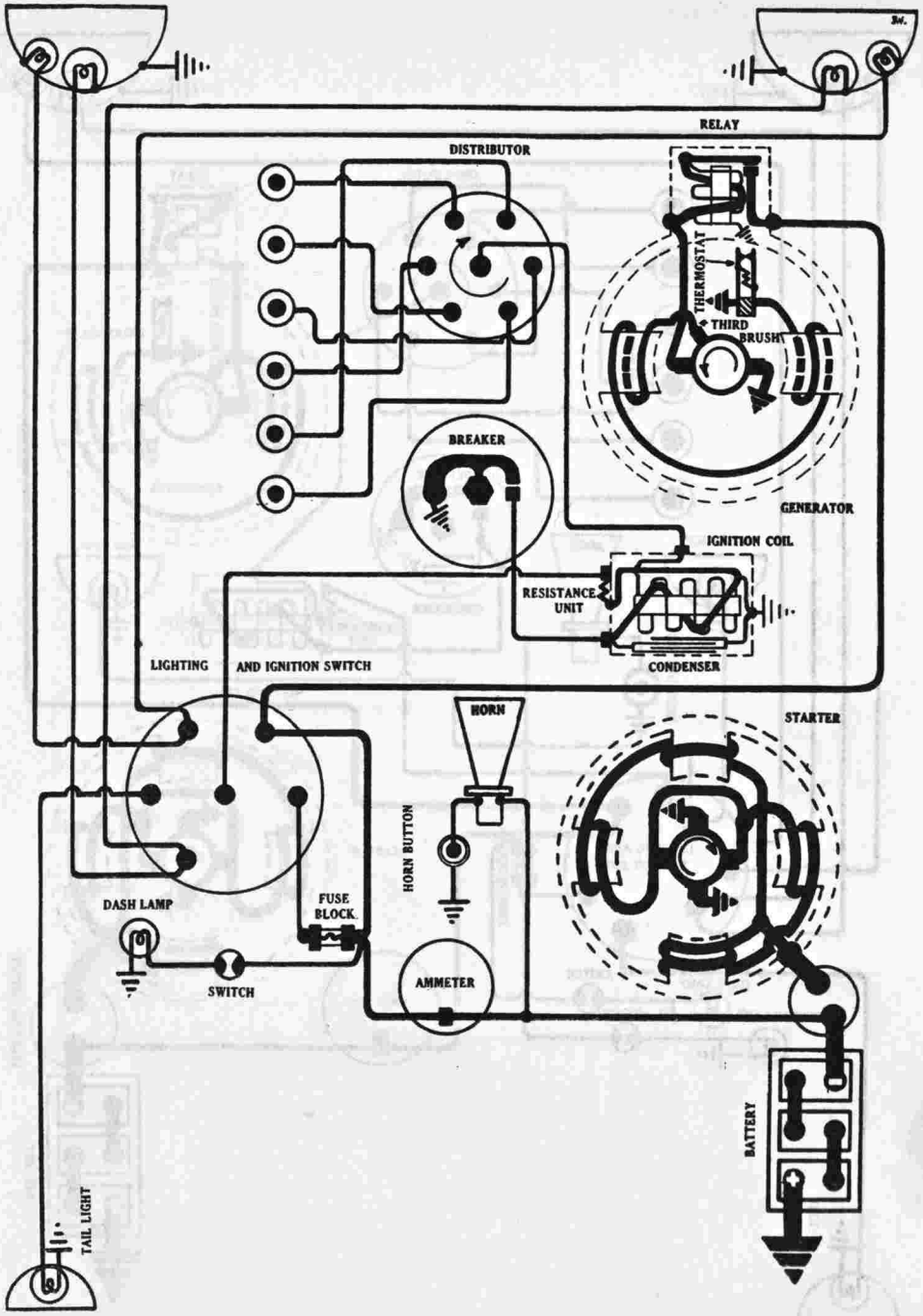
The tension of all the brushes is 14 to 18 ounces. Charging rate is varied by adjusting third brush setting. Third brush is moved by turning a small screw exposed in the commutator end plate. Move the third brush in the direction of armature rotation to increase the charging rate and in the opposite direction to decrease the charging rate. Reseat the brush after adjusting position.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must bedone every 500 miles.

RELAY.—Model No. 264-B. The relay closes at 675 R.P.M. of armature and opens at 625 R.P.M. The contacts separate .012 to .015 inch and the air gap between the coil core and the relay armature is .012 to .015 inch, contacts closed. Clean the contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 20 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.





AUBURN

MODEL 6-43 (1923-24)

REMY GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY.—Exide, Type 3-XC-13-1. 6 volt. Starting capacity is 98 amperes for 20 minutes. Lighting capacity is 5 amperes for 16.8 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model 284-C. Distributor Model 366-N. Breaker contacts separate .020-.025 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine flat jeweler's file. Distributor is of the manual type. Manual advance is 40°.

Oiling:—Refill the grease cup under the distributor head and turn down two turns every two weeks or each 500 miles. Put a small bit of vaseline on the face of the breaker cam under the fiber bumper every two weeks.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 nich. Gaps are .022 inch.

STARTER:—Model 720-J. Starter is connected to the engine through a Bendix drive. Direction of rotation is counter-clockwise, looking at the commutator end . Starter brush tension should be 20-28 ounces each. Starter switch is Model 404-F.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at the commutator end of the starter every month or each 1000 miles.

GENERATOR.—Model 922-A. The direction of rotation is counter-clockwise. looking at the commutator end. Generator current regulation is by the third brush system combined with a thermostat. Thermostat contacts open at 165°F. cutting a resistance into the field circuit and reducing the charging rate by approximately 50%. To adjust the generator charging rate, loosen the small round-headed screw on the generator endplate and shift the third brush mounting bracket. Shifting the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. Tighten the screw after making the adjustments.

Generator Data

	Cold Test			Hot Test	
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	7.2	550			
7	7.2	675	11	8.2	1800
20	8.5	1650			

Shunt field current is 5 amperes at 6 volts. Brush tension should be 16 ounces each.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles.

RELAY:—Model 265-A. Relay contacts close at 550 R.P.M. of the generator when the voltage reaches 7.2 volts and open with a current discharge of 0-2.5 amperes. Contacts separate .014 inch. Air gap between relay armature and coil core is .014 inch, contacts closed.

LIGHTING:—Head and stop lamps are each 6-8 volt, 21 cp. Side, tail and dash lamps are each 6-8 volt, 2 cp.

FUSES:—Lighting fuses are 20 amperes.

AUBURN

MODEL 6-63 (1923-24)

REMY GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY.—Exide, Type 3-XC-15-1. 6 volt. Starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model 284-P. Distributor Model 626-H. Breaker contacts separate .020-.025 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine, flat jeweler's file. Distributor is of the semi-automatic type. Manual advance is 25°. Automatic advance is 30°.

Oiling.—Refill the grease cup under the distributor head and turn down two turns every two weeks or each 500 miles. Put a small bit of vaseline on the face of the breaker cam under the fiber bumper every two weeks.

Timing.—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are ⅞ inch. Gaps are .022 inch.

STARTER.—Model 720-J. Starter is connected to the engine through a Bendix drive. Direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 20-28 ounces each. Starter switch is Model 404-F.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at the commutator end of the starter every month or each 1000 miles.

GENERATOR:—Model 917J and R. Direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system combined with a thermostat. Thermostat contacts open at 165° F. cutting a resistance into the field circuit and reducing the charging rate by approximately 50%. To adjust the generator charging rate, loosen the small round-headed screw on the generator end plate and shift the third brush mounting bracket. Shifting the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. Tighten the screw after making the adjustments.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	7.2	675			
7	7.2	850	11	8.2	1900
19	8.4	1900			

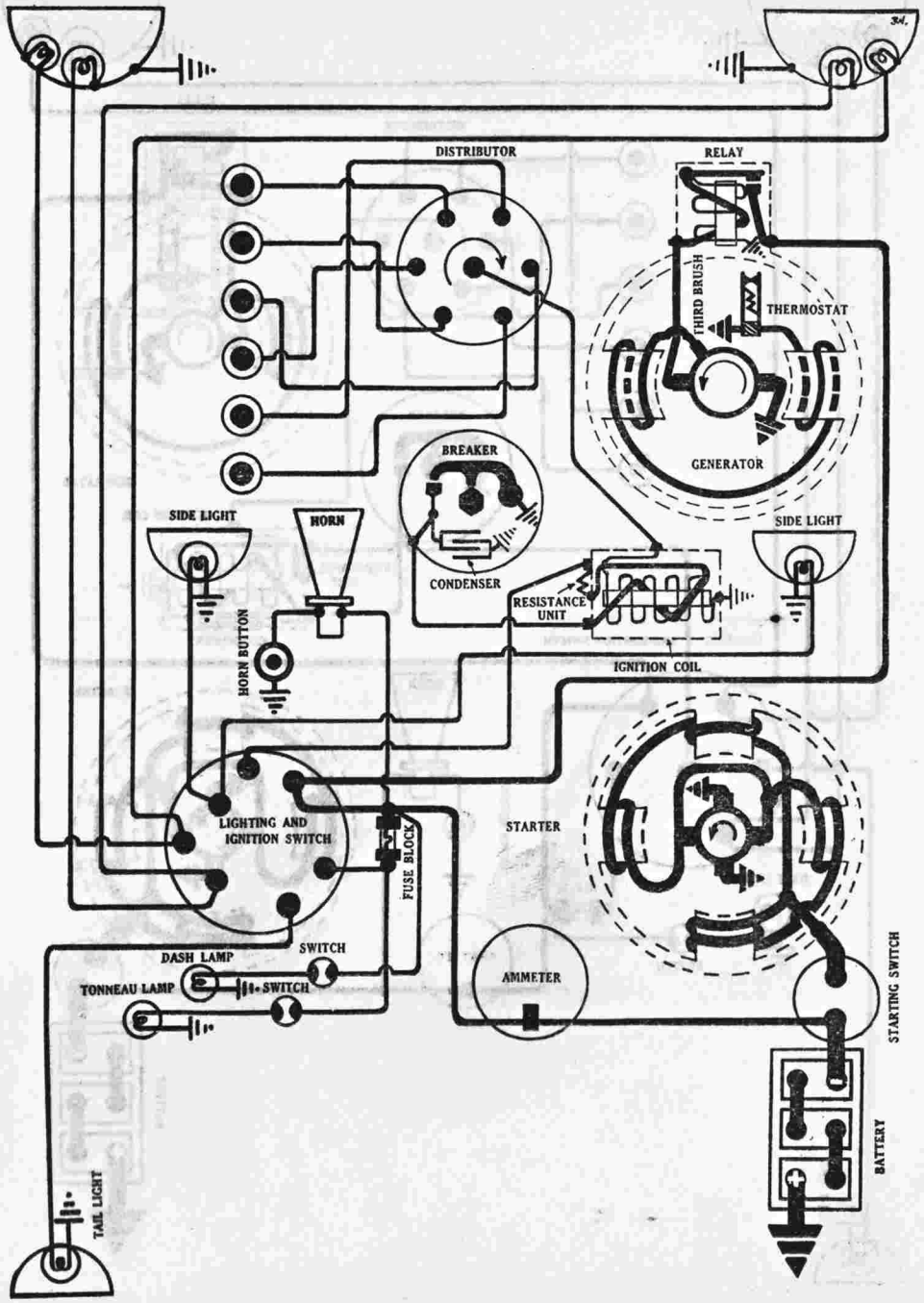
Shunt field current is 5 amperes at 6 volts. Generator brush tension is 22-28 ounces each.

Oiling.—Put 4 or 5 drops of light engine oil in each of generator bearing oilers every month or each 1000 miles.

RELAY.—Model 265-A. Relay contacts close at 675 R.P.M. of the generator when the voltage reaches 7.2 volts and open with a current discharge of 0-2.5 amperes. Contacts separate .014 inch. Air gap between relay armature and coil core is .014 inch, contacts closed.

LIGHTING.—Head and stop lamps are each 6-8 volt, 21 cp. Side, tail and dash lamps are each 6-8 volt, 2 cp. Dome and pillar lamps are each 6-8 volt, 4 cp.

FUSES.—Lighting fuses are 20 amperes.

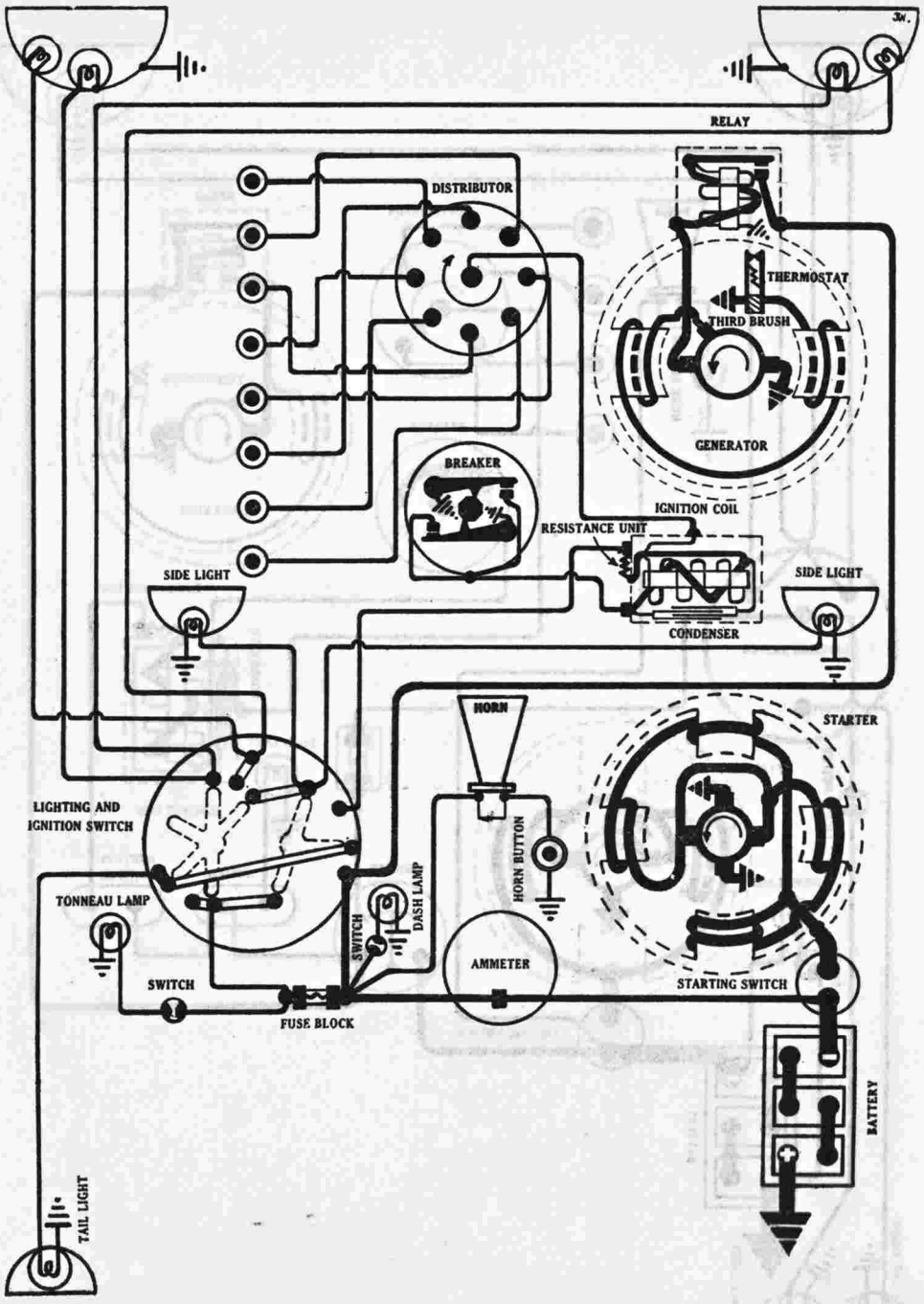


AUBURN

MODEL 8-63 (1925)

REMY GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION



BATTERY.—U. S. L., Type XY-15-X. 6 volt. Starting capacity is 119 amperes for 20 minutes. Lighting capacity is 5 amperes for 20.8 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model 284-L. Distributor Model 648-A. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Distributor has both manual and automatic advance. Manual advance is 20°. Automatic advance is 15°.

Oiling.—Refill the grease cup under the distributor head with medium cup grease and turn down two turns every month or each 1000 miles. Put a small bit of grease on the face of the breaker cam under the fiber bumper every month.

Timing.—Breaker contacts separate when the piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position. The breaker uses double contacts which must be synchronized to open at the same instant. Set stationary contacts on high point of cam and shift plate on which other set of contacts are mounted until they also are on the high point of the cam.

Firing Order.—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .022 inch.

STARTER.—Model 720-J. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 20-28 ounces each. Starting switch is Model 406-A.

Starter Data

Torque	R.P.M.	Amperes	Volts
0 lb. ft.	6000	65	5
15 "	Lock	570	3.15

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles.

GENERATOR.—Model 917-V. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system combined with a thermostat. Thermostat contacts open at 165°F. and cut a resistance into the shunt field circuit, reducing the charging rate approximately 50%. To adjust generator output loosen the round headed screw on the outside of the generator and plate and shift the third brush mounting arm by hand. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. Tighten the screw after making the adjustment.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
2	7.2	675			
7	7.2	850	11	7.5	1900
19	8.4	1800			

Shunt field current is 5 amperes at 6 volts. Generator brush tension should be 22-28 ounces each.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles.

RELAY.—Model 265-B. Relay is mounted on the generator. Relay contacts close at 675 R.P.M. of the generator armature when the voltage reaches 7.2 volts, and open with a discharge current of 0-3 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING.—Switch Model 471-E. Head lamps are each 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Tonneau lamp is 6-8 volt, 4 cp. Dash and tail lamps are each 6-8 volt, 2 cp.

FUSE.—Lighting fuse is 20 amperes.

AUBURN

MODEL 4-44 (1925-26)

REMY GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY.—U. S. L., Type XY-13X. 6 volt. Starting capacity is 102 amperes for 20 minutes. Lighting capacity is 5 amperes for 17.4 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model 284-L. Distributor Model 366-T. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Distributor is of the manual type. Manual advance is 40°.

Oiling.—Fill the grease cup under the distributor head with medium cup grease and turn down two turns every month or each 1000 miles. Put a small bit of grease on the face of the breaker cam under the fiber bumper every month.

Timing.—Breaker contacts begin to separate when piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1-3-4-2.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER.—Model 714-A. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 20-24 ounces. Starting switch is Model 406-A.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
12 "	Lock	3.63	475

Oiling.—Put 4 or 5 drops of light engine oil in the starter bearing oilers every month or each 1000 miles.

GENERATOR.—Model 941-Q. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust charging rate loosen the small round headed screw on the generator end plate and shift the third brush mounting arm by hand. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. Tighten the screw after making the adjustment.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7-7.3	750			
15-17	7.95-8.15	1400	11-14	7.55-7.85	1800
15		2500			

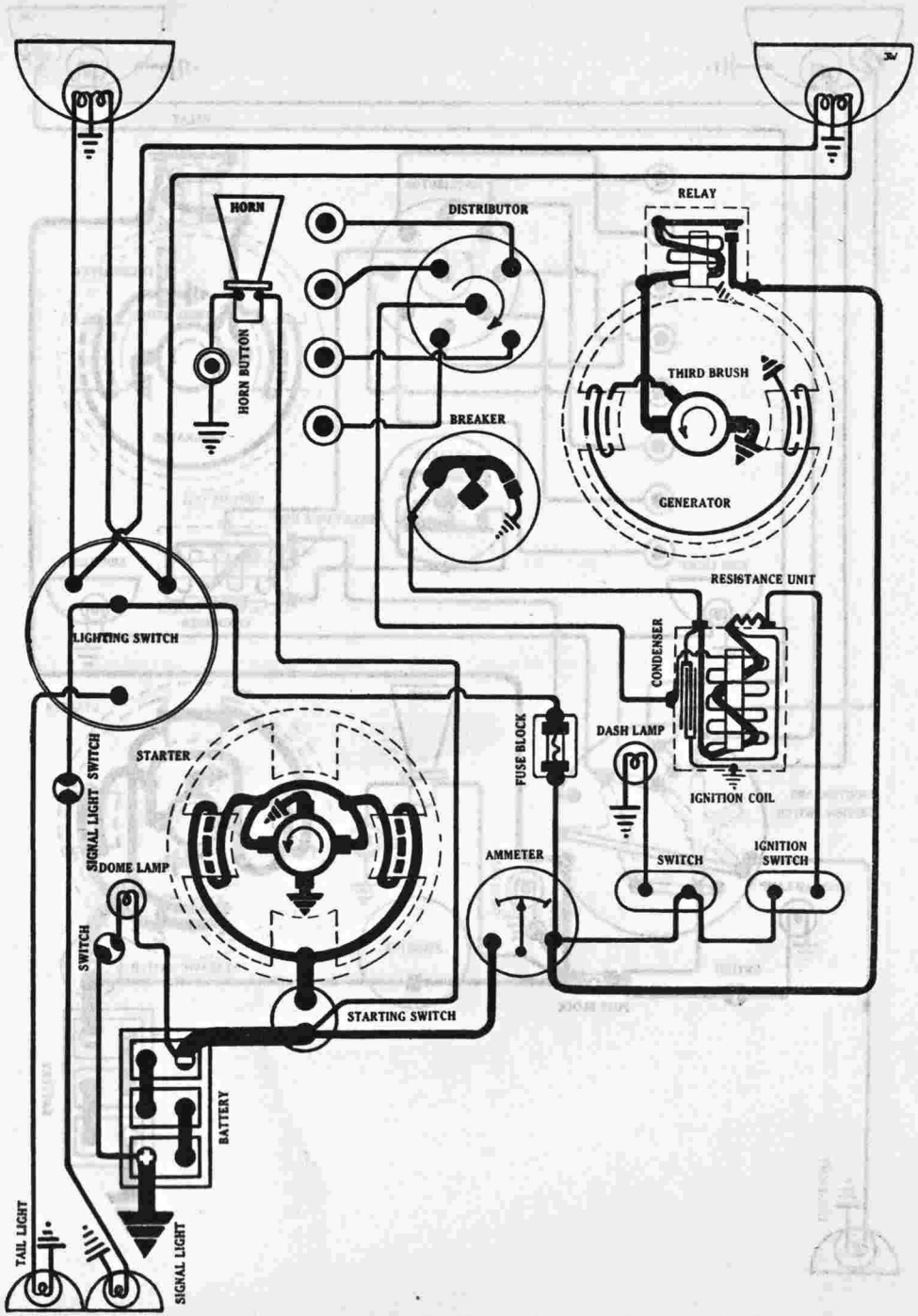
Shunt field current is 5 amperes at 6 volts. Generator brush tension should be 24-28 ounces each.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles.

RELAY.—Model 265-B. Relay is mounted on the generator. Relay contacts close at 675 R.P.M. of the generator armature when the voltage reaches 7.25 volts and open with a current discharge of 0-3 amperes. Charging current at closing of contacts is 2 amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .014-.018 inch, contacts closed.

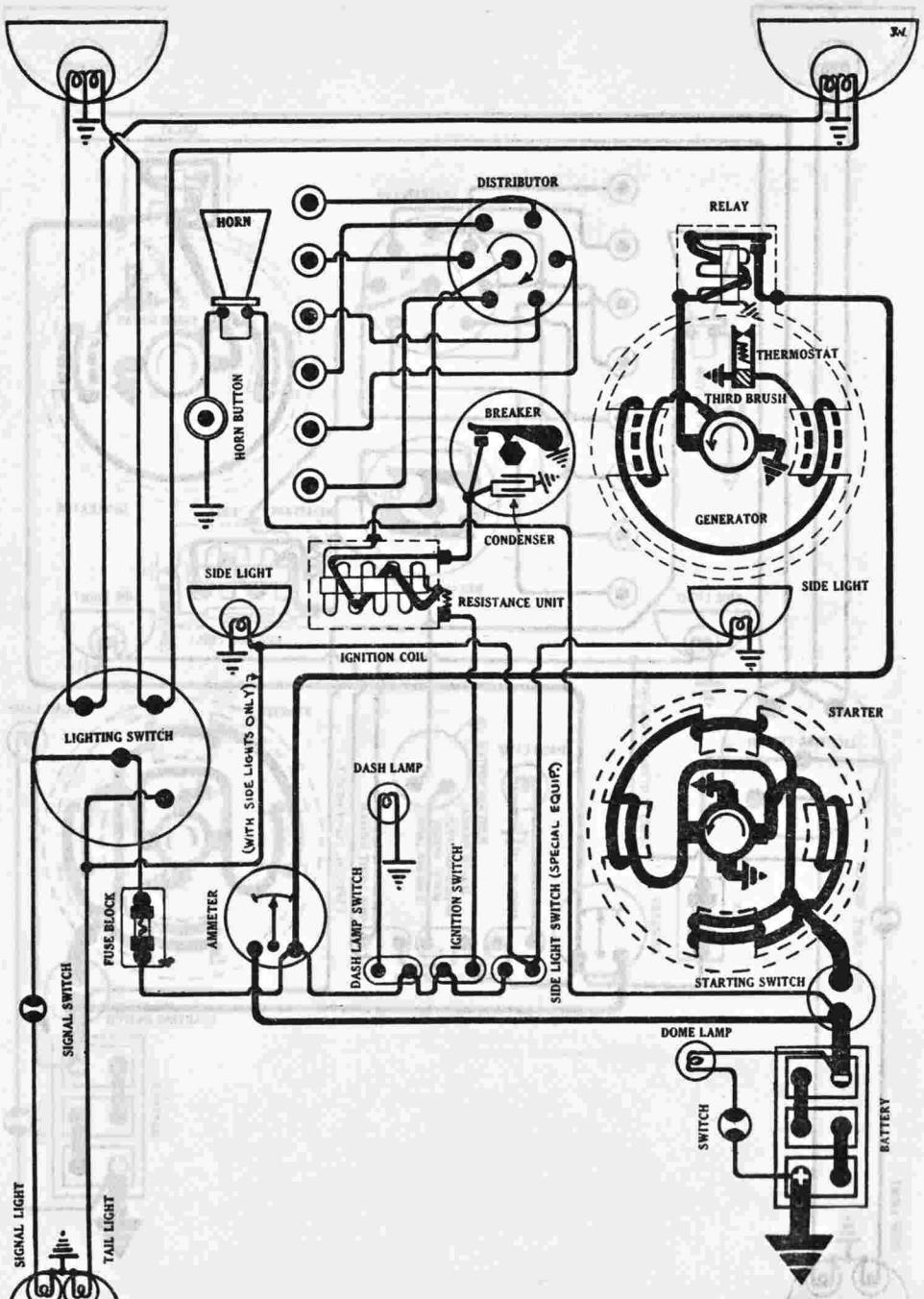
LIGHTING.—Briggs & Stratton Switch Model 39720. Head lamps are 6-8 volt, 21 cp. D.C. with double filament for dimming. Dimmer filaments are 6-8 volt, 2 cp. Dome lamp is 6-8 volt, 4 cp. D.C. Dash and tail lamps are each 6-8 volt, 2 cp. S.C.

FUSES.—Lighting fuses are 20 amperes.



AUBURN

MODEL 6-66 (1925-26)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION



BATTERY.—U. S. L., Type XY-13X. 6 volt. Starting capacity is 102 amperes for 20 minutes. Lighting capacity is 5 amperes for 17.4 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model 284-A. Distributor Model 636-D. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine, flat jeweler's file. Distributor is of the manual and automatic advance type. Manual advance is 25°. Automatic advance is 30°.

Oiling.—Refill the grease cup under the distributor head with medium cup grease and turn down two turns every month or each 1000 miles. Put a small bit of grease on the face of the breaker cam under the fiber bumper of the contact arm every month.

Timing.—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER.—Model 720-J. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 20-28 ounces each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 lb. ft.	Lock	3.15	570

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles.

GENERATOR.—Model 941-D. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system combined with a thermostat. Thermostat contacts open at 165°, cutting a resistance into the shunt field circuit and reducing the charging rate approximately 50%. To adjust charging rate loosen the round headed screw on the outside of the generator end plate and shift the third brush mounting arm. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. Tighten the screw after making the adjustment.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
2	7.25	675			
7	7-7.3	750			
21	8.35-8.5	1450	11	7.5	1900

Shunt field current is 5 amperes at 6 volts. Generator brush tension should be 22-28 ounces each.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles.

RELAY.—Model 265-B. Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 7.25 volts at 675 R.P.M. of the generator armature and open with a discharge current of 0-3 amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING.—Briggs and Stratton Switch Model 39720. Head lamps are 6-8 volt, 21 and 2 cp. D.C. Head lamp bulbs are double filament. Dome lamp is 6-8 volt, 4 cp. D.C. Stop lamp is 6-8 volt, 4 cp. S.C. Dash and tail lamps are 6-8 volt, 2 cp. S.C.

FUSES.—Lighting fuses are 20 amperes.

AUBURN

MODEL 8-88 (1926)

REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—U. S. L., Type XY-15X. 6 volt. Starting capacity is 119 amperes for 20 minutes. Lighting capacity is 5 amperes for 20.8 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model 284-L. Distributor Model 648-B. Breaker contacts separate .022 inch. They are made of tungsten. When the condition of the contacts affects the ignition, resurface on a medium hard oilstone or with a fine, flat jeweler's file.

Oiling.—Fill the grease cup under the distributor head with medium cup grease and turn down two turns every month or each 1000 miles.

Timing.—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position. Set timing with the mark on the flywheel opposite the rib in the chain case, with the distributor fully retarded. Breaker uses double contacts which must be synchronized to open at the same instant. Adjust stationary contact to .022 inch when on the high point of the cam. Then shift mounting plate with movable contact so that it is also on the high point of the cam. The breaker gap must be kept within the limits of .018-.024 inch.

Firing Order.—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER.—Model 720-Q. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 20-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles.

GENERATOR.—Model 941-D. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. A thermostat located in the third brush circuit opens at 165° F. cutting a resistance into the shunt field and reducing the output approximately 50%. To adjust generator output loosen the small round headed screw on the outside of the generator end plate and shift the third brush mounting arm. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. Tighten the screw after making the adjustment.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
2	7.25	675			
7	7-7.3	750	11	7.5	1900
21	8.35-8.5	1450			

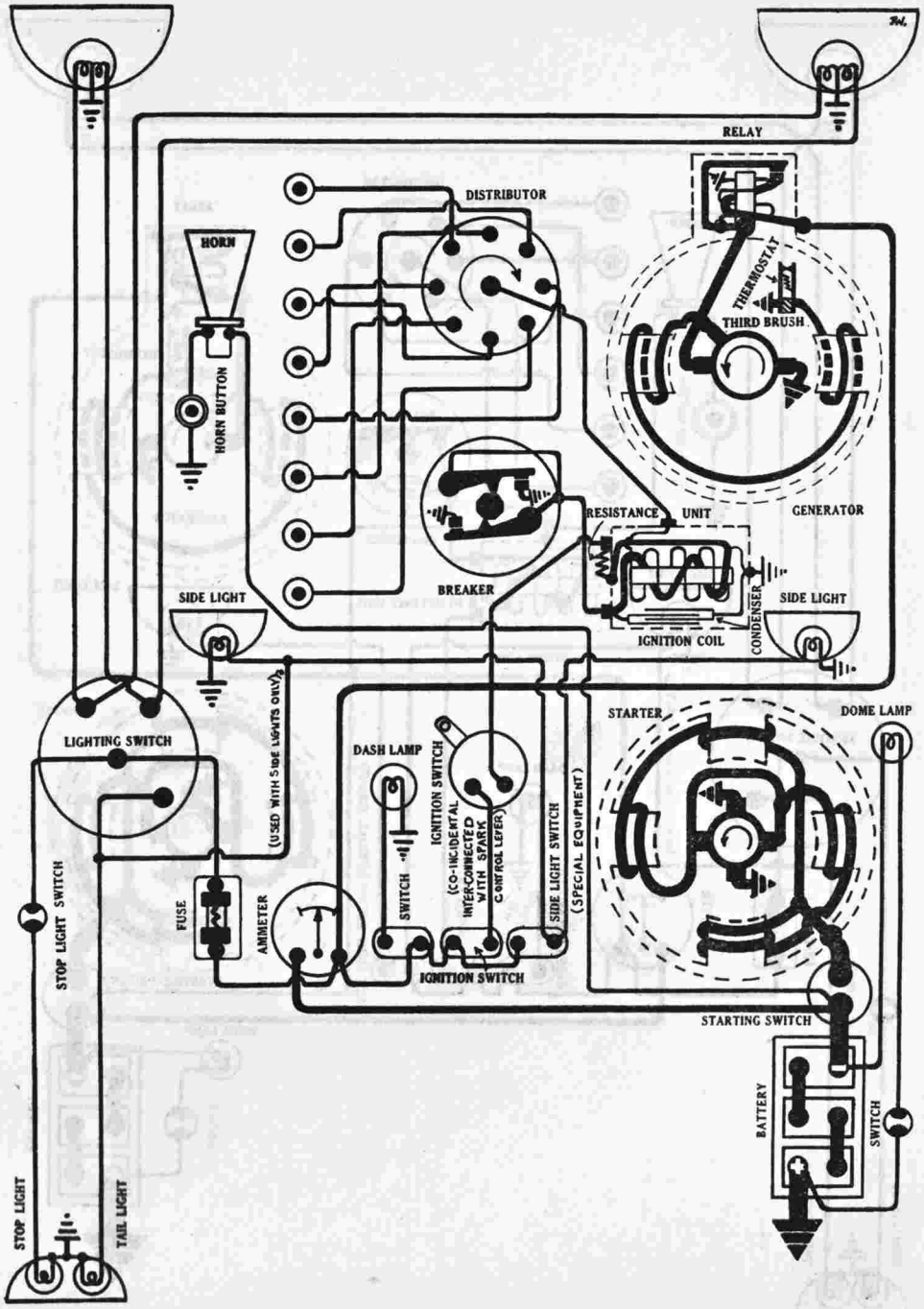
Shunt field current is 5 amperes at 6 volts. Generator brush tension is 22-28 ounces each.

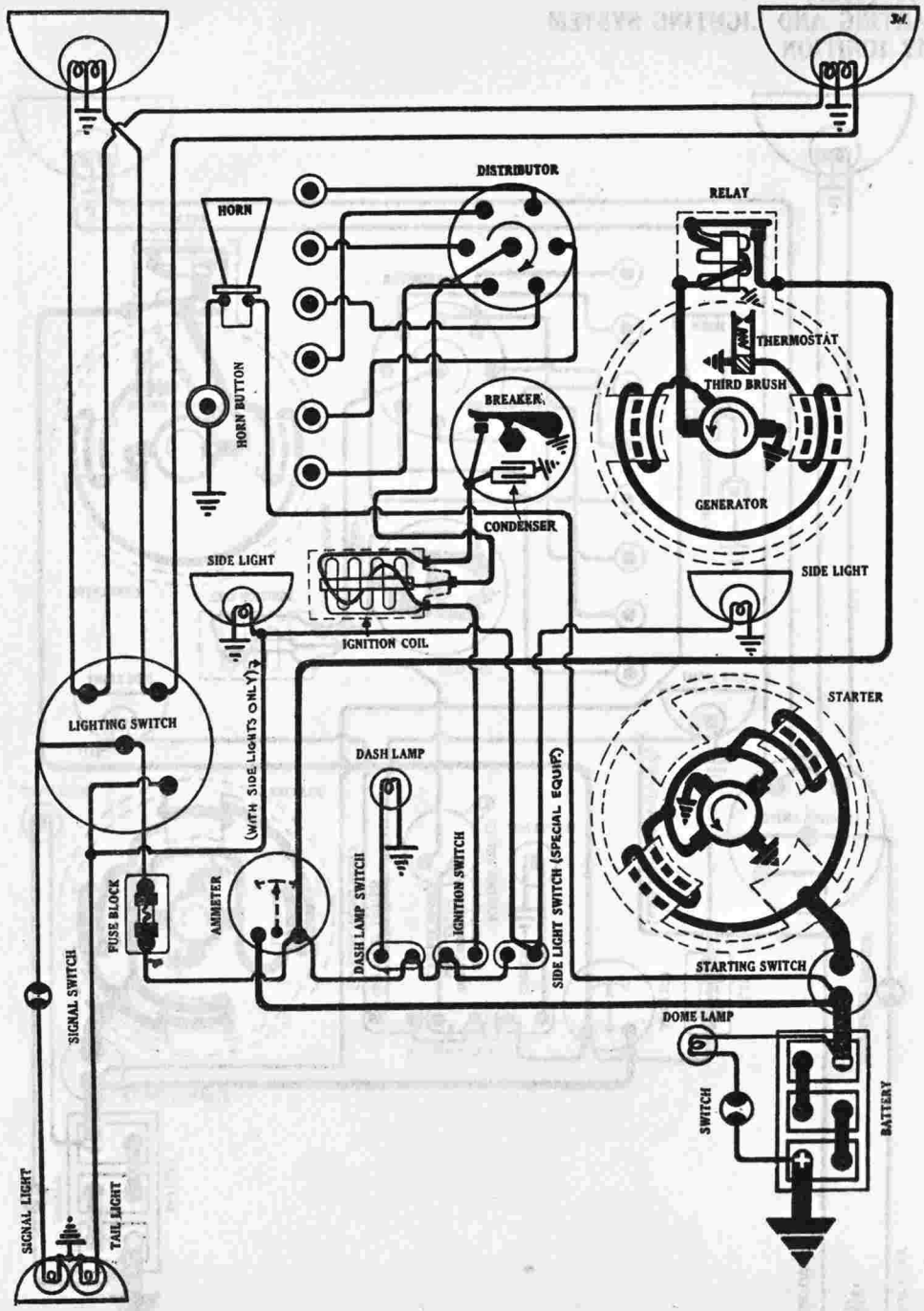
Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every month or 1000 miles.

RELAY.—Model 265-B. Relay is mounted on top of the generator. Relay contacts close at 675 R.P.M. of the generator armature when the voltage reaches 7.25 volts and open with a discharge current of 0-3 amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING.—Briggs & Stratton Switch Model 39720. Head lamps are 6-8 volt 21 cp. Head lamp bulbs have double filament. Dimmer filament is 6-8 volt, 2 cp. Dome lamp is 6-8 volt, 4 cp. D. C. Stop lamp is 6-8 volt, 4 cp. S. C. Dash and tail lamps are 6-8 volt, 2 cp. S. C.

FUSES.—Lighting fuse is 20 amperes.





AUBURN

MODEL 6-66A (1927)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—U. S. L., Type XY-13-X6. 6 volt. Starting capacity is 90 amperes for 20 minutes. Lighting capacity is 5 amperes for 17.4 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model 252-A. Distributor Model 637W. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine flat jeweler's file. Distributor is of the manual and automatic advance type. Manual advance is 22°. Automatic advance is 25°, which starts at 600 R.P.M.

Oiling:—Refill the grease cup under the distributor head with medium cup grease and turn down two turns every month or each 1000 miles. Put a small bit of grease on the face of the breaker cam under the fiber bumper of the contact arm every month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control llever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Model 714E. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 24-28 ounces each. Starter switch model is 406A.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
12 lb. ft.	Lock	3.63	475

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles.

GENERATOR:—Model 940E. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system combined with a thermostat. Thermostat contacts open at 165°, cutting a resistance into the shunt field circuit and reducing the charging rate approximately 50%. To adjust the charging rate, loosen the screw on the end bearing and shift the third brush mounting arm. Shifting the third brush in the counter-clockwise direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. Tighten the screw after making the adqjustment.

Generator Data

Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.5	1450	9-12	7.5	2000

Shunt field current is 4 amperes at 6 volts. Generator brush tension should be 14-18 ounces each.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 7.25 volts at 675 R.P.M. of the generator armature and open with a discharge current of 0- 3amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING:—Briggs and Stratton Switch Model 39720. Head lamps are 6-8 volt, 21 and 2 cp. D.C. Head lamp bulbs are double filament. Dome lamp is 6-8 volt, 4cp. D.C. Stop lamp is 6-8 volt, 4 cp. S.C. Dash and tail lamps are 6-8 volt, 2 cp. S.C.

ACCESSORIES:—Rochester gas gauge. National Gauge ammeter.

FUES:—Lighting fuses are 20 amperes.

AUBURN

MODEL 8-77 (1927)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—U. S. L., Type XY-13 X 6, 6 volt. Starting capacity is 90 amperes for 20 minutes. Lighting capacity is 5 amperes for 17.4 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model 525-A. Distributor Model 658-B. Breaker contacts separate .022 inch. They are made of tungsten. When the condition of the contacts affects the ignition, resurface on a medium hard oilstone or with a fine flat jewelr's file. Distributor is of the manual and automatic advance type. Manual advance is 22° and automatic advance is 25°.

Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down two turns every month or each 1000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position. Set timing with the mark on the flywheel opposite the rib in the chain case, with the distributor fully retarded. The other set of contacts should open exactly 45° after this point. They may be checked by a special tool furnished by the manufacturer.

Valve Timing:—INLET VALVES:—Head diameter, 1⅜ inches; stem diameter, 11/32 inch; stem length, 5⅞ inch; tappet clearance, .006-.008 inch hot; spring pressure, 36 pounds closed; valve lift, 11/32 inch; intake opens at top dead center, and closes 40° after lower dead center.

EXHAUST VALVES:—Head diameter, 1¼ inches; stem diameter, 11/32 inch; stem length, 5⅞ inches; tappet clearance, .006-.008 inch hot; spring pressure, 36 pounds closed; valve lift, 11/32 inch; exhaust opens 50° before lower dead center, and closes 10° after top dead center. The guide stems are removable. Oversize valve stems are made.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

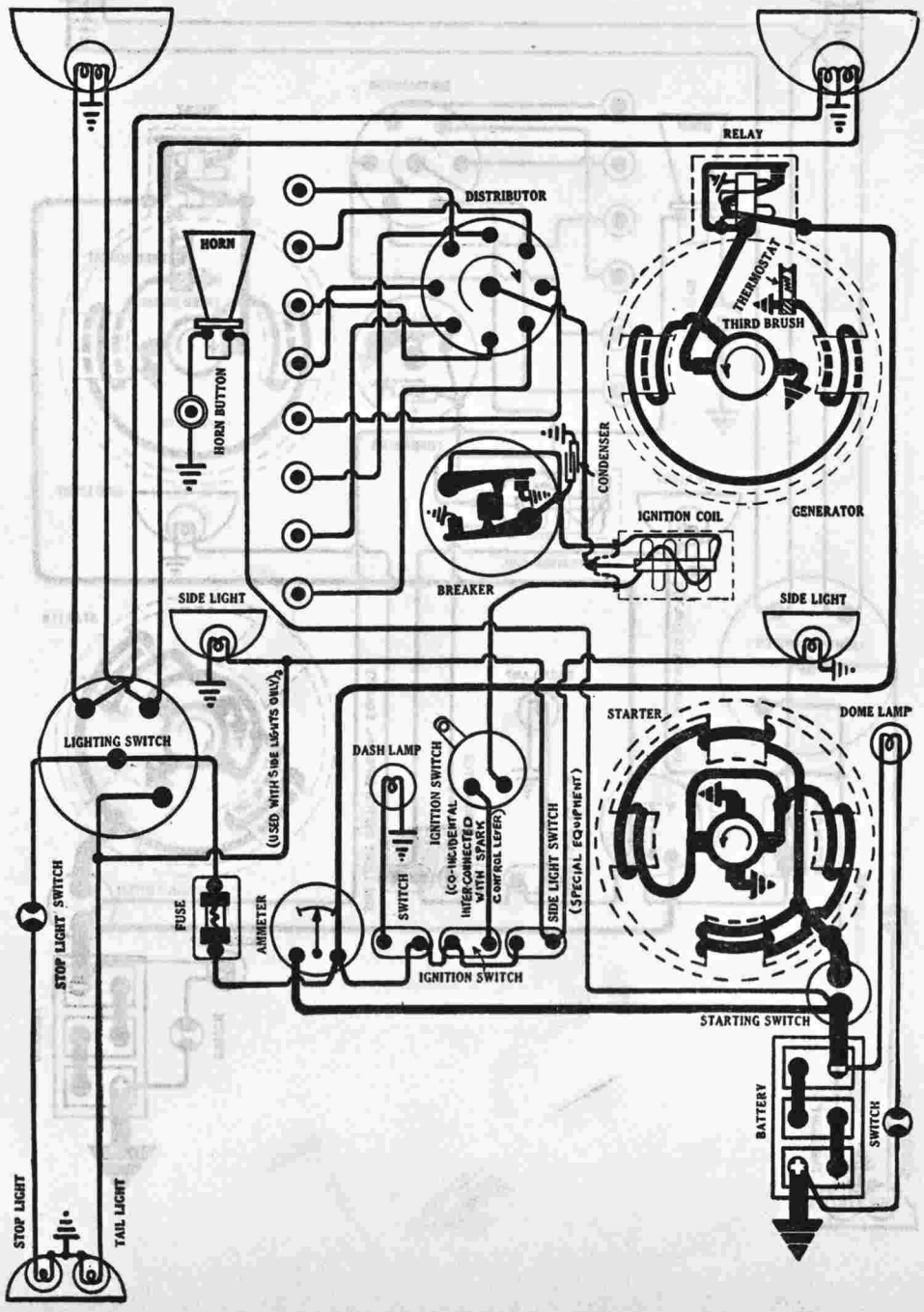
STARTER:—Model 716-A. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
12 lb. ft.	Lock	3.63	475

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles.

GENERATOR:—Model 949-B. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. A thermostat located in the third brush circuit opens at 165°F. cutting a resistance into the shunt field and reducing the output approximately 50%. To adjust generator output loosen the small round-headed screw on the outside of the generator endplate and shift the third brush mounting arm. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. Thighten the screw after making the adjustment.



AUBURN

MODEL 8-77 (1927)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

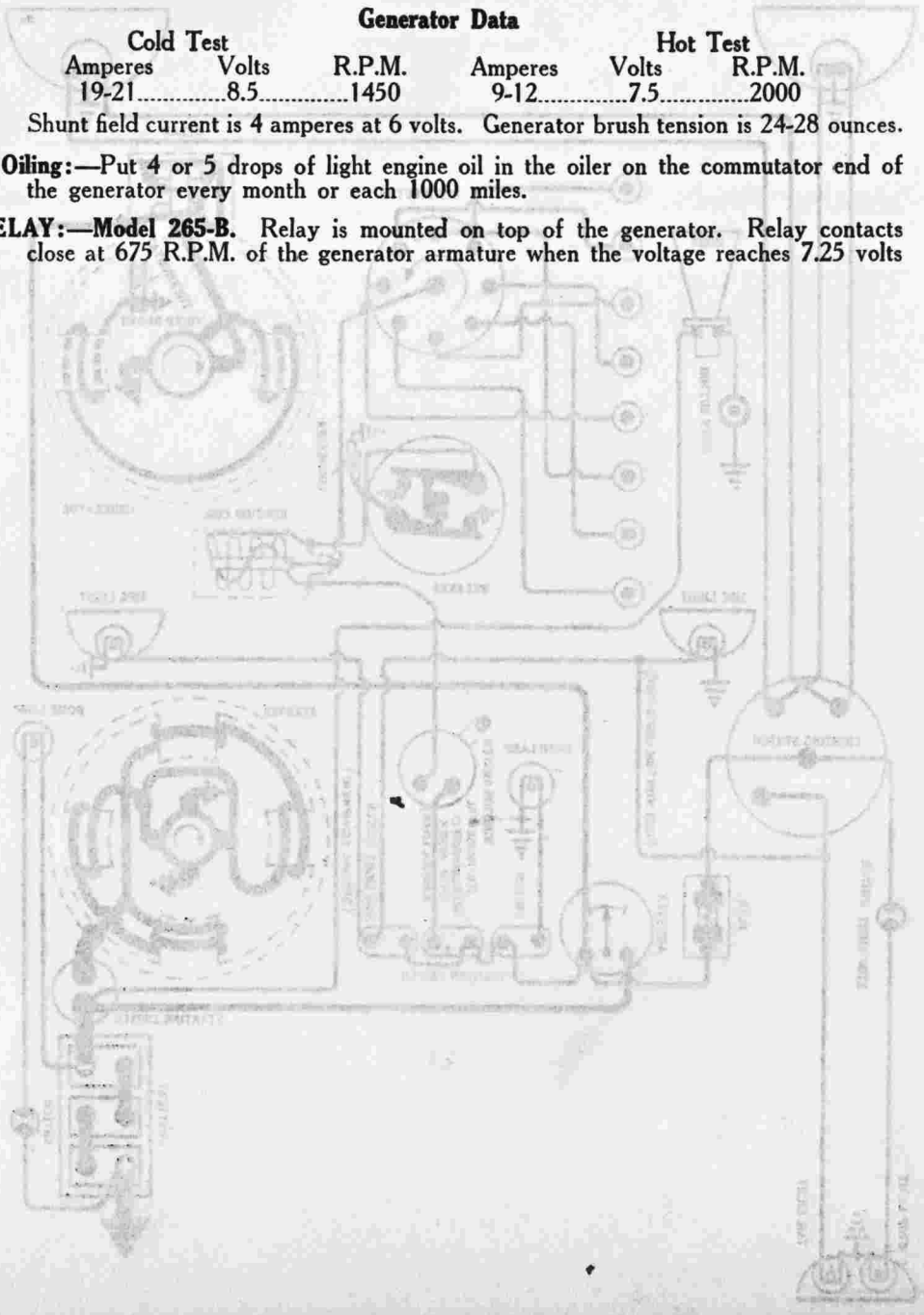
Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.5	1450	9-12	7.5	2000

Shunt field current is 4 amperes at 6 volts. Generator brush tension is 24-28 ounces.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay contacts close at 675 R.P.M. of the generator armature when the voltage reaches 7.25 volts and open with a discharge current of 0-3 amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed. ....



LIGHTING:—Briggs & Stratton Switch, Model 39720. Head lamps are 6-8 volt, 21 cp. Head lamp bulbs have double filament. Dimmer filament is 6-8 volt, 2 cp. Dome lamp is 6-8 volt, 4 cp. D.C. Stop lamp is 6-8 volt, 4 cp. S.C. Dash and tail lamps are 6-8 volt, 2 cp. S.C.

FUSES:—Lighting fuse is 20 amperes.

ACCESSORIES:—National Gauge gas gauge; Cuno cigar lighter; National Gauge ammeter.

AUBURN

MODEL 8-88 (1927)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—U. S. L., Type XY-13 X 6. 6 volt. Starting capacity is 90 amperes for 20 minutes. Lighting capacity is 5 amperes for 17.4 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model 525-A. Distributor Model 658-A. Breaker contacts separate .022 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 15 degrees. Automatic advance begins at 300 R.P.M. Maximum automatic advance is 17 degrees reached at 1800 R.P.M. Breaker uses two sets of contacts on a four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This firing interval is very important and must be correctly set. See Synchronization of Contacts.

Mounting:—Distributor is mounted on top of the engine block. To remove distributor, disconnect breaker leads and remove high tension cables or remove distributor head. Then loosen distributor clamp screw under distributor cup and lift distributor from place.

Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down two turns every month or each 1000 miles.

Synchronization of Contacts:—Contacts must be synchronized to secure proper firing interval of 45 degrees between opening of each set of contact. Use Delco-Remy Tool. Part No. 820738, and follow directions on Page S-30 on synchronizing these breakers. Contacts can be synchronized without tool after distributor is timed to engine. With one set of contacts adjusted to open with piston No. 1 on top dead center, crank engine over 90 degrees until piston No. 6 reaches top dead center. The second set of contacts should begin to open at this point. Adjust by loosening two lock screws on breaker plate and turning eccentric adjusting screw until contacts begin to separate. Tighten the lock screws and check contact opening. If it is outside limits of .018-.024 inch, reset contact opening and repeat synchronizing operation.

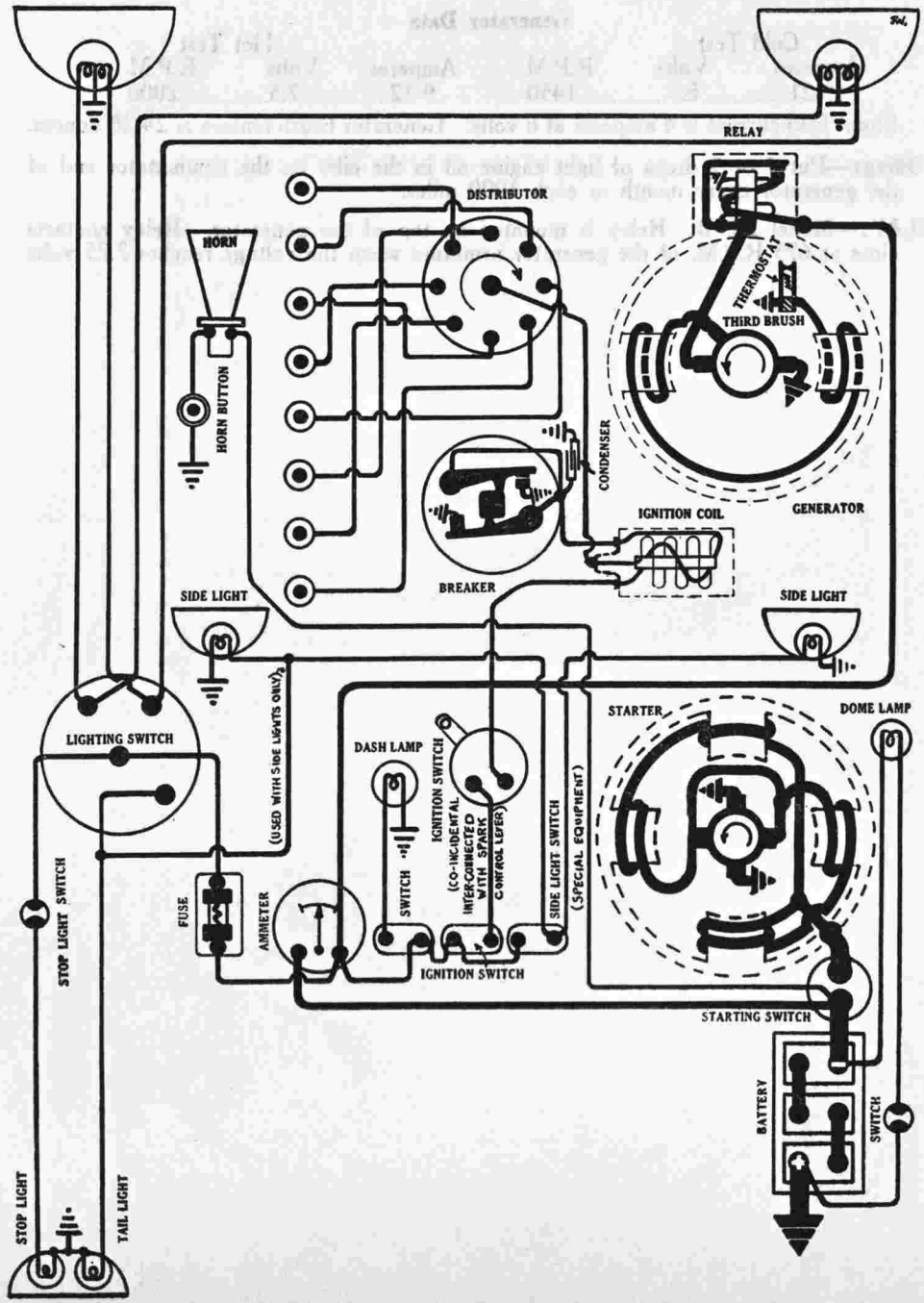
Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position. Set timing with the mark on the flywheel opposite the rib in the chain case with the distributor fully retarded. The other set of contacts should open exactly 45° after this point. They may be checked by a special tool furnished by the manufacturer.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Sparg plug diameters are 7/8 inch. Gaps are .025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter is 1 15/32 inches; stem diameter is 11/32 inch; stem length is 5½ inches. Tappet clearance is .006 inch (hot). Spring pressure is 36 pounds with valves closed. Inlet valves open at top dead center and close at 35 degrees after lower dead center.
EXHAUST VALVES:—Head diameter is 1 15/32 inches; stem diameter is 11/32 inch; stem length is 5½ inches. Tappet clearance is .006 inch (hot). Spring pressure is 36 pounds with valves closed. Exhaust valves open 42 degrees before lower dead center and close 5 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are made.

STARTER:—Model 720-Q. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 24-28 ounces.



AUBURN

MODEL 8-88 (1927)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

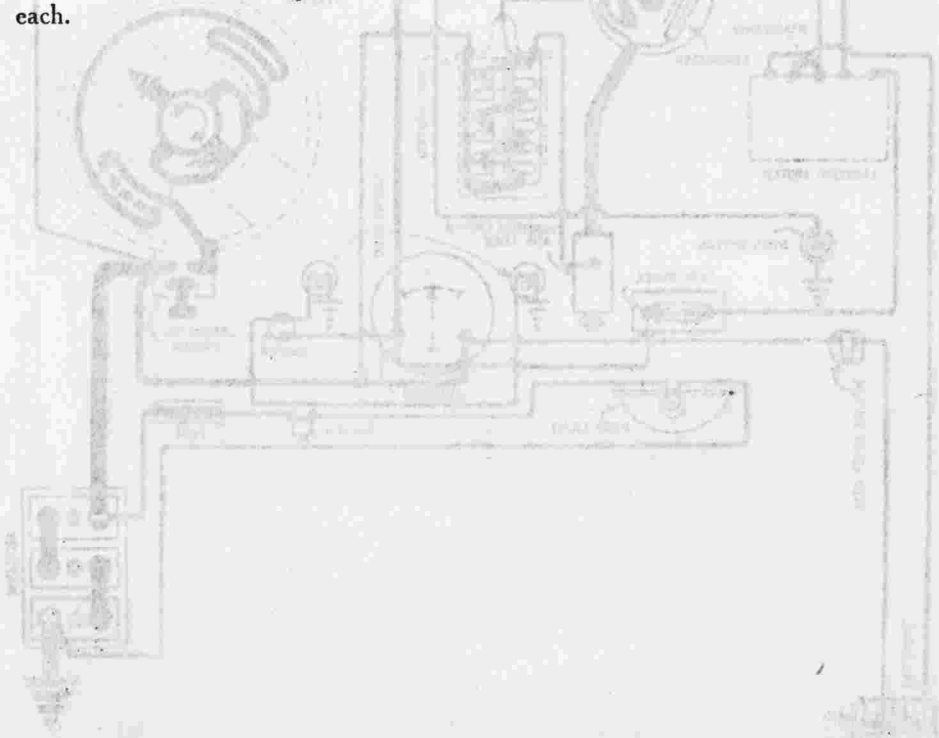
Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles.

GENERATOR:—Model 949-A. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. A thermostat located in the third brush circuit opens at 165°F. cutting a resistance into the shunt field and reducing the output approximately 50%. To adjust generator output loosen the small round headed screw on the outside of the generator end plate and shift the third brush mounting arm. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the carging rate. Tighten the screw after making the adjustment.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.5	1450	9-12	7.5	2000

Shuntfield current is 4 amperes at 6 volts. Generator brush tension is 24-28 ounces each.



Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay contacts close at 675 R.P.M. of the generator armature when the voltage reaches 7.25 volts and open with a discharge current of 0-3 amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING:—Briggs & Stratton Switch Model 39720. Head lamps are 6-8 volt 21 cp. Head lamp bulbs have double filament. Dimmer filament is 6-8 volt, 2 cp. Dome lamp is 6-8 volt, 4 cp. D.C. Stop lamp is 6-8 volt, 4 cp. S.C. Dash and tail lamps are 6-8 volt, 2 cp. S.C.

FUSES:—Lighting fuse is 20 amperes.

ACCESSORIES:—National Gauge gas gauge; Cuno cigar lighter; National Gauge ammeter.

AUBURN

MODEL 76 (1928)

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—U.S.L., Type XY-13X-6, 6 volts, 13 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 90 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted on right frame member under front seat.

IGNITION:—Coil Model 525-C. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped. Coil is mounted on the dash.

Distributor Model 641-A. Breaker contacts separate .020 inch with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 22 degrees reached at 2600 R.P.M. Breaker arm spring tension is 17-21 ounces.

Mounting:—Distributor is mounted on cylinder head. To remove distributor, disconnect manual advance rod and primary lead and remove head with cables intact. Then use a pry under extension on distributor sleeve; prying lightly and tapping opposite side of sleeve will pull the distributor out of motor head. Electrolock Type 5A is used.

Oiling:—Turn grease cup one complete turn every 1000 miles. Refill with good grade of medium cup grease.

Timing:—To replace distributor after removing, take out large pipe plug in flywheel housing at starter flange; turn motor over until No. 1 piston is coming up on the compression stroke, turn over slowly and watch flywheel markings through plug hole, stop turning when mark '1-6 D.C.' lines up in hole; adjust distributor so as to be ready to break on No. 1; press distributor sleeve into place with extension straight out at right angle to motor; rock distributor shaft slightly so as to engage shaft coupling without damage.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Gaps are .025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1 3/8 inches; stem diameter, 11/32 inch; stem length, 5 25/32 inches. Valve lift, 11/32 inch. Spring pressure, 47 pounds. Tappet clearance, .006-.008 inch. Inlet valves open at top dead center and close 45 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 1/4 inches; stem diameter, 11/32 inch; stem length, 5 25/32 inches. Valve lift, 11/32 inch. Spring pressure, 36 pounds. Tappet clearance, .006-.008 inch. Exhaust valves open 50 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

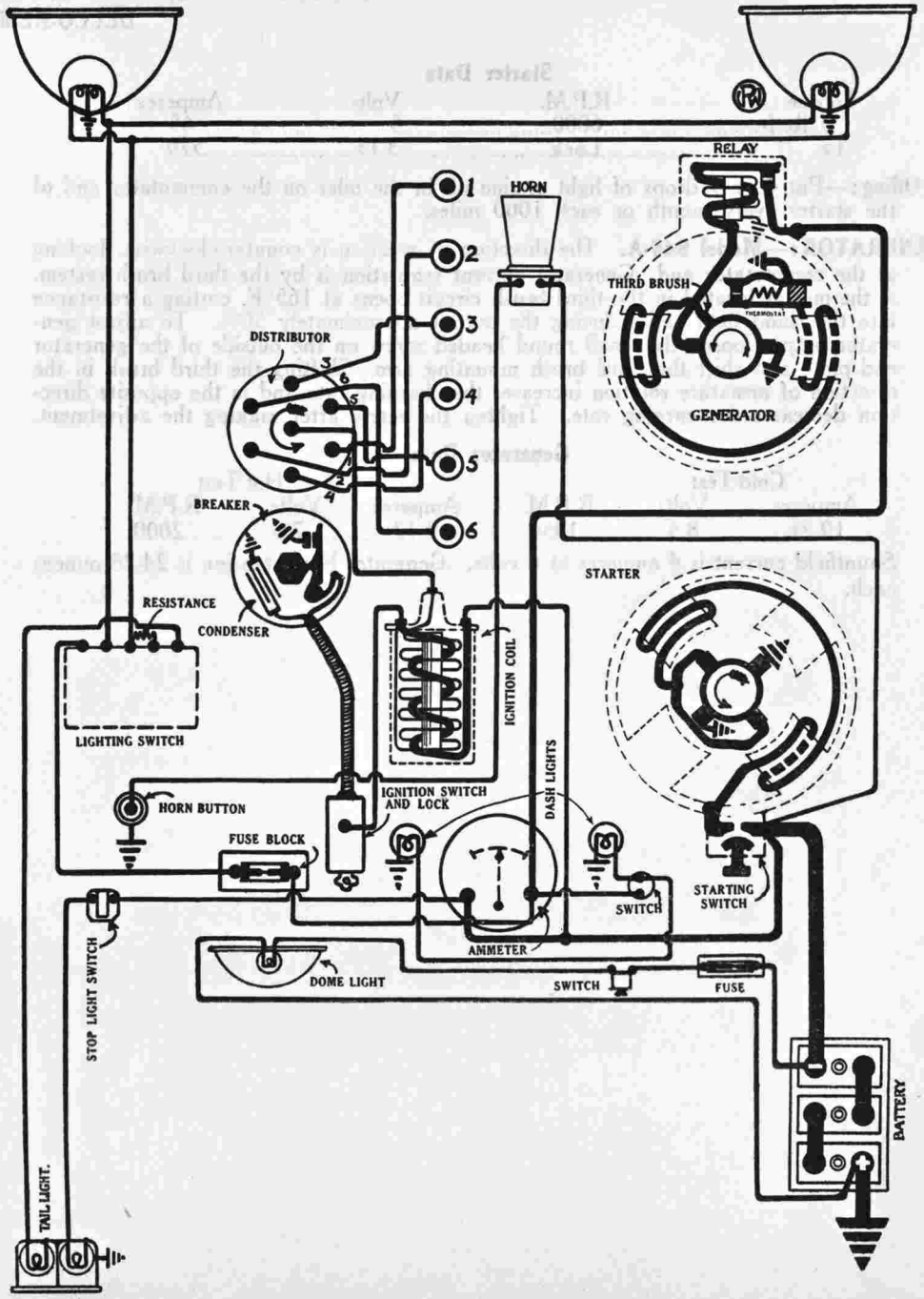
STARTER:—Model 716-C. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	5	70
15 "	Lock	3.7	450

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, remove cable, take out fulcrum pin in switch lever, take out the 3 cap screws on flange and lift out starter.

Oiling:—Put 4 or 5 drops of light oil in the oiler on the commutator end of the starter every 1000 miles. The drive end bearing is oilless.



AUBURN

MODEL 76 (1928)

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

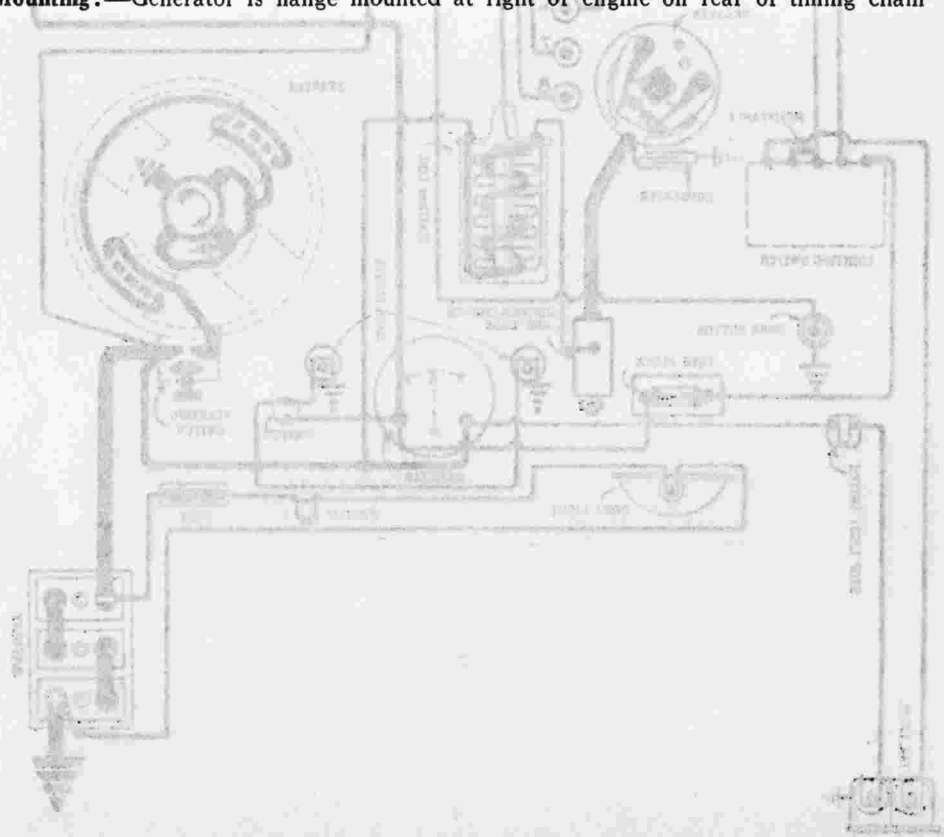
GENERATOR:—Model 949-C. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165 degrees F. putting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, maximum charging rate is 21 amperes (cold) or 12 amperes (hot) reached at 1450 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.5	1450	9-12	7.5	2000

Motoring generator draws 5 amperes at 6 volts. Shunt field current is 4 amperes at 6 volts. Brush spring tension is 24-28 ounces.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, loosen mounting bracket screws; push generator and water pump towards crank case, pry off belt. Remove water and oil connections to pump; take out generator mounting screws, lift out generator and pump assembly. Radiator must be drained before the pump can be removed.



Oiling:—Put 4 or 5 drops of light oil in the generator oilers every 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay closes at 575 R.P.M. of armature or 12 M.P.H. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current is approximately 2 amperes at closing of contacts. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Soreng-Manigold Switch, Model 360-A. Switch is mounted at lower end of steering column. Head lights are 6-8 volt, 21 and 3 cp. (special double filament bulbs using 3 cp. filament for dimming). Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dome light is 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Lighting fuse is 20 amperes.

AUBURN

MODEL 88 (1928)

DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—U.S.L., Type XY-13X-6, 6 volt, 13 plates. The starting capacity (20 minutes rate) is 90 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted on right frame member under front seat. The positive (+) terminal is grounded.

IGNITION:—Coil Model 525-C. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped. Ignition coil is mounted on the dash.

Distributor Model 657-E. Breaker contacts separate .022 inch with breaker arm on lobe of cam. Adjust contact opening by loosening lock screw on stationary contact plate and turning eccentric adjusting screw to secure proper opening. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. There are two sets of contacts on a four sided cam opening alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This firing interval must be correctly set. See Timing. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 15-17½ degrees reached at 2000 R.P.M.

Mounting:—Distributor is mounted on cylinder head. To remove distributor, disconnect manual advance rod and primary lead and remove head with cables intact. Then use a pry under extension on distributor sleeve. Prying lightly and tapping opposite side of sleeve will pull the distributor out of the motor head. Electrolock Type 5A is used.

Oiling:—Turn grease cup one complete turn every 1000 miles. Refill with good grade medium cup grease.

Timing:—Synchronization of Contacts. To synchronize contacts, use Delco-Remy Tool, Part No. 820738, and follow directions on Page S-2. Contacts can be synchronized without tool after distributor is correctly timed to engine by cranking engine over 90 degrees from firing position of piston No. 1 when piston No. 6 will reach top dead center entering power stroke. The second set of contacts should separate at this point. If they do not, loosen lock screws on breaker plate and turn eccentric adjusting screw until contacts begin to separate. Check contact opening with breaker arm on lobe of cam. If it is not within limits of .018-.024 inch, reset contact opening at .022 inch and repeat synchronization.

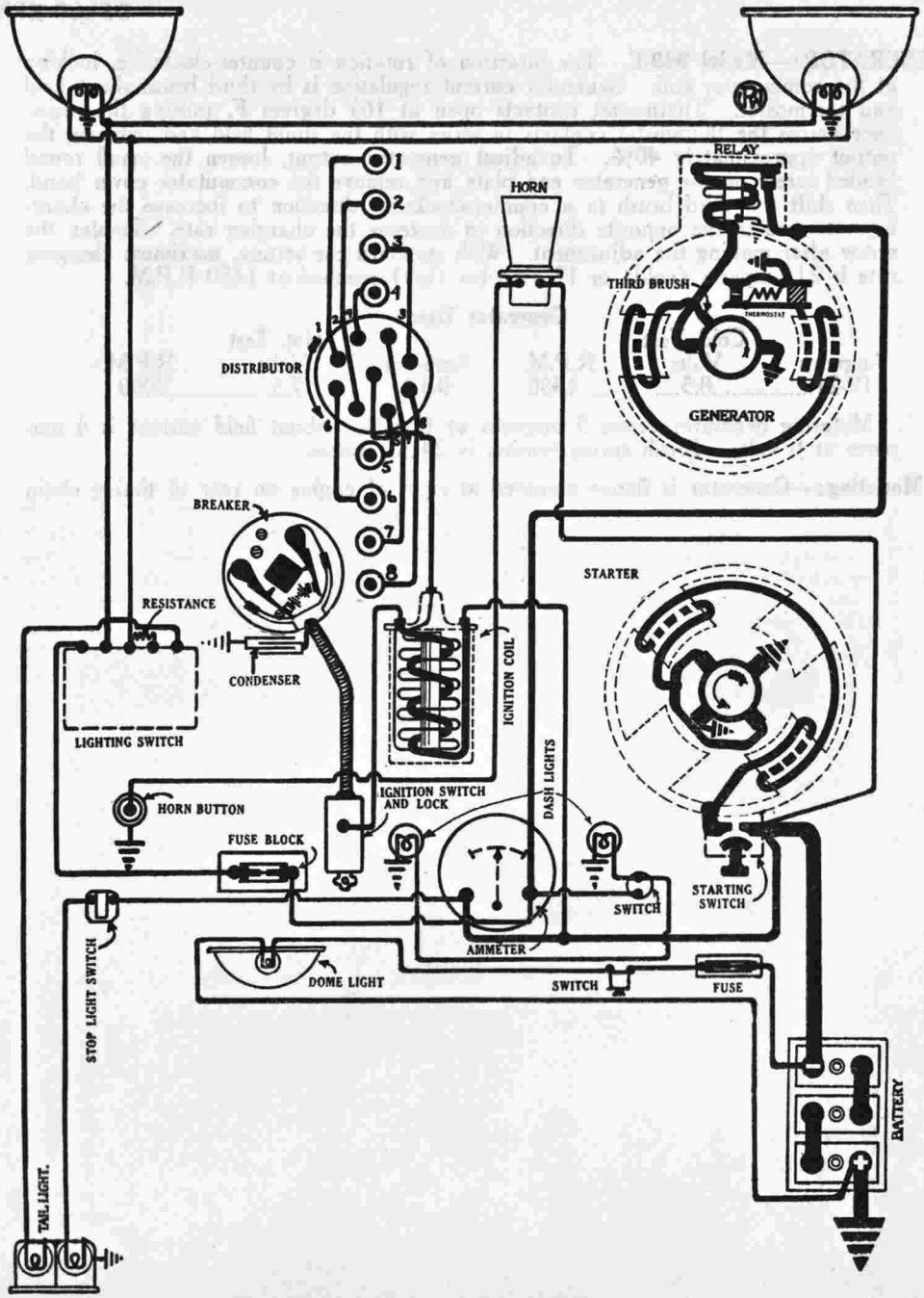
To Time Distributor to Engine:—Remove large pipe plug in flywheel housing at starter flange; turn motor over until No. 1 piston is coming up on the compression stroke, turn over slowly and watch flywheel markings through plug hole, stop turning when mark '1-8 D.C.' lines up in hole; adjust distributor so as to be ready to break on No. 1; press distributor sleeve into place with extension straight out at right angles to motor, rock distributor shaft slightly so as to engage shaft coupling without damage.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are .025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1⅜ inches; stem diameter, 11/32 inch; stem length, 5 25/32 inches. Valve lift, 11/32 inch. Spring pressure, 47 pounds. Tappet clearance, .006-.008 inch. Inlet valves open at top dead center and close 45 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1¼ inches; stem diameter, 11/32 inch; stem length, 5 25/32 inches. Valve lift, 11/32 inch. Spring pressure, 36 pounds. Tappet clearance, .006-.008 inch. Exhaust valves open 50 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are not made.



AUBURN

MODEL 88 (1928)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

STARTER:—Model 716-C. The starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 24-28 ounces.

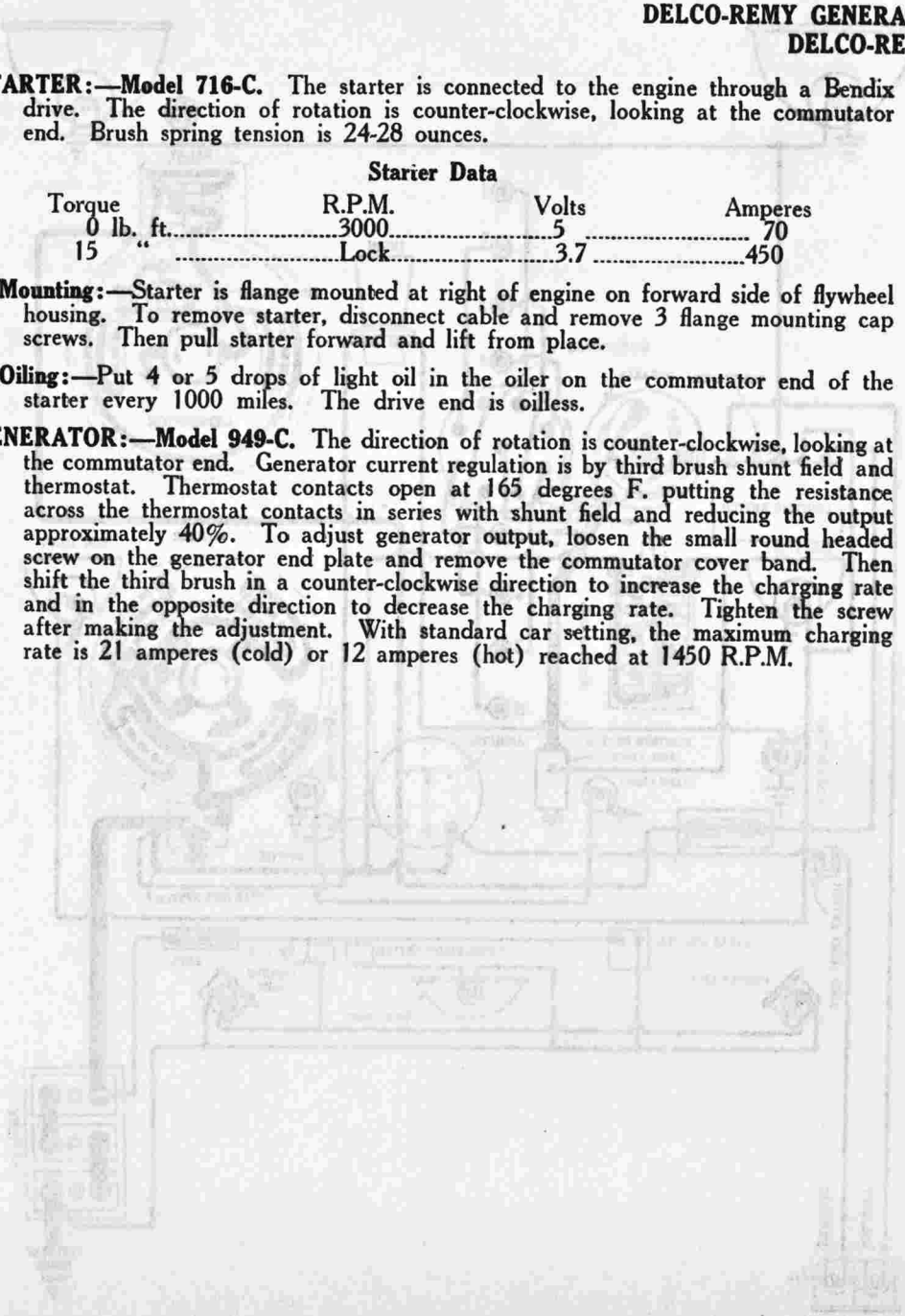
Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	5	70
15 "	Lock	3.7	450

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove 3 flange mounting cap screws. Then pull starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light oil in the oiler on the commutator end of the starter every 1000 miles. The drive end is oilless.

GENERATOR:—Model 949-C. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165 degrees F. putting the resistance across the thermostat contacts in series with shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 21 amperes (cold) or 12 amperes (hot) reached at 1450 R.P.M.



Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.5	1450	9-12	7.5	2000

Motoring generator draws 5 amperes at 6 volts. Shunt field current is 4 amperes at 6 volts. Brush spring tension is 24-28 ounces.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, loosen mounting bracket screws, push generator and water pump assembly towards crank case, pry off belt. Remove water and oil connections to pump. Take out the generator mounting screws; lift out generator and pump assembly. Radiator must be drained before the pump can be removed.

Oiling:—Put 4 or 5 drops of light oil in the generator oilers every 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay closes at 575 R.P.M. or 12 M.P.H. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Soreng Manigold Switch Model 360-A. Switch is mounted on lower end of steering column. Head lights are 6-8 volt, 21 and 3 cp. (double filament bulbs using 3 cp. filament for dimming). Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dome light is 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Lighting fuse is 20 amperes capacity.

AUBURN

MODEL 115 (1928)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—U.S.L., Type XY-15X-6, 6 volt, 15 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 119 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 21 hours. Battery is mounted on right frame member under front floor boards.

IGNITION:—Coil Model 525-A. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped. Coil is mounted on the engine side of the dash.

Distributor Model 657-D. Breaker contacts separate .022 inch. To adjust contact opening, loosen lock screw on stationary contact plate and turn eccentric adjusting screw until proper contact opening is secured. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. There are two sets of contacts on a single cam opening alternately at intervalts of 45 degrees corresponding to 90 degrees of crankshaft rotation. This firing interval is very important and must be correctly set. See 'Synchronization of Contacts' under Timing. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 17 degrees reached at 3600 R.P.M.

Mounting:—Distributor is mounted on the cylinder head. To remove distributor, disconnect manual advance rod and primary lead and remove head with cables intact. Then use a pry under extension on distributor sleeve; prying lightly and tapping opposite side of sleeve. This will pull distributor out of motor head. Electrolock Type 5A is used.

Oiling:—Turn grease cup one complete turn every 1000 miles. Refill with good grade of medium cup grease.

Timing:—Synchronization of Contacts:—To synchrnozize contacts use Delco-Remy Tool, Part No. 820738, and follow directions given on Page S-2. The contacts can be synchronized without the use of this tool after the distributor has been timed to the engine. Crank the engine over 90 degrees from the firing position of cylinder No. 1 when piston No. 6 will reach top dead center entering power stroke. The second set of breaker contacts should separate at this point. If they do not, loosen the lock screws on the breaker plate and turn the eccentric adjusting screw until contacts begin to open. Then tighten the lock screws and check contact opening with breaker arm on lobe of cam. If contact opening is not within limits of .018-.024 inch, reset at .022 and repeat synchronization.

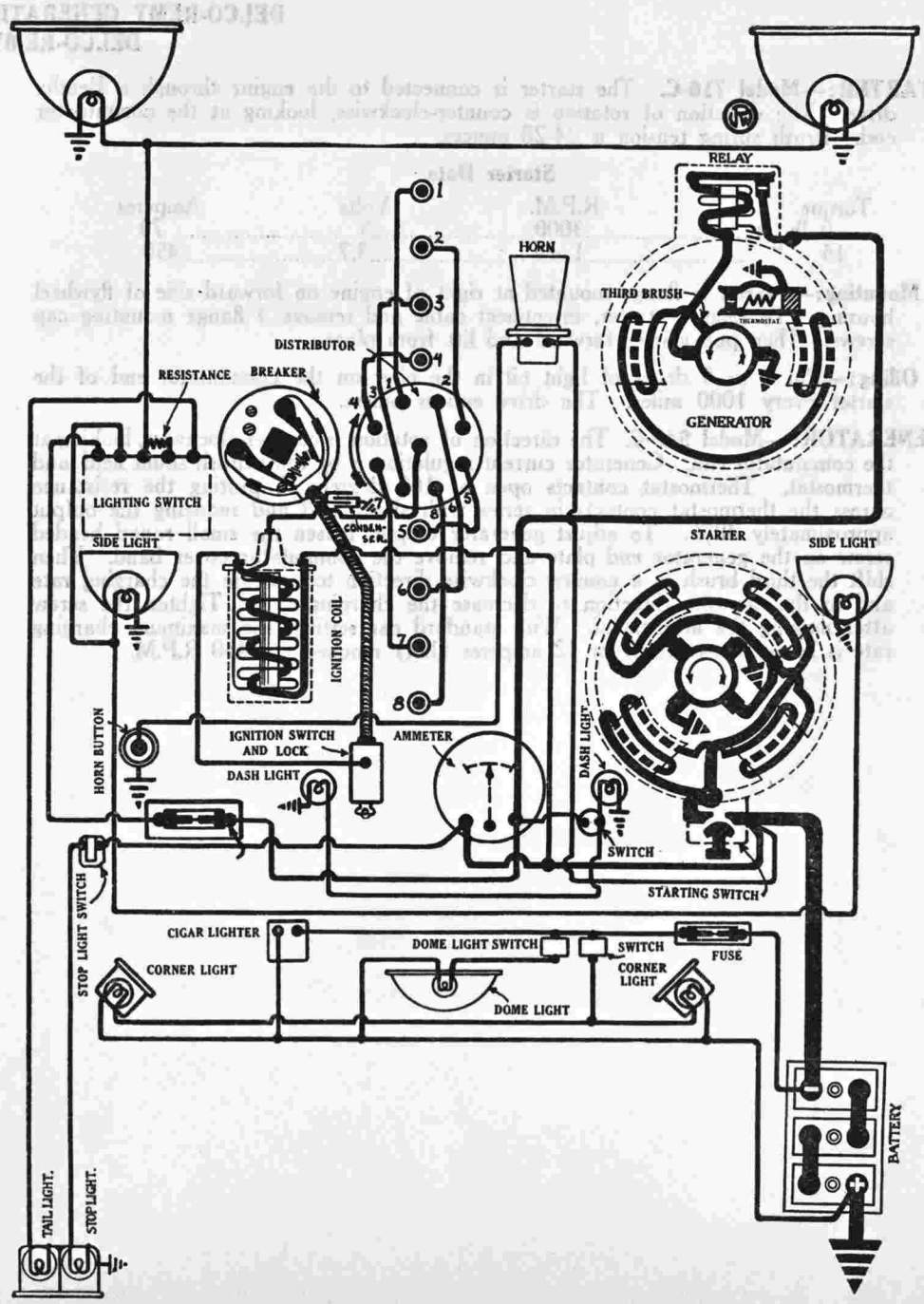
Timing of Distributor to Engine:—Remove the plate on top of the flywheel housing. Turn the motor over until No. 1 piston is coming up on the compression stroke, turn over slowly and watch flywheel markings through hole in flywheel housing; stop turning when mark '1-8 D.C.' lines up in hole; adjust distributor so as to be ready to break on No. 1; press distributor sleeve into place with sleeve extension pointing to the right across motor; rock distributor shaft slightly so as to engage shaft coupling without damage.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

VALVE TIMING:—Specifications:—Head diameter, 1 15/32 inches; stem diameter, 11/32 inch; stem length, 5 7/16 inches. Valve lift, 5/16 inch. Spring pressure, closed, 37 pounds. Tappet clearance, .006 inch (hot). Valve stem guides are removable. Oversize valve stems are not made.

Timing:—Inlet valves open at top dead center and close 45 degrees past lower dead center. Exhaust valves open 50 degrees before lower dead center and close 10 degrees past top dead center.



AUBURN

MODEL 115 (1928)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

STARTER:—Model 718-A. The direction of rotation is counter-clockwise, looking at the commutator end. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable, take out fulcrum pin in switch lever, take out the cap screws in the flange and lift out starter.

Oiling:—Put 4 or 5 drops of light oil in the oiler on the commutator end of the starter every 1000 miles. The drive end bearing is oilless.

GENERATOR:—Model 949-A. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field combined with a thermostat. Thermostat contacts open at 165 degrees F. putting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, maximum charging rate is 21 amperes (cold) or 12 amperes (hot) reached at 1450 R.P.M.



Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.5	1450	9-12	7.5	2000

Motoring generator draws 5 amperes at 6 volts. Shunt field current is 4 amperes at 6 volts. Generator brush spring tension is 24-28 ounces.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, take off hose connections at water pump, loosen plate on front of chain case and swing out of the way. Loosen generator flange nuts, push generator towards motor, lift off chain from sprocket; keep chain from dropping down in chain case by fastening up with wire. Radiator must be drained before generator is removed.

Oiling:—Put 4 or 5 drops of light oil in the generator oilers every 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay closes at 575 R.P.M. of armature or 12 M.P.H. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed. Charging current at closing of contacts is approximately 2 amperes.

LIGHTING:—Soreng Manigold Switch Model 360-A. Switch is mounted on lower end of steering column. Head lights are 6-8 volt, 21 cp. S.C. Mazda No. 1129. Side lights are 6-8 volt, 6 cp. S.C. Mazda No. 81. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dome and corner lights are 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Lighting fuse is 20 amperes capacity.

BARLEY

SIX (6-Y CONTINENTAL) (1922-23).
DELCO GENERATING, STARTING AND LIGHTING SYSTEM.
DELCO IGNITION.

BATTERY:—Prest-O-Lite, Type 611-SHK, 6 volt. Starting capacity is 110 amperes for 20 minutes. Lighting capacity is 5 amperes for 18.5 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model 2159. Distributor is mounted on generator. Breaker contacts separate .020-.025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file or on a medium hard oilstone. Automatic advance begins at 550 R.P.M. and reaches a maximum of 22-26° at 2400 R.P.M. Manual advance is 44°. The tension of the breaker arm spring should be 16-20 ounces.

Oiling:—Fill the oiler on the side of the distributor shaft with medium heavy grease every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Place a small bit of heavy grease on the face of the breaker cam and polish the rotor track with grease, removing all surplus, every 1000 miles.

Timing:—Breaker contacts begin to separate when piston No. 1 entering power stroke reaches top dead center with the spark control lever in the fully retarded position. At this point the flywheel marking 'UD' will be opposite the indicator on the flywheel housing. To set timing, loosen timing adjustment screw in center of cam and rotate the breaker cam until the contacts begin to separate. Then tighen the screw.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

STARTER:—Model 240. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	50
12 "	Lock	2.75	....

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month. Saturate the wick in the oiler at the end of the starter gear case once every year.

GENERATOR:—Model 241. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the generator output, remove generator from engine and remove distributor drive housing from commutator end. Then loosen the three screws in the bearing retainer plate and shift the third brush. Shifting the brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. Tighten the screws after making the adjustment.

Generator Data

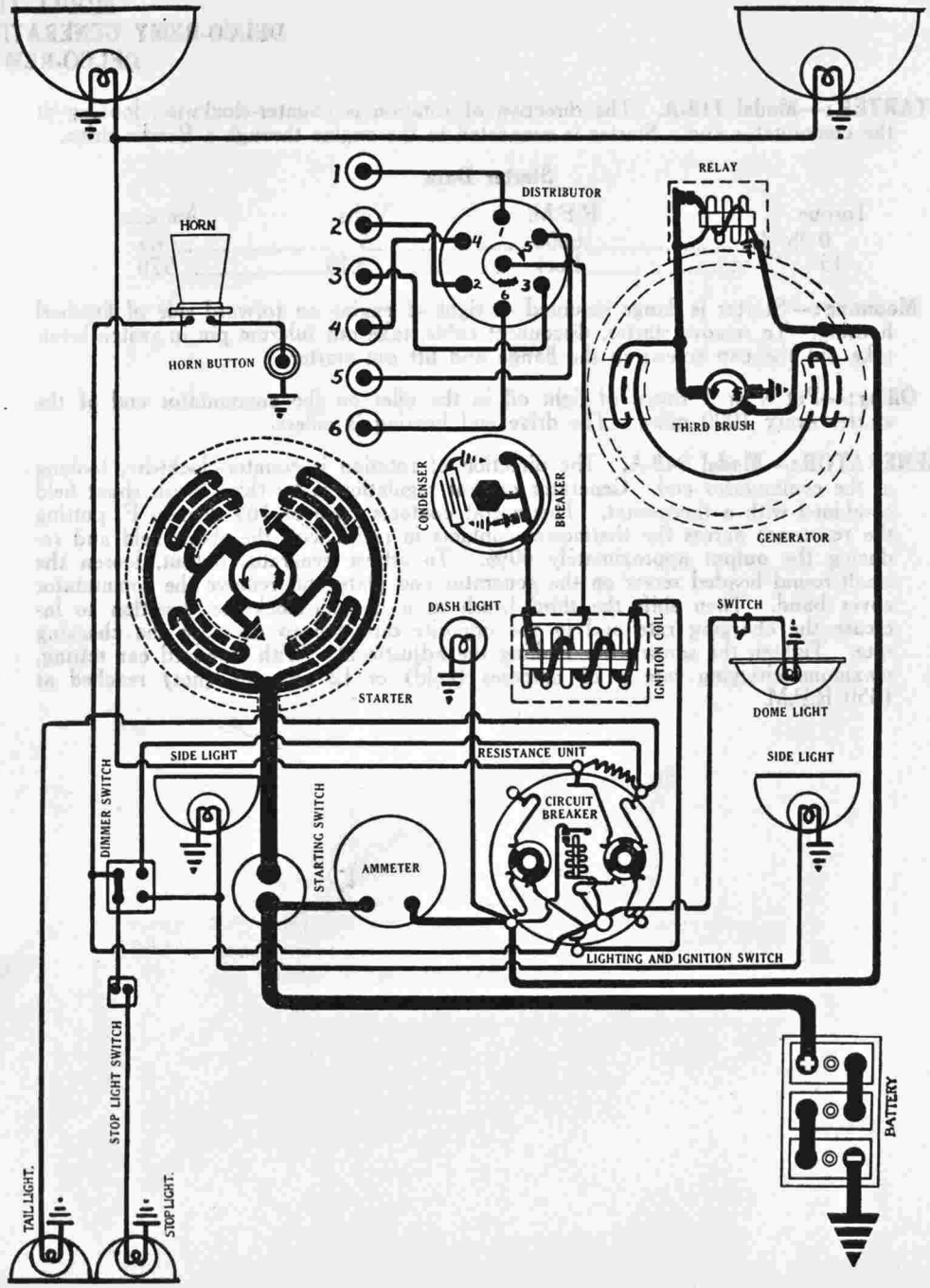
Amperes	R.P.M.
5	700
16-18	1600

Oiling:—Put 8 or 10 drops of light engine oil in the generator oiler every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Relay is mounted on the generator. Contacts close when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-3 amperes. Relay contacts separate .045-.060 inch. Air gap between relay armature and coil core is .025-.035 inch.

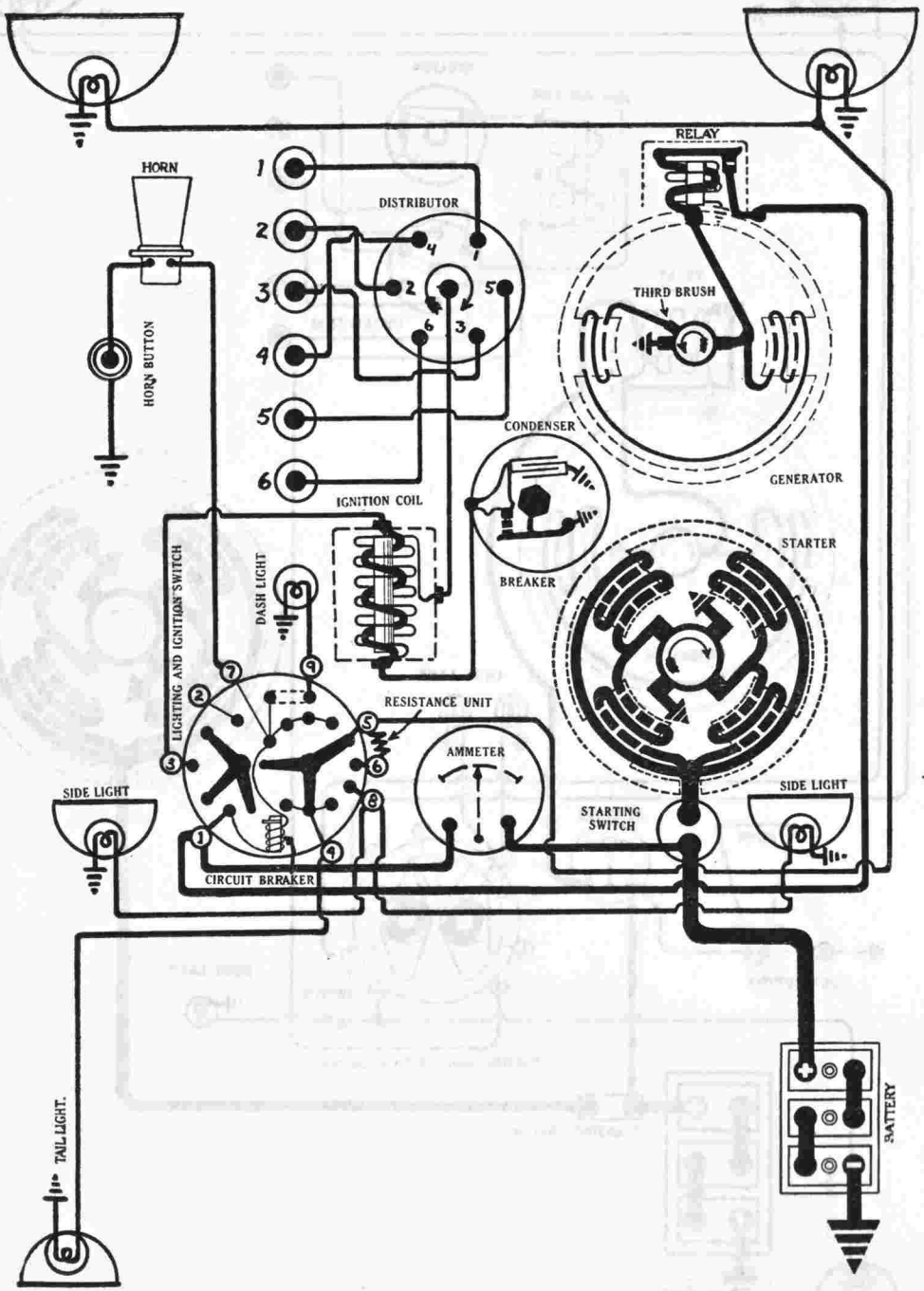
LIGHTING:—Switch Model 1172. Head and stop lamps are each 6-8 volt, 21 cp. S.C. Side and tail lamps are 6-8 volt, 2 cp. D.C. Dash and tonneau lamps are 6-8 volt, 2 cp. S.C.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the back of the switch. A current of 25-30 amperes causes this device to operate. While



BARLEY

SIX (6-Y CONTINENTAL) (1923-1924)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM.
DELCO IGNITION.



BATTERY:—Prest-O-Lite, Type 611 SHK, 6 volt. Starting capacity is 110 amperes for 20 minutes. Lighting capacity is 5 amperes for 18.5 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model 2178. Distributor is mounted on generator. Breaker contacts separate .020-.025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file, or on a medium hard oilstone. Automatic advance begins at 550 R.P.M. and reaches a maximum of 17-21° at 2000 R.P.M. Manual advance is 30°. The tension of the breaker arm spring should be 13-16 ounces.

Oiling:—Put eight or ten drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles. Remove the plug in the distributor gear housing and fill with medium heavy grease twice each year. Place a small bit of heavy grease on the face of the distributor cam every 1000 miles.

Timing:—Breaker contacts begin to separate when Piston No. 1 entering power stroke reaches top dead center with the spark control lever in the fully retarded position. At this point the flywheel marking 'UD' will be opposite the indicator on the flywheel housing. To set timing, loosen advance lever clamp screw and turn the distributor cup until breaker contacts begin to separate. Then tighten the clamp screw. Make certain that the rotor button is under the segment connected with the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

STARTER:—Model 208. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, looking at the commutator end. Starter brush tension is 2¼-2¾ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	36
27 "	Lock	2.75	....

Oiling:—Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles. Saturate the wick in the oiler at the end of the Bendix gear case with light oil once each year. Remove the plug on the reduction gear housing, and refill with medium heavy grease twice each year.

GENERATOR:—Model 257. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the charging rate, loosen the generator cover band and shift the third brush mounting plate by means of the handle on the plate. In shifting the third brush in direction of armature rotation, increases the charging rate, and the opposite direction decreases the charging rate. The mounting is held in any desired position by friction clamp washers. The generator brush tension should be 1½-1¾ pounds each.

Generator Data

Amperes	R.P.M.
5	700
16-18	1500

Oiling:—Put 8 or 10 drops of light engine oil in the generator oiler at commutator end of generator every two weeks or each 500 miles.

RELAY:—Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 6.75-7.5 volts and open with a discharge current of 0-3 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .015-.025 inch.

LIGHTING:—Switch Model 1244. Head and stop lamps are each 6-8 volt, 21 c.p. S.C. Side and tail lamps are 6-8 volt, 2 cp. D.C. Dash and tonneau lamps are 6-8 volt, 2 cp. S.C.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the back of

BAY STATE

MODEL 1 (1922), SERIES NO. 106 AND UP.
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Exide, Type 3-XC-15-1, 105 ampere-hours capacity. The starting capacity is 114 amperes for 20 minutes. The lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2159. Distributor Model No. 5207. The breaker contacts separate .020 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone.

Oiling.—Put 8 or 10 drops of light engine oil into distributor oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles. Repack the distributor shaft housing with medium soft grease up to the advance ring and yoke each season.

Timing.—Breaker contacts begin to separate when piston No. 1 is at top dead center, on compression stroke, indicated on flywheel by the mark "UD," spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plugs.—The spark plug diameters are 7/8 inch, gaps are .027 inch.

STARTER.— Model No. 181. The direction of rotation is clockwise, looking at commutator end. The starter is connected to the engine through a Bendix drive. Cranks the engine at 5.0 volts, taking a current of 125-200 amperes.

Starter Test Data

Torque	R.P.M.	Amperes	Volts
0 lb. ft.	Free	6	36
27 "	Lock	3.6	525

Oiling.—Put 8 or 10 drops of light engine oil into each starter oiler every month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles.

GENERATOR.—Model No. 165. The direction of rotation is counter-clockwise, looking at commutator end. The third brush is used for current regulation. To increase the charging rate loosen the three adjusting screws and move the plate at the end of the geuerator. Shift the same in the direction indicated by arrow. Generator motoring freely takes a current of 3.5-4-5 amperes, 6 volts. The shunt field takes a current of 2.5 amperes, at 6 volts.

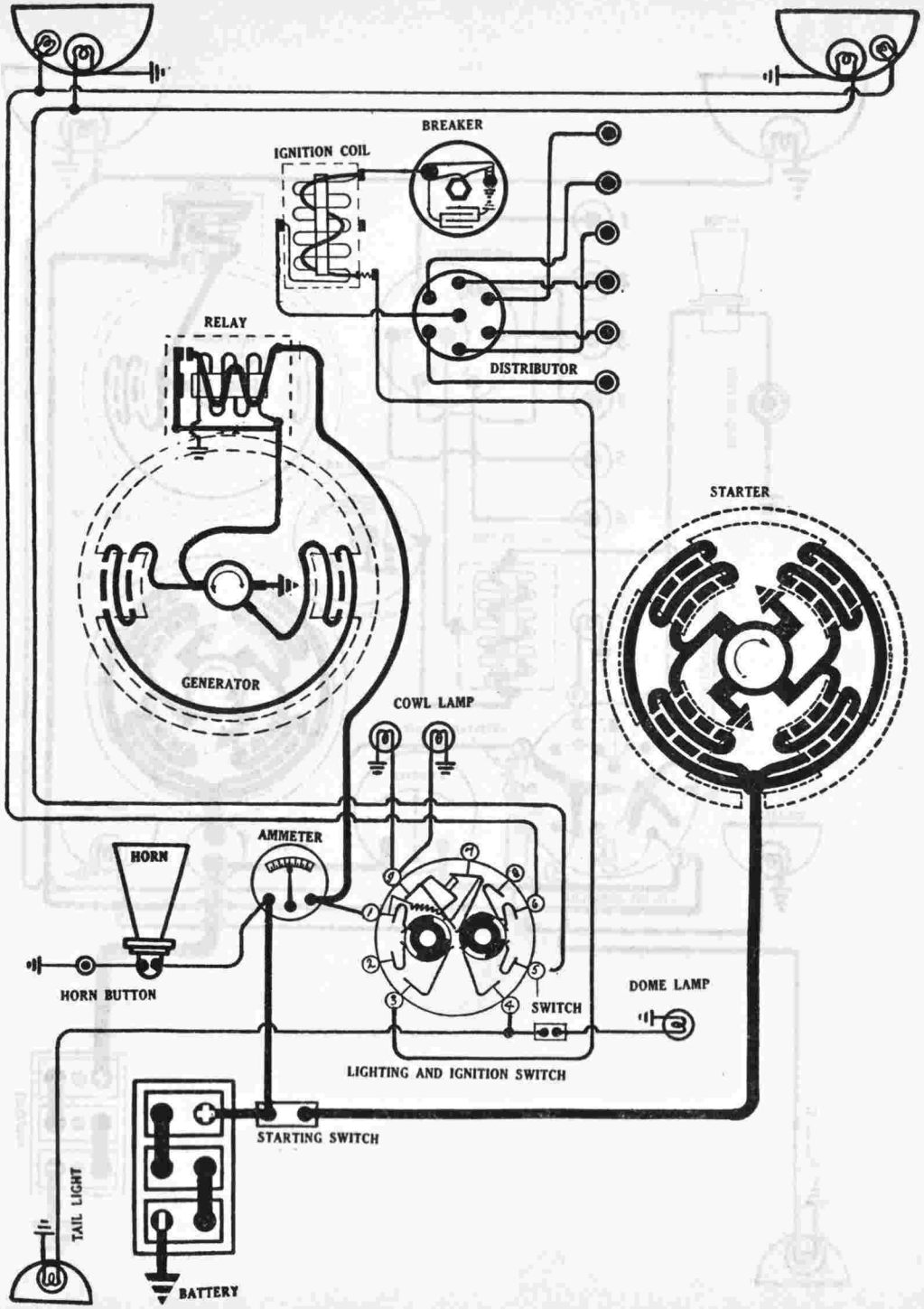
Amperes	R.P.M.	M.P.R.
8	1000	—
0	650	—
4	800	—
12-16 (Max.)	1600	20
8-12	2300	—

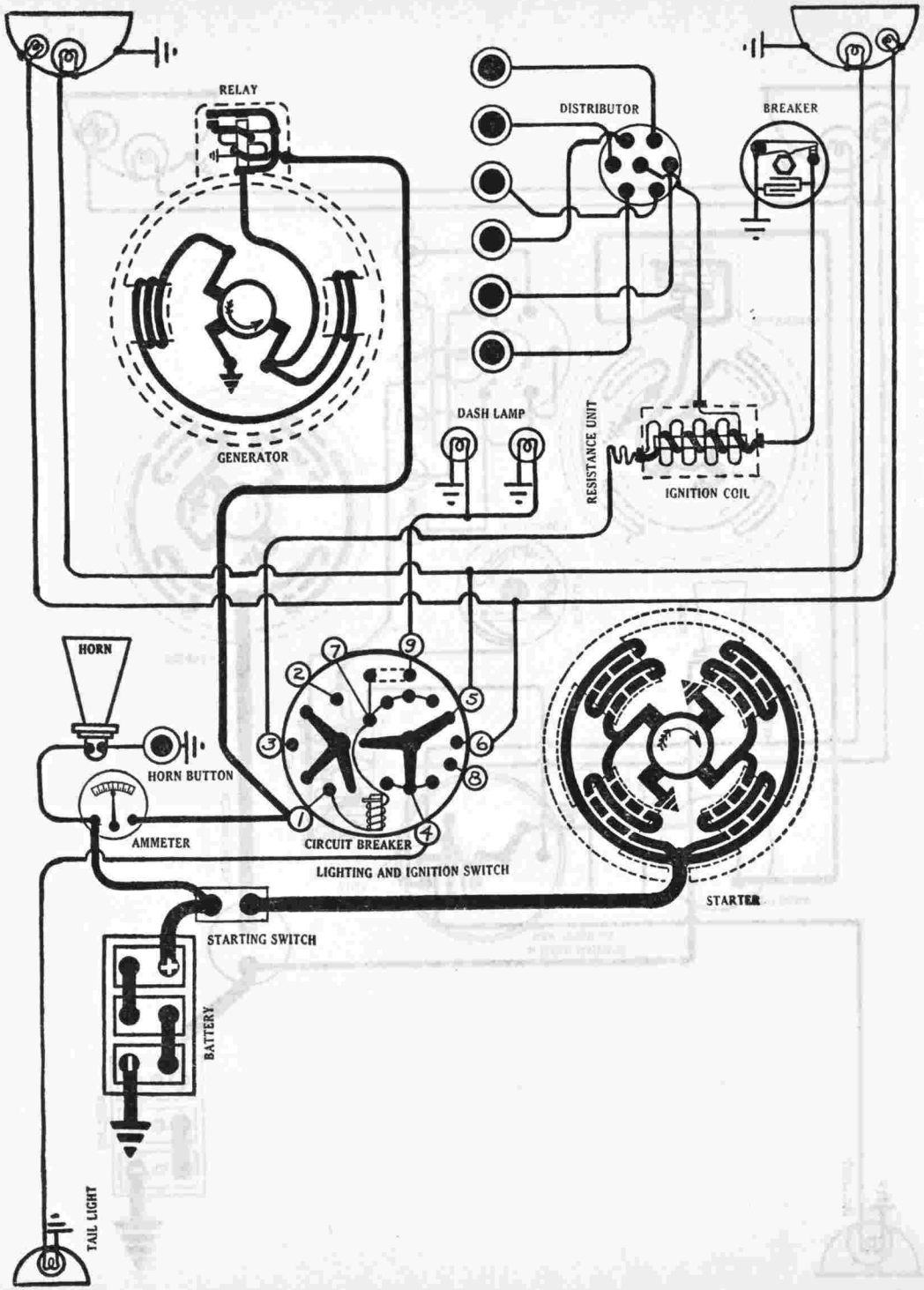
Oiling.—Put 8 or 10 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—The relay closes at 600-650 R.P.M. or 6-8 M.P.H. at 7-8 volts. Relay opens at 550-600 R.P.M. with a current discharge of 0.3 amperes. The relay gap separates .046-.072 inch. The air gap between relay armature and coil core is .025-.035 inch, contacts fully closed.

LIGHTING.—Combination Switch Model No. 1199 is used. Head lamps are 6-8 volts, 21 cp., S.C. Auxiliary, dash and tail lamps are each 6-8 volts, 2 cp., S.C. The dome light is 6-8 volts, 2 cp., D.C.

CIRCUIT BREAKER.—A circuit breaker is used in the place of fuses. Circuit breaker begins to operate with a current flow of 25-30 amperes, and will continue to operate with a current flow of not less than 15 amperes.





BAY STATE

MODELS 1 AND 2 (1923-24-25)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Exide, Type 3-XC-15-1, 6 volts, 105 ampere-hour capacity. The starting capacity is 114 amperes for 20 minutes. The lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2178. ..Distributor Model No. 5256. The breaker contacts separate .020 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone.

Oiling.—Put 8 or 10 drops of light engine oil into distributor oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

Timing.—Breaker contacts begin to separate when piston No. 1 is at top dead center, on compression stroke, indicated on flywheel by marks "UD," spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plugs.—The spark plug diameters are 7/8 inch, gaps are .027 inch.

STARTER: — Model No. 181. The direction of rotation is clockwise, looking at the commutator end. The starter is connected to the engine through a Bendix drive. Cranking engine, starter takes 125-200 amperes at 5 volts.

Starter Test Data

Torque	R.P.M.	Amperes	Volts
0 lb. ft.	4000	36	6
27 "	Lock.	450.500	2.75

The pressure of the starter brushes on the commutator should be 2¼-2¾ pounds each.

Oiling.—Put 8 or 10 drops of light engine oil into each starter oiler every month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles. Saturate the wick in the oiler at the end of the Bendix gear case with light engine oil once each year. Every six months remove the plug in the reduction gear case and inject medium heavy cup grease.

GENERATOR.—Model No. 258. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. To adjust charging rate, remove the cover band and shift the third brush mounting plate by means of an extension handle on the third brush. The plate is held in any position desired by means of friction clamp washers. The maximum charging rate is 16 amperes, reached at 1600 R.P.M.

Generator Test Data

Amperes	R.P.M.
4	800
8	1000
14-16 (Max.)	1600
15	2000

Oiling.—Put 8 or 10 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Relay closes at 8-10 M.P.H. or at 6.75-7.5 volts, and opens with a current discharge of 0-3 amperes. The contact gap is .025-.035 inch, and the air gap between the relay armature and coil core is .010-.015 inch, contacts fully closed.

LIGHTING: — Combination Switch Model No. 1246. Head lamps are 6-8 volt, 21 cp. S. C. Dome lamp is 6-8 volt, 2 cp. D. C. Dimmer, cowl and tail lamps are each 6-8 volt, 2 cp. S.C. On 1923 cars dash and tail lights are connected in series and are 3-4 vot, 2 cp.

CIRCUIT BREAKER.—A circuit breaker is used in the place of fuses. Circuit breaker will operate with a current flow of 25-30 amperes, and will continue to function with a current flow of not more than 15 amperes.

BAY STATE

MODELS 1 AND 2 (1925-26)
AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

BATTERY:—Exide, Type 3-XC-15-1. Starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model TC-30. Distributor Model T-6210. Breaker contacts separate .018-.020 inch. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone.

Oiling:—Fill the oiler on the side of the distributor housing with light engine oil every month or each 1000 miles if the car is driven more than 1000 miles in a month. Place a small bit of cup grease on the face of the breaker cam under the fiber bumper of the contact arm and put one drop of oil on the breaker arm pivot pin.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

STARTER:—Model 942. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 1¾-2 pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	6	50
9 "	Lock	4	350

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model 1047. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, insert the special Bosch key wrench in the hole in the generator end plate and shift the third brush mounting plate by turning the key. The third brush plate can be turned by hand after removing the commutator cover band. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate.

Generator Data

Cold Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
0	500	0	600
7	800	4	800
12	1200	8.5	1200
13.5	1600	10	1600
12.8	2000	9.5	2000
9	3000	6.5	3000

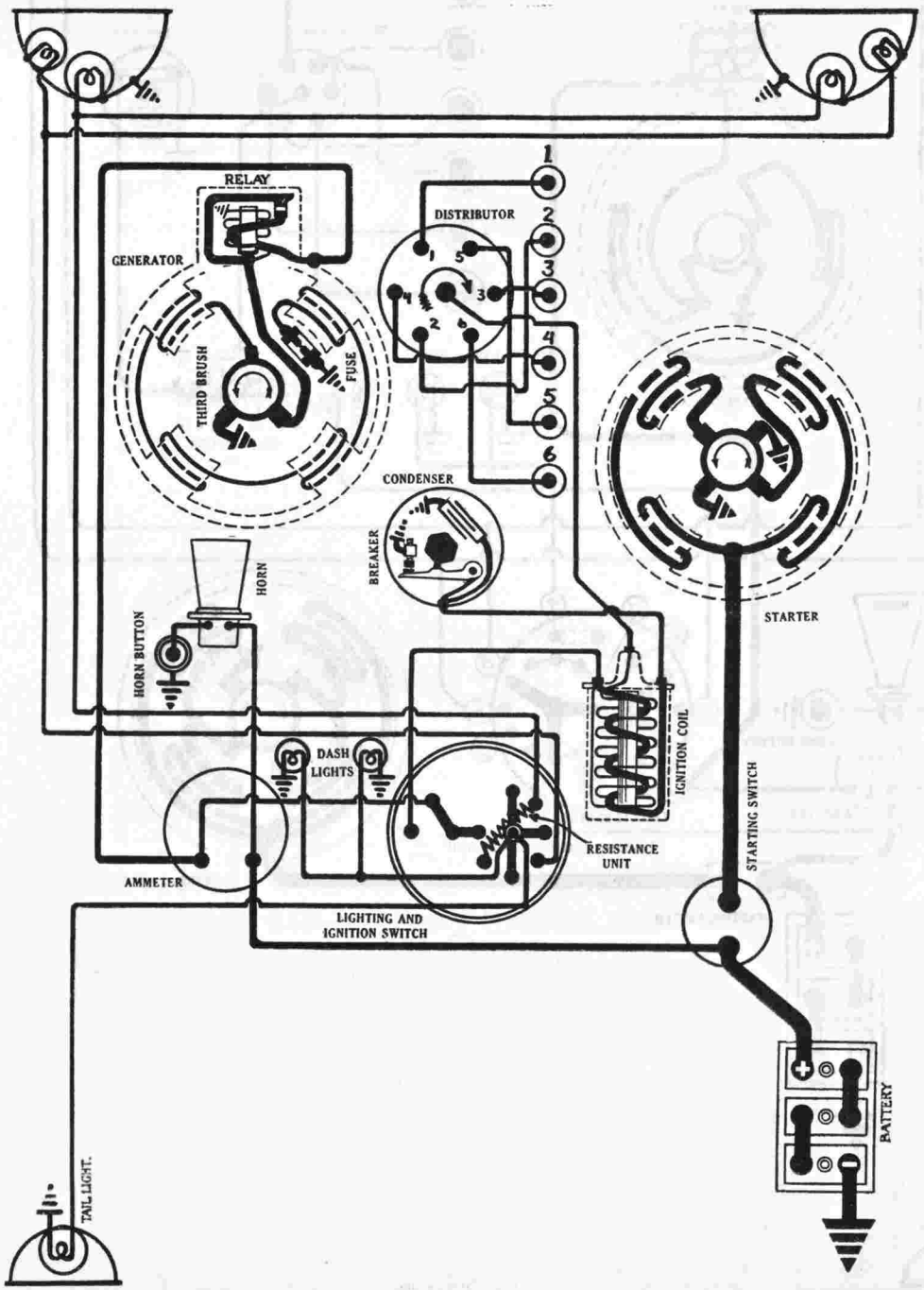
Motoring freely, generator draws 6 amperes at 6 volts. Shunt field current is 3.4 amperes at 6 volts. Generator brush tension should be 1¼ pounds each.

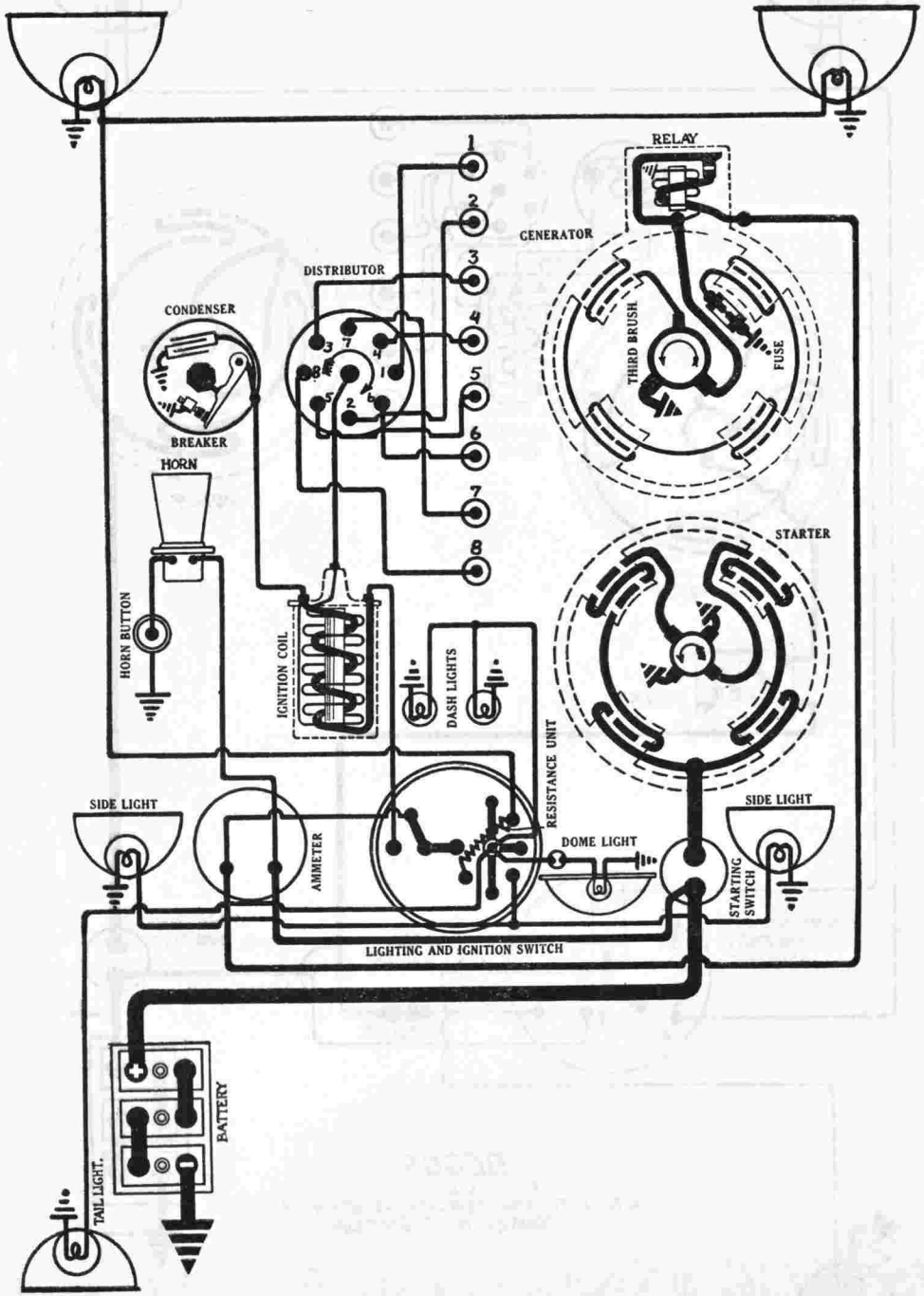
Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Relay is mounted on the generator. Relay contacts close at 500 R.P.M. when the voltage of the generator reaches 6.5-7.5 volts and open with a discharge current of 0-2 amperes. Relay contacts separate .030 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING:—Switch Model S-106. Head lamps are 6-8 volt, 21 cp. S.C. Dome lamp is 6-8 volt, 4 cp. S.C. Dash, side and tail lamps are each 6-8 volt, 2 cp. S.C.

FUSES:—Generator field fuse is 5 amperes.





BAY STATE

MODEL 3 (1925-26)

AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

BATTERY:—Exide, Type 3-XC-15-1, 6 volt. Starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model TC-30. Distributor Model T-8202. Breaker contacts separate .018-.020 inch. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone.

Oiling:—Fill the oiler on the side of the distributor housing with light engine oil every month or each 1000 miles if the car is driven more than 1000 miles in a month. Put a small bit of heavy grease on the face of the breaker cam under the fiber bumper and put one drop of light oil on the breaker arm pivot pin every month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

STARTER:—Model 942. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 1¾-2 pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	6	50
9 "	Lock	4	350

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model 1262. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, remove the commutator cover band and shift the third brush mounting plate by hand. Move the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate.

Generator Data

	Cold Test			Hot Test	
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.75	550	0	6.5	625
7	7.	700	2.5	6.5	700
12	7.6	850	8	7.5	900
17	8.	1300	13	8.	1300
12.6	8.	2000	11	8.	2000
9.5	7.6	2800	9	7.	2800

Motoring freely, generator draws 6 amperes at 6 volts. Shunt field current is 6.6 amperes at 6 volts. Generator brush tension should be 1¾-2¾ pounds each.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY:—Relay is mounted on top of the generator. Relay closes at 500 R.P.M. when the voltage of the generator reaches 6.5-7 volts and opens at 400 R.P.M. with a discharge current of 1-3 amperes. Contacts separate .015 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING:—Switch Model S-106. Head lamps are 6-8 volt, 21 cp. S.C. Dome lamp is 6-8 volt, 4 cp. S.C. Side, dash and tail lamps are each 6-8 volt, 2 cp. S.C.

BEGGS

MODEL 20 (1920-21-22-23-24-25)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

CONNECTICUT IGNITION

BATTERY:—Exide, Type 3-XC-13-1. 6 volt, 90 ampere hour. The starting capacity is 98 amperes for 20 minutes. The lighting capacity is 5 amperes for 16.8 hours. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .023 inch. They are made of tungsten. When the condition of the contacts affects the ignition, renew the inner breaker mechanism. For temporary service, resurface with fine emery cloth.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER:—Model MH-1025. Starter is connected to the engine by means of a Bendix drive. The direction of rotation is counter clockwise, looking at the commutator end.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	6.	40-60
1.3 "	1500	5.5	100
5 "	800	5.	200
9 "	400	4.5	300
17.5 "	Lock	4.	600

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Model GJ. Generator current regulation is by the third brush system.

Generator Data.

Cold Test. (25°C) Amperes.	Volts.	R.P.M.	Hot Test (75°C) Amperes.	Volts.	R.P.M.
2	6.25	575	2	6.95	700
6	6.4	700	6	7.1	875
10	6.55	900	10	7.25	1200
14	6.7	1250	12	7.35	1650
15.5	6.8	1700	12	7.35	1850

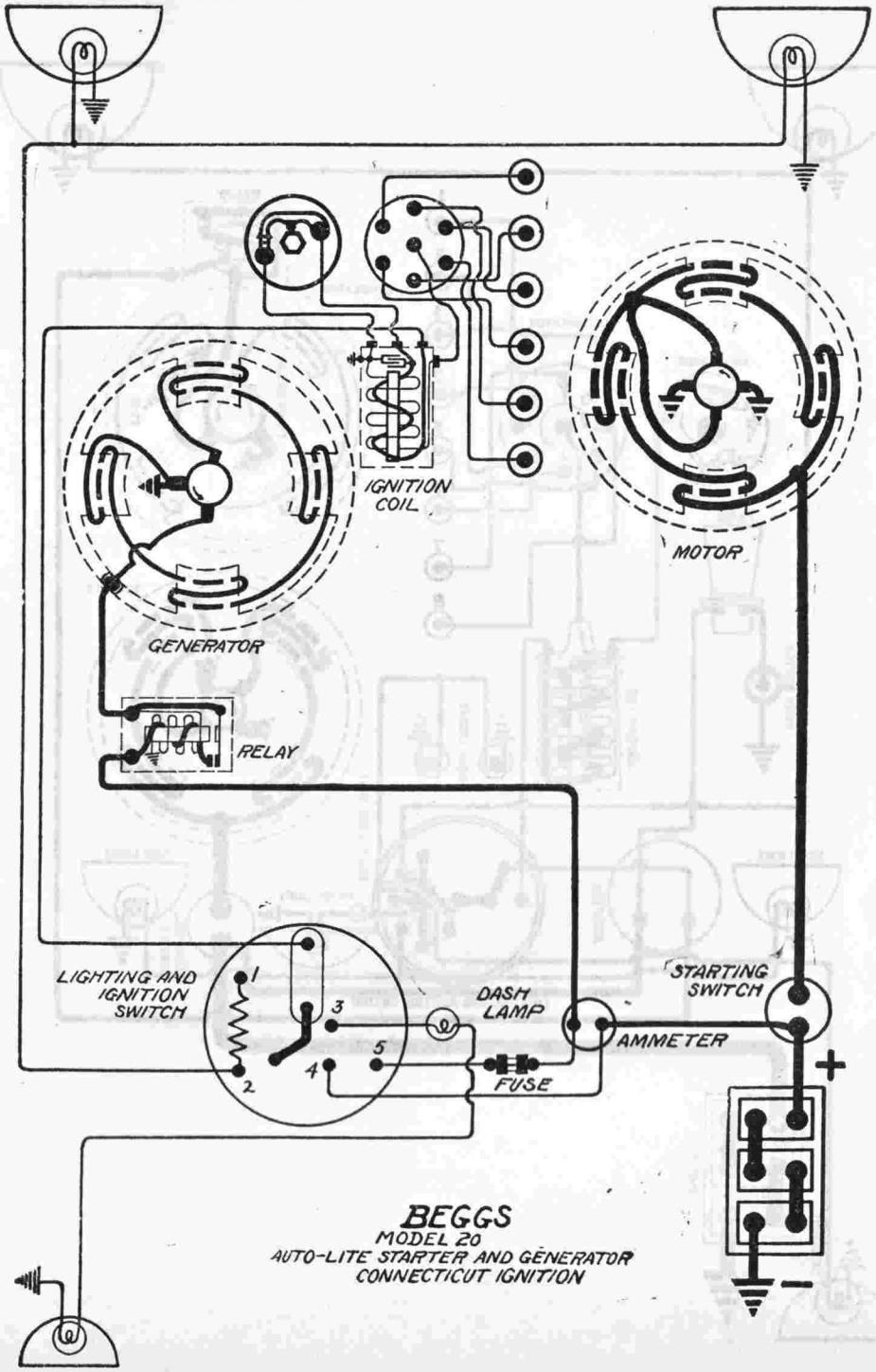
Maximum charging rate is reached at 20-25 miles per hour or 1600-1700 R.P.M. of the armature.

OILING.—Put 4 or 5 drops of light engine oil in each of generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

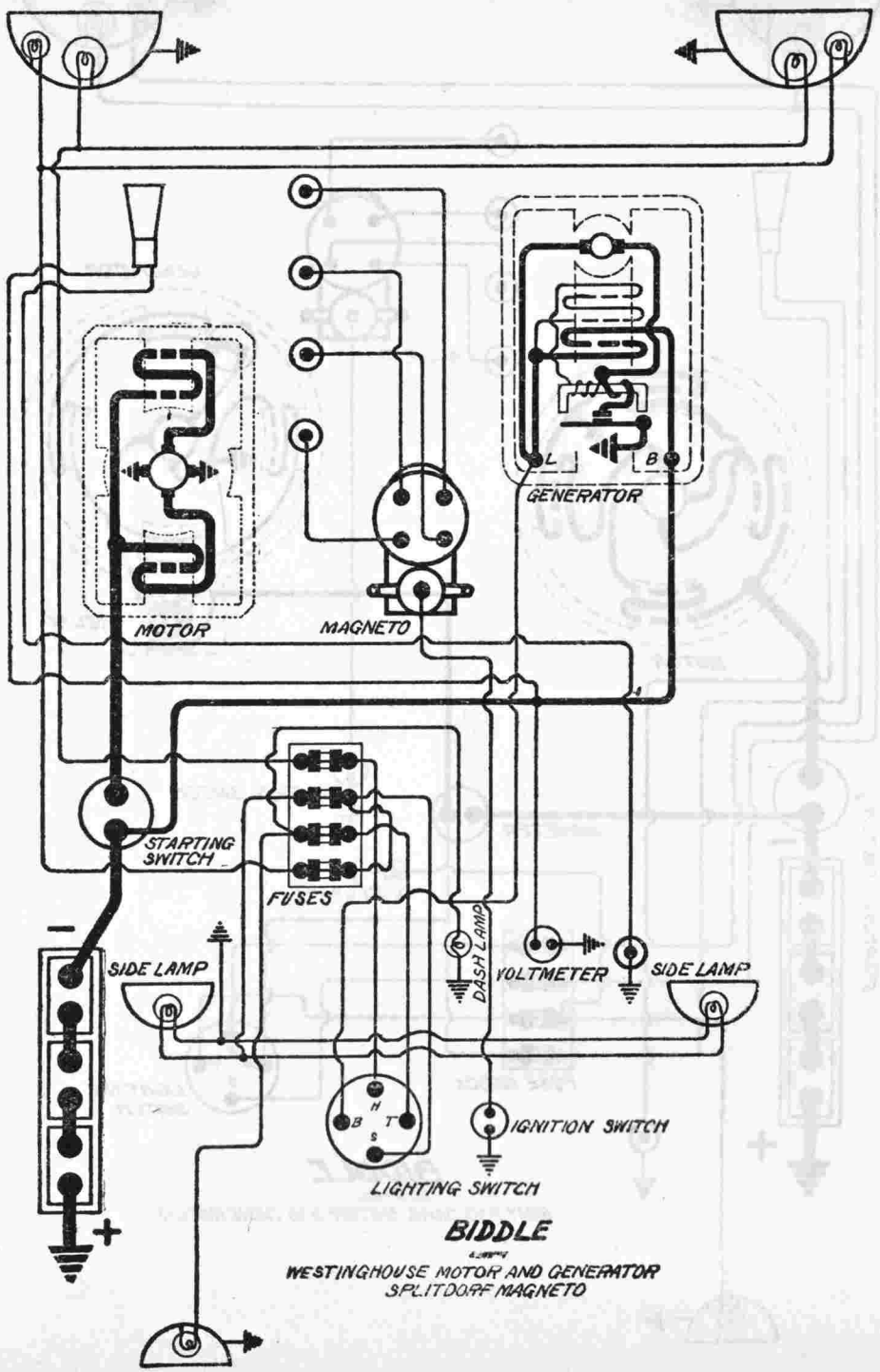
RELAY.—Relay closes at 6-9 miles per hour or 550-600 R.P.M. of the armature and opens at 4-7 miles per hour or 500-550 R.P.M. of the armature. Charging current is 1-3 amperes at closing, and discharge current .5 to 1.5 amperes at opening of relay contacts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove allgrit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dash and tail lamps are 3-4 volt, 2 cp.

FUSES:—Lighting fuse is 10 amperes capacity.



BEGGS
MODEL 20
AUTO-LITE STARTER AND GENERATOR
CONNECTICUT IGNITION



BIDDLE

MODEL D (1916-17)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM

EISEMANN OR SIMMS IGNITION

BATTERY.—Battery is 6 volt, 90 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .015 to .018 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 4 or 5 drops of light engine oil in the magneto oilers every month. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Frame No. 318. Starter is connected to the engine through a Bendix drive. Lock torque is 11.5 pound-feet, current being 400 amperes at 4.25 volts. Torque at 1400 R.P.M. is 2 pound-feet, current being 125 amperes at 5.5 volts. Pressure of brushes on the commutator is 1¼ to 1½ pounds.

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR.—Frame No. 208. Generator current regulation is by reverse series field. Maximum charging rate is 11-15 amperes, reached at 1500 R.P.M. of the armature or 25 miles per hour.

Amperes	Generator Data	R.P.M.
0		425
8		650
11-15		1500

Shunt field current is 1.5-2.5 amperes at 6 to 6.3 volts. Operating freely as a motor, generator takes 2.5-3.5 amperes at 6-6.3 volts. The current taken by the lamps does not pass through the reverse series field, and hence has but little effect on the charging rate.

OILING.—Put 5 or 6 drops of light engine oil in the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in the generator frame. Relay closes at 425-475 R.P.M. of the armature or 8 miles per hour, and opens at 375-425 R.P.M. of the armature or 6 miles per hour. Adjust relay to open with a discharge current of 0-2 amperes and close when the voltage of the generator reaches 7 to 7.5 volts, battery disconnected. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Tail and dash lamps are 6-8 volt, 2 cp.

FUSES.—Fuses are 10 ampere.

BIDDLE

MODEL H (1919-20-21-22)

GRAY & DAVIS GENERATING, STARTING AND LIGHTING SYSTEM

SIMMS OR SPLITDORF IGNITION

BATTERY.—Willard, 6 volt, 90 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .020 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 4 or 5 drops of light engine oil in the magneto oilers every month. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firng order is 1, 3, 4, 2.

SPARK PLUGS.—Diameter, 7/8 inch. Spark gaps are .025 inch.

STARTER.—Model No. 513. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 150 R.P.M., taking 140-180 amperes.

Starter Data

Torque	R.P.M.	Amperes
1 lb. ft.	2100	100
4 lb. ft.	1200	195
6 lb. ft.	900	260
8 lb. ft.	650	320
15 lb. ft.	Lock	500

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

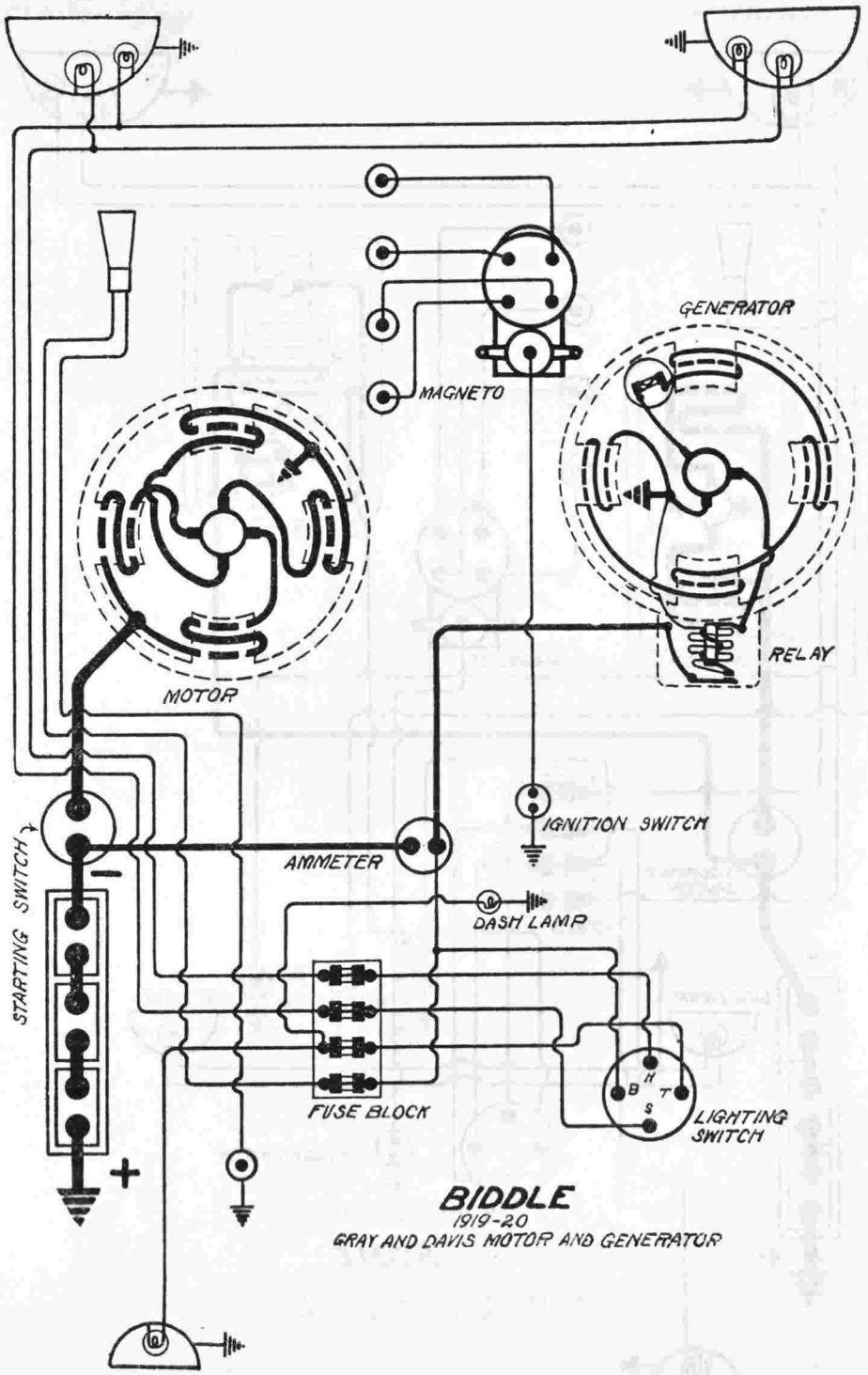
GENERATOR.—Model No. 801. Generator current regulation is by the third brush system. Maximum current output is 18 amperes, reached at 1200 R.P.M. of the armature or 15-18 miles per hour.

Charging rate is varied by adjustment of the third brush setting. Adjustment is made by turning the pinion screw located at the bottom of the rear cover plate, between the fuse and the relay. Turn this screw to the right to increase the charging rate, and to the left to decrease the charging rate.

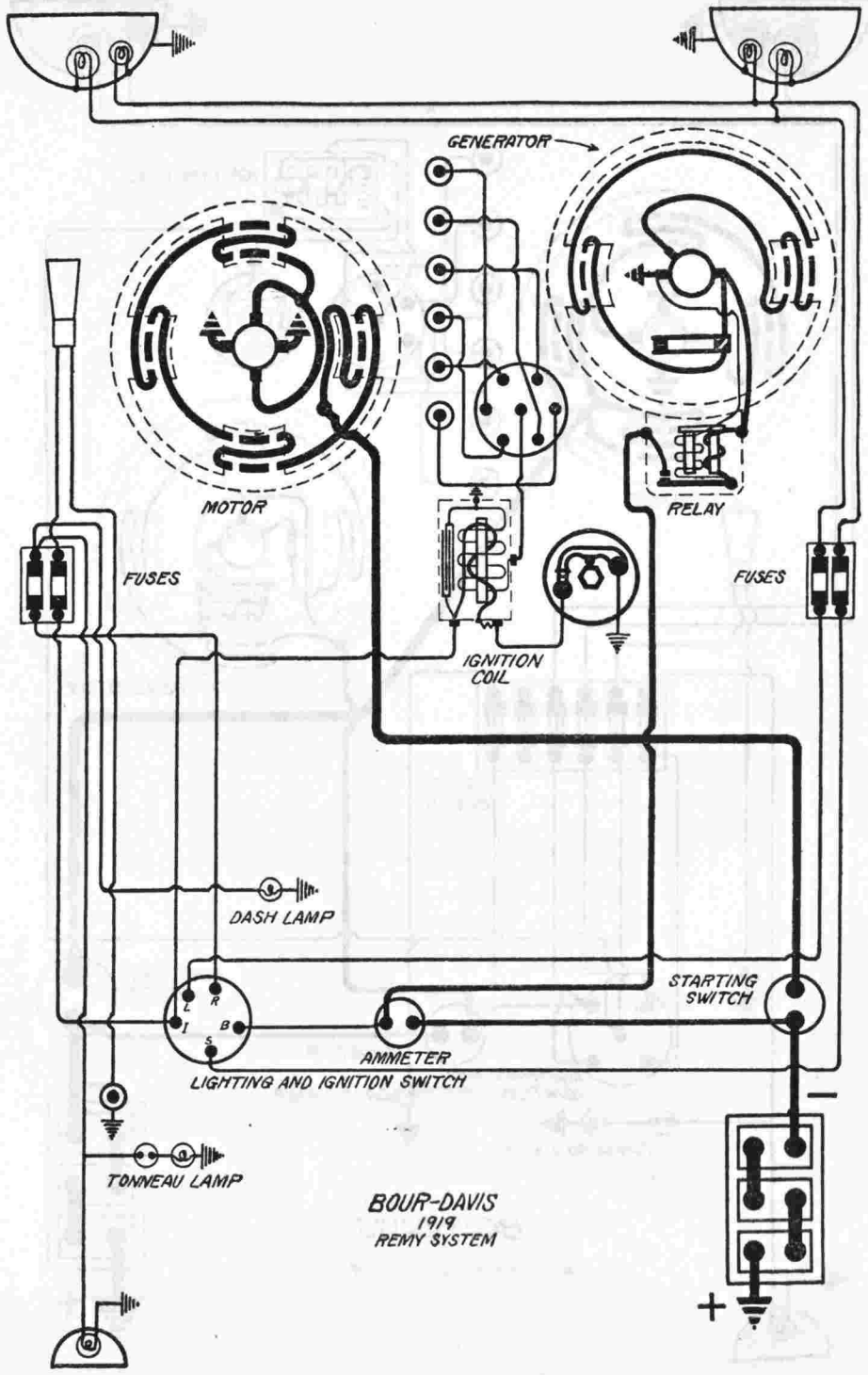
OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes at 500 R.P.M. of the armature or 8-10 miles per hour and opens at 450 R.P.M. of the armature or 6-8 miles per hour. Relay contacts separate .015 to .018 inch. Air gap between relay armature and coil core is .010 to .012 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.



BIDDLE
1919-20
GRAY AND DAVIS MOTOR AND GENERATOR



BOUR-DAVIS

1919

REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY—Willard, Type SJW-4, 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .020 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model No. 303A. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes	Volts
1 lb. ft.	1850	110-115	5.3-5.5
2 lb. ft.	1400	158-165	5.1-5.3
3 lb. ft.	1150	200-210	4.9-5.1
4 lb. ft.	850	238-250	4.6-4.8
5 lb. ft.	700	275-285	4.4-4.6
15 lb. ft.	Lock	550-575	3.3-3.4

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Model No. 230-C. Generator current regulation is by third brush system. A thermostat, located in the brush rigging of the generator, cuts a resistance into the shunt field circuit at a temperature of 175°F., reducing the maximum charging rate 6 amperes. The thermostat is intended to regulate the charging rate as demand of seasons or car operation requires. Never touch the thermostat points.

Generator Data

Amperes	R.P.M.	Volts
0	515	6.4
7	745	7.1
14	1000	7.9
22	1800	8.6
17	2500	8.2
12	3000	7.8

Above tests are made with relay in circuit and thermostat points closed, but without ignition. Shunt field current is 5 amperes at 6.4 volts. Brush pressure of main brushes is 17 to 20 ounces. Pressure of third brush is 13 to 17 ounces. Maximum charging rate is reached at 30 miles per hour.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 500-550 R.P.M. of the armature or 8-10 miles per hour, and opens at 450-500 R.P.M. of the armature or 6-8 miles per hour. Relay contacts separate .012 to .015 inch. Air gap between relay armature and coil core is .012 to .015 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Fuses are 10 ampere.

BOUR-DAVIS

MODEL 20 (1920) AND 21 (1921-22)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WESTINGHOUSE IGNITION

BATTERY:—Willard, (20) Type SJWN-4, 6 volt, 102.8 ampere hour, **(21) Type SJRN-4,** 6 volt 118 ampere hour. The positive (+) terminal is grounded.

IGNITION.—Westinghouse, Type SC. Breaker contacts separate .012 to .016 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone. The bumper on the contact spring is 1/8 inch off center from the line through the centers of the shaft and terminal screw, this offset being opposite to the direction of rotation of the cam. The above adjustment is made by bending the solid arm at the terminal block. A pull of 20 to 25 ounces, applied to the movable contact, is required to separate the contacts .020 inch. The spring pressure is adjusted by bending the solid arm at the point of contact with the contact spring. Resistance of the primary winding of the ignition coil is 1 ohm. The resistance of the ballast resistor is .4 ohm. Resistance of the secondary winding is 3700-4700 ohms.

OILING.—Put 4 or 5 drops of light engine oil in the oiler at the side of the breaker box every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1/2 inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .023 to .027 inch.

STARTER.—Frame 711. Starter is connected to engine through a Bendix drive. Torque at 1250 R.P.M. is 2.5 pound-feet. Lock torque is 16 pound-feet, current 525 amperes. The brush tension is 2 1/2 to 3 pounds.

OILING.—Refill starter oil wells with light engine oil every month.

GENERATOR.—Frame No. 760. Generator current regulation is by third brush system. Current output is varied by adjustment of third brush setting. Set the third brush so that at 1100-1500 R.P.M. the maximum current output is 15 to 17 amperes, at 7 1/2 volts. The cold test readings are obtained with the normal setting of third brush, and a generator temperature under 35°C. (95°F.). The hot test readings are obtained after the generator has been operated one hour at 1800 R.P.M., charging a half-charged battery or its equivalent.

Generator Data

Cold Test			Hot Test		
	Generator Output	Generator		Generator Output	Generator
R.P.M.	Amperes	Voltage	R.P.M.	Amperes	Voltage
500	0	6.5	1250	12-14	7.5
750	8	6.5	2500	7-11	6.5-7.5
1250	15-17	7.5			
2500	7-11	6.5-7.5			

Field current is 2.8 to 3.25 amperes, 6 volts. Field resistance is 1.9 to 2.25 ohms at 25°C. (77°F.).

Field Test, Generator Operating

Cold Test

R.P.M.	Generator Output Amperes	Generator Voltage	Field Current
1250	15-17	7.5	1.5-2.4

Hot Test

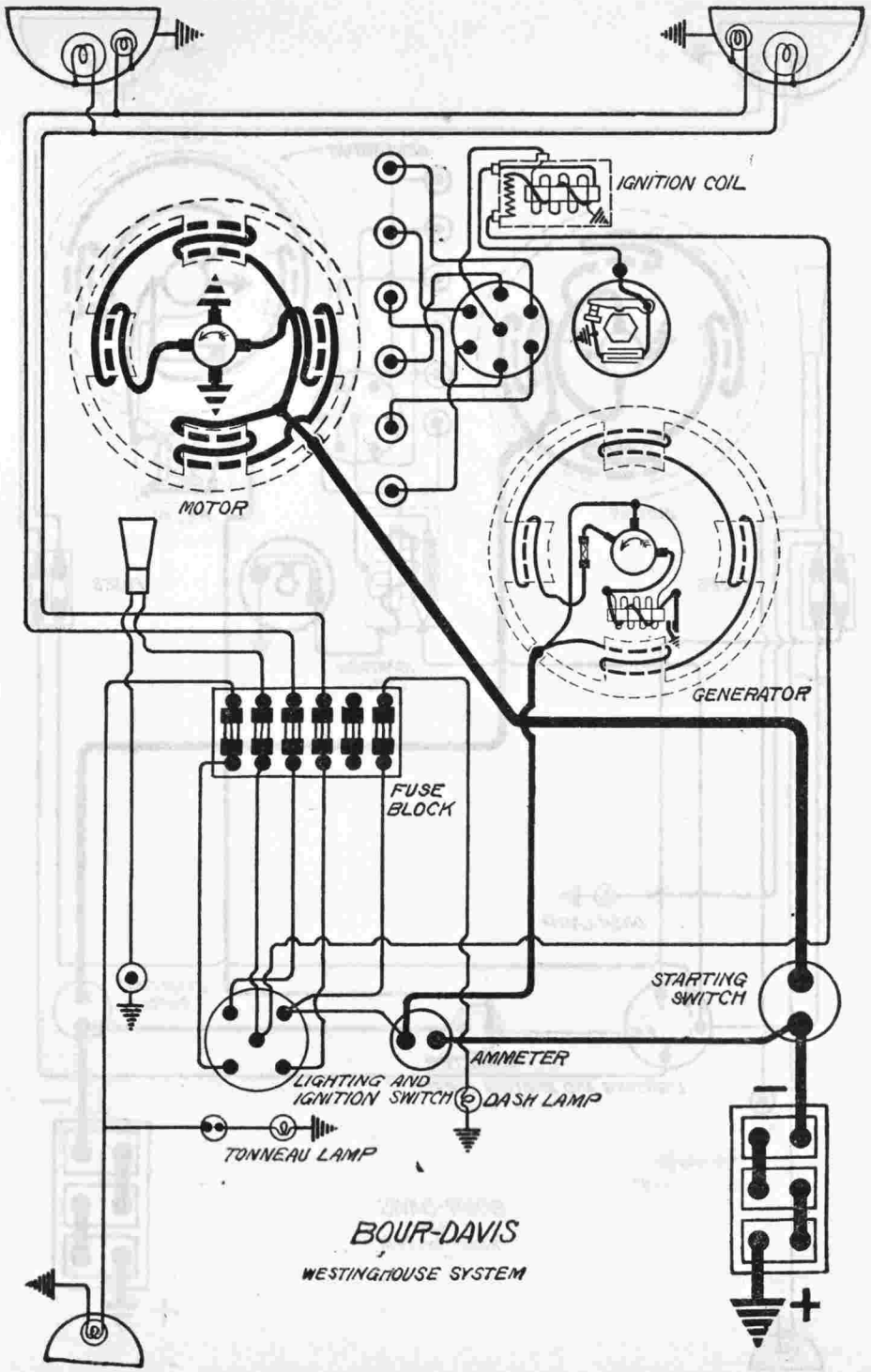
R.P.M.	Generator Output Amperes	Generator Voltage	Field Current
1250	12-15	7.5	1.5-2.2

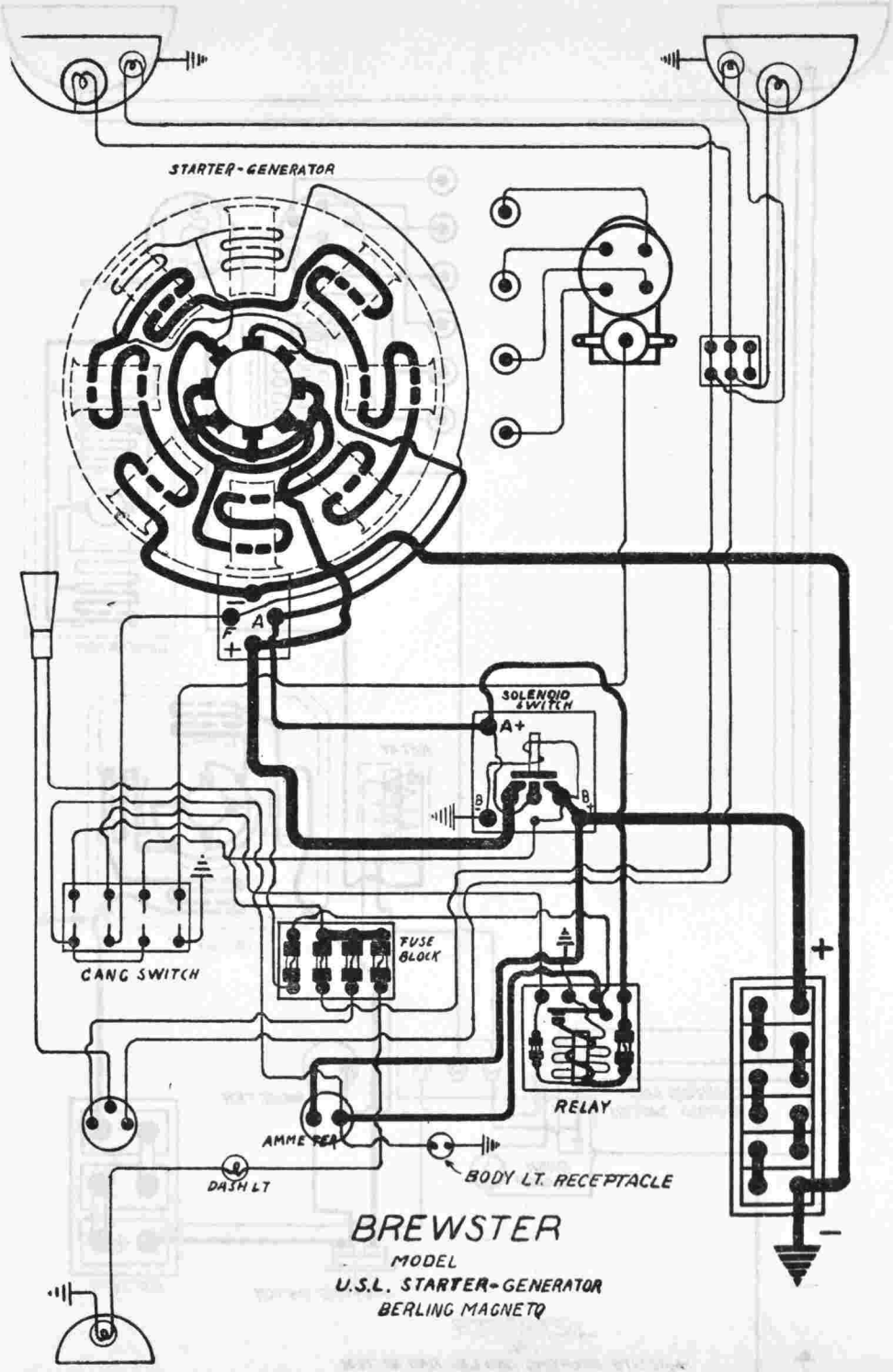
Operating freely as a motor, current flow is 3.5 to 5 amperes, 6 to 6.6 volts.

OILING.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 500-550 R.P.M. of armature, and opens at 6-8 miles per hour, or 450-500 R.P.M. of armature. Charging current is 1 to 2 amperes at closing, and the discharge current 0 to 2 amperes at opening of relay. Air gap between relay armature (moving member) and coil core is .031 inch, contacts separated. Contacts separate .013 to .018 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. **Dash**





BREWSTER

1917-18-19-20-21-22-23-24-25-26

U. S. L. GENERATNG, STARTING AND LIGHTING SYSTEM

BERLING IGNITION

1917-20

BATTERY.—U. S. L., Type HDN-611-C, 12 volt, 93 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Magneto breaker contacts separate .016 to .020 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

MODEL 02 (1924-25)

BATTERY:—Exide. Type 6-XX-13-1. 12 volt, 90 ampere hour. The starting capacity is 185 amperes for 20 minutes. The negative (—) terminal is grounded.

IGNITION:—Model ZR-4. Breaker contacts separate .016-.020 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 10 drops of light engine oil in each of the magneto oil cups every month. Put a small amount of vaseline on the cam and on the rubbing surfaces of the fiber lever, applying with a toothpick. If the car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

TIMING:—Breaker contacts begin to separate when piston entering power stroke is 5 millimeters before top dead center with the spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUGS:—Spark plugs are 7/8 inch in diameter. Gaps should be .020 inch.

STARTER-GENERATOR.—Model E-207. Armature is fastened to the engine crankshaft, taking the place of the flywheel. When operating as a starter, the unit cranks the engine at 175 R.P.M., taking 185 amperes.

GENERATOR.—Generator current regulation is by third brush and compensating field. Maximum current output is 12 amperes at 500 R.P.M. of the armature or 18 miles per hour. Pressure of brushes on the commutator is 1¾ pounds.

OILING.—Starter-generator requires no oiling.

RELAY.—Relay closes at 11 miles per hour or 350 R.P.M. of the armature, and opens at 9 miles per hour or 250 R.P.M. of the armature. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 12-16 volt, 36 cp. Dimmer lamps are 12-16 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES:—Lighting fuses are 20 ampere. Large fuse in relay box is 30 ampere. Small field fuse is 6 ampere capacity.

BRIGGS-DETROITER

MODEL 6-45 (1916)
AUTO-LITE STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded at starting motor.

IGNITION.—Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the points affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

TIMING.—Breaker contacts begin to separate when top dead center mark on flywheel is 1½ inches past indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .027 inch to .030 inch.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

STARTER.—Starter Model M E is used. Starter is connected to engine through a Bendix drive.

OILING.—Thoroughly clean out and repack starter bearings with soft cup or ball bearing grease every six months.

GENERATOR.—Generator current regulation is by reverse series field. Maximum charging rate of 17-18 amperes is reached at 25-30 miles per hour, or 3200-3700 R.P.M., of armature.

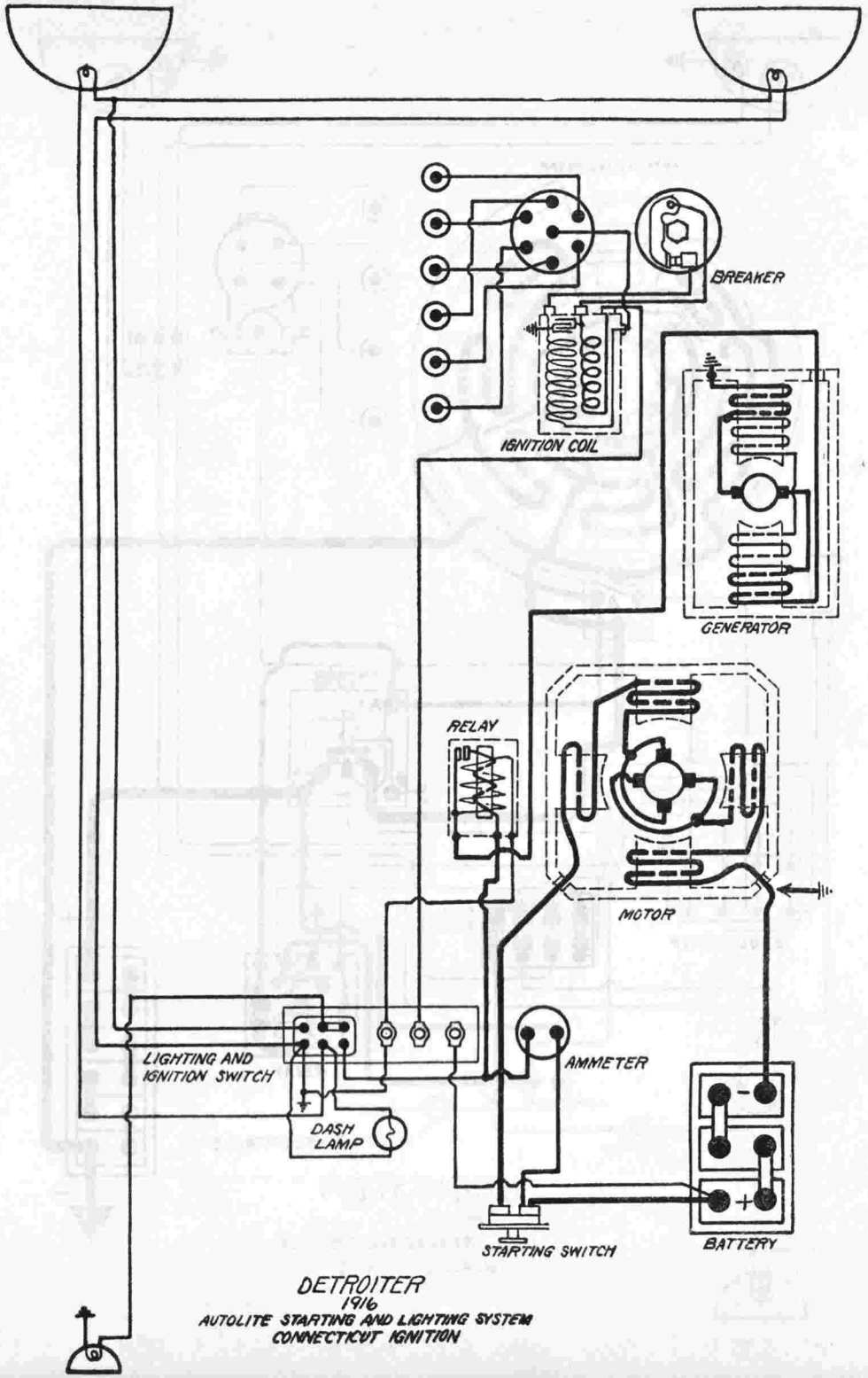
Amperes	Generator Data. Model G	R.P.M.
5.00		750- 860
10.00		1225-1400
12.50		1600-1825
15.00		2125-2450
17-18		3200-3700

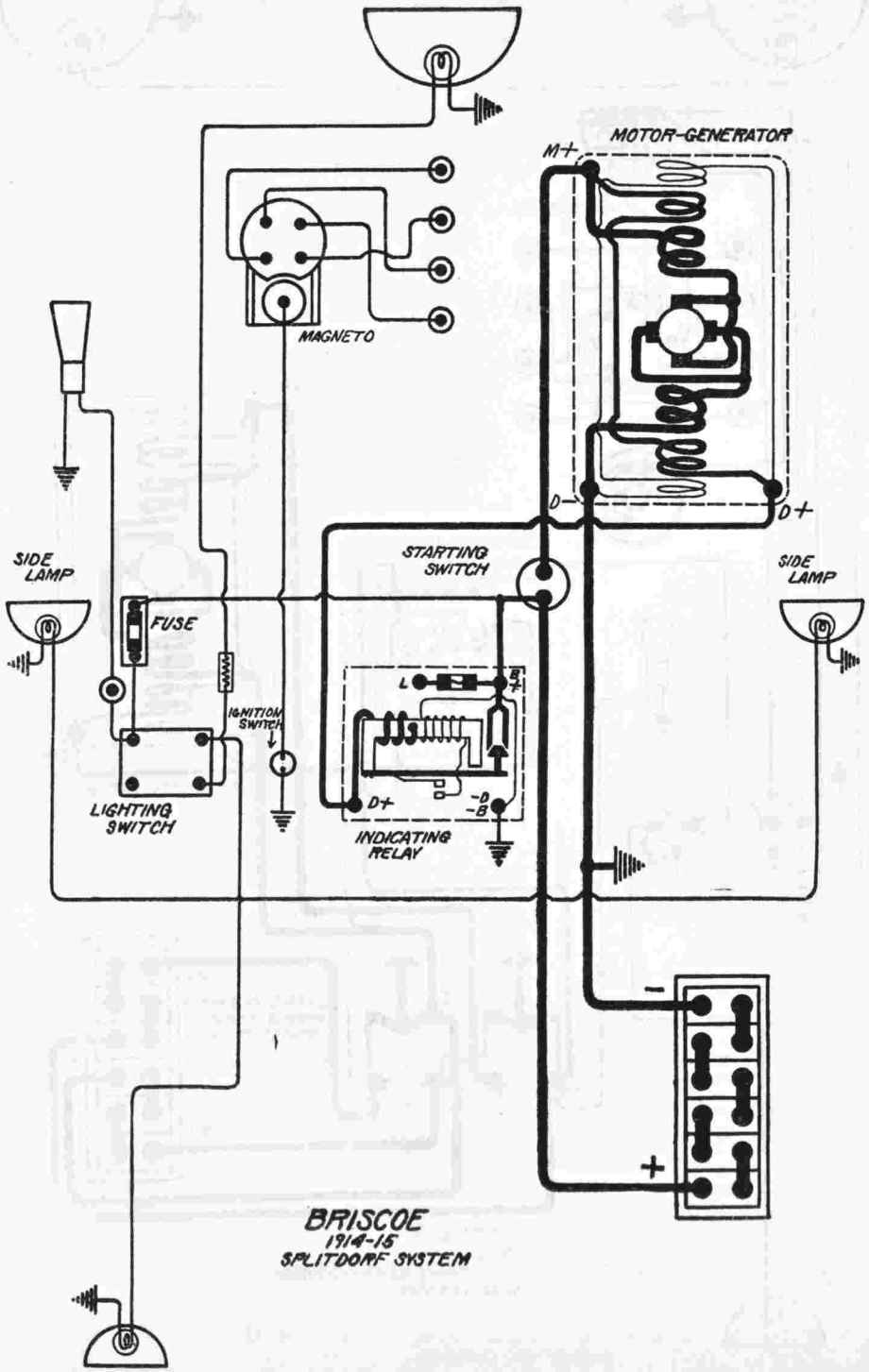
A variation of 1.5 amperes from these amounts is allowable. Output may be varied slightly by adjusting brush pressure on commutator. Brush pressure should be 1 to 1¼ pounds. Operating freely as a motor, generator takes 2.8 amperes, armature revolving at 350 R.P.M. Shunt field takes 1.1 amperes.

OILING.—Put several drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Relay closes at 7-9 and opens at 5-7 miles per hour. Relay closes at 500-575 R.P.M., of armature. Charging current is .5 to 1.5 amperes at closing, and the discharge current 0 to 1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.





BRISCOE

MODEL B-15 (1914-15)

SPLITDORF GENERATING, STARTING AND LIGHTING SYSTEM

SPLITDORF MAGNETO IGNITION

BATTERY.—Battery is 12 volt, 35 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Type EU-4-2. Breaker contacts separate .020 inch. When the condition of the points affects the ignition resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 2 or 3 drops of light engine oil in each of the magneto oilers every month. Put a small amount of vaseline on the cam, applying with a toothpick. If the car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER-GENERATOR.—Starter and generator are combined into one unit. The unit is connected to the engine by chain. Starter cranks the engine at 175 to 250 R.P.M. First inrush of current is 350 amperes, decreasing to 80 amperes as starter gains speed. Lock torque is 35-40 pound-feet, taking 350 amperes at 9.4 volts. Pressure of brushes on commutator is 8 to 14 ounces.

GENERATOR.—Generator current regulation is by reverse series field. Maximum current output is 12 to 15 amperes, reached at 1500 R.P.M. of the armature or 20 miles per hour. Shunt field current is 1¼ amperes at 12 volts.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter-generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 10 miles per hour or 880 R.P.M. of the armature, and opens at 8 miles per hour or 770 R.P.M. of the armature. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamp is 6-8 volt, 20 cp. Side lamps are 12-16 volt, 4 cp. Tail lamp is 12-16 volt, 2 cp.

FUSES.—Fuse is 15 ampere.

Briscoe

Model 8-38 (1916)

Splitdorf-Apelco Starting and Lighting System

Remy Ignition

Battery.—Battery is 12 volt, 35 ampere-hour. The negative (—) terminal of one-half of the battery is grounded at the switch.

Ignition.—Breaker contacts should open .020 inch to .025 inch. They are made of tungsten so should not be filed or sand papered.

Care.—Should they become badly burned or pitted, resurface them by drawing across a piece of fine emery cloth laid on a very flat surface, as on the bed of a drill press.

Timing.—Contacts should begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1R, 1L, 3R, 3L, 4R, 4L, 2R, 2L.

Spark Plug Gaps.—The spark plug gap should be .027 inch to .030 inch.

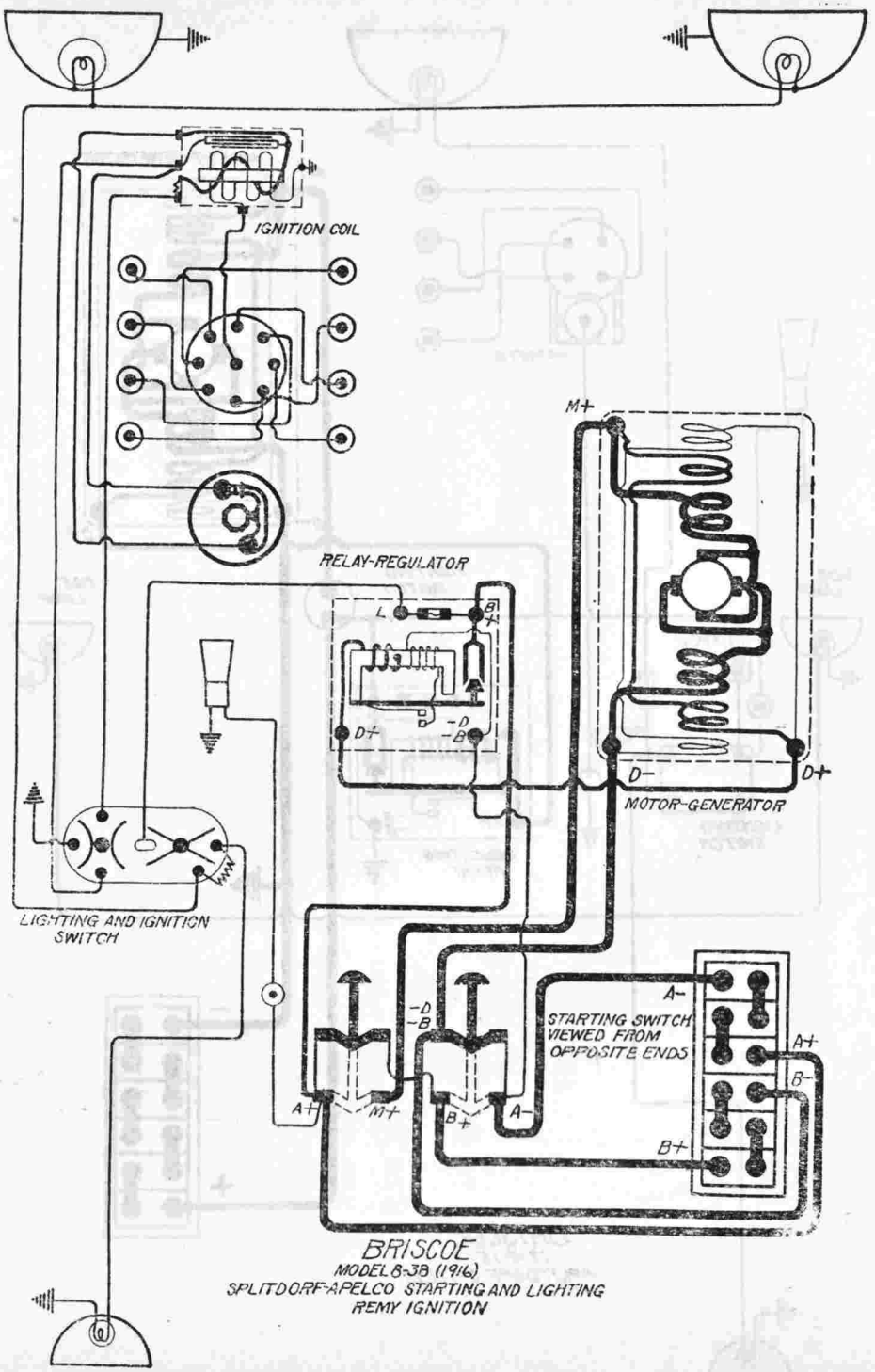
Oiling.—The oiler under the breaker should be kept full of medium cup grease and tightened two turns every 500 miles. In case the oiler is provided with a wick, use pure vaseline instead of cup grease.

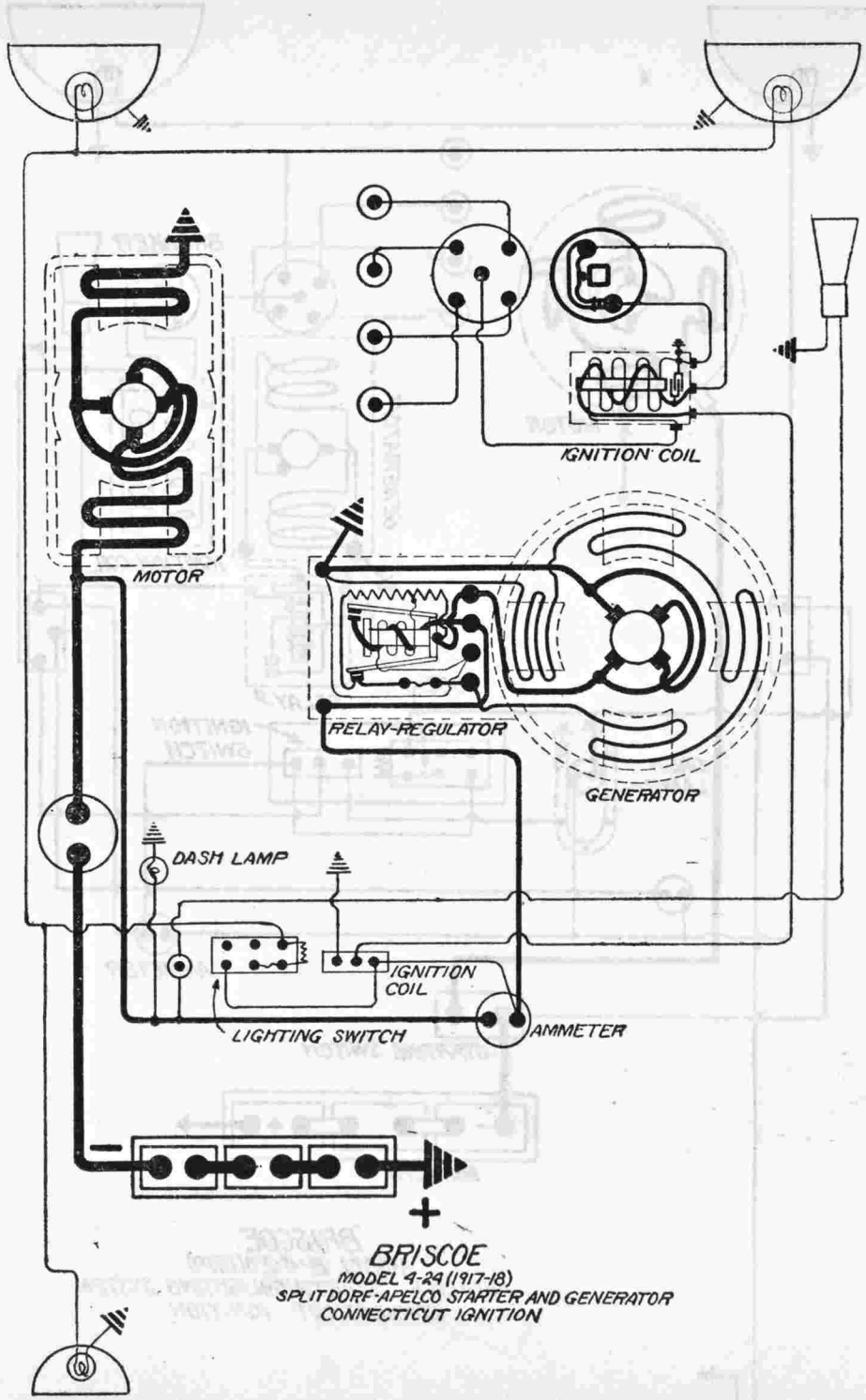
Starter.—The motor-generator circuits are fully traced on Page No. 161. Directions for the care of the system are also given on this page.

Output.—The maximum generator output should be 7-8 amperes, reached at 20 miles per hour, high gear car speed. Relay should close at about 8 miles per hour.

Fuse.—There is a 10 ampere, strip fuse, on the back of the relay. This fuse is in the lighting circuit. Put 5 or 6 drops of light engine oil in each of the generator oilers every month or 1000 miles.

Lamps.—Head lamps are 6-8 volts, 17 cp. Tail lamp is 6-8 volts, 2 cp.





Briscoe

Model 4-24 (1917-18)

Splitdorf-Apelco Starting and Lighting System

Connecticut Ignition

Battery.—Battery is 6 volt, 85 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Contacts should open .014 inch to .015 inch. Breaker contacts are made of tungsten metal.

Care.—Should they become so badly worn as to impair the proper operation of the engine, the inner breaker mechanism should be renewed as directed on Page No. 50.

Spark Plug Gaps.—The spark plug gap is .028 to .031 inch, about the thickness of a smooth dime.

Timing.—Spark should occur when the top dead center mark on the flywheel is just past the indicator, spark control lever and breaker assembly in the fully retarded position. A simple test for the breaker setting is as follows: With spark control lever fully retarded, turn engine until the mark "1 and 4" on the flywheel is at the indicator. Ammeter should indicate discharge, all lights off. Advancing the spark control lever ½ inch should cause the ammeter to indicate zero, due to the opening of the breaker contacts.

Firing Order.—The firing order is 1, 3, 4, 2.

Care.—Use only pure vaseline in the cup under the breaker head. Ignition should take about 5 amperes, engine idle and contacts closed, and about 3 amperes when engine is running.

Starter.—The starter is connected to the engine by a Bendix drive. Every month put several drops of light engine oil in each of the motor oilers.

Generator.—Generator voltage regulation is by a vibrating regulator. Relay should close at about 8 and open at 6-7 miles per hour. The maximum generator output should be 12-14 amperes, reached at about 20 miles per hour.

Care.—The output is decreased by decreasing the spring tension on the vibrator and increased by increasing the spring tension. Internal circuits of and directions for the care of the generator are given on Page 160.

Lamps.—Head lamps are 6-8 volts, 17 cp., on the 1917 cars and 6-8 volts. 20 cp., on the 1918 cars. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp. Tonneau, dome and trouble lamps are 6-8 volts, 2 cp.

Fuses.—Lighting fuses are 10 ampere.

BRISCOE

Model B-4-24 (1917-18-19)

Auto-Lite Starting and Lighting System

Connecticut Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate .023 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed. To do this, remove the wire which leads to breaker from coil terminal marked C. Unclasp and remove distributor head, leaving wires on. Lift off distributor rotor. Unscrew the two retaining screws which hold the breaker in the case. Then remove the breaker by pulling upward. Remove the primary wire and keep it, to be replaced on the new breaker. To install new breaker, reverse the operations described above. Do not file breaker contacts. In an emergency, they may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should separate when piston entering power stroke is on top dead center, or when flywheel marking "1:4" is at indicator, with spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps should be .027 inch to .030 inch.

Oiling.—Refill the cup under the distributor head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Starter—Starter is connected to the engine through a Bendix drive. Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current.

Oiling.—Starter bearings are packed with medium cup grease. They should be thoroughly cleaned out and grease renewed every six months.

Generator.—Generator is Type GH. Current regulation is by third brush method.

GENERATOR DATA, TYPE GH

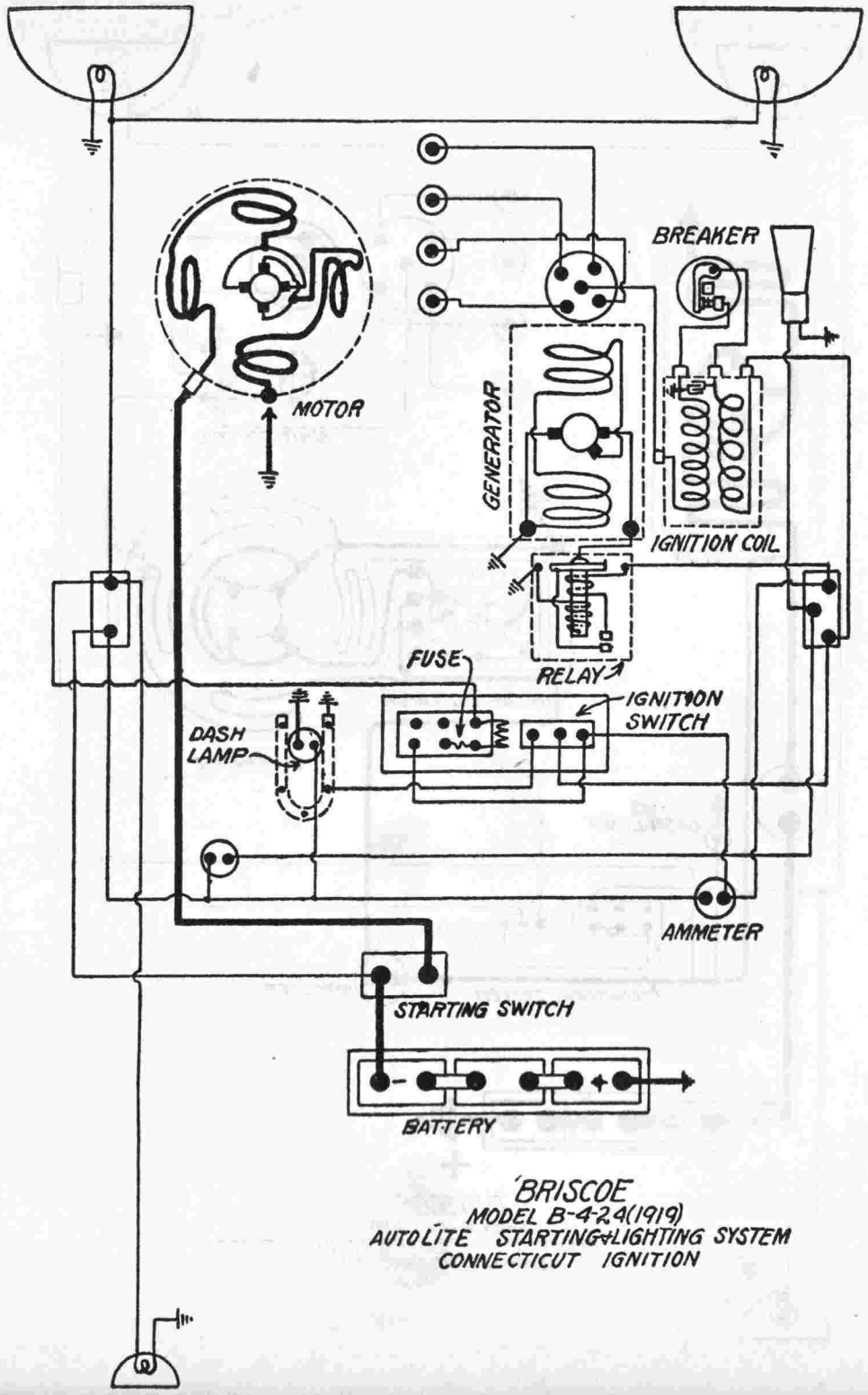
Amperes	R. P. M.
5.0	760- 820
10.0	1020-1100
12.5	1200-1300
15.0	1460-1675
15.4-16.8	1950-2250

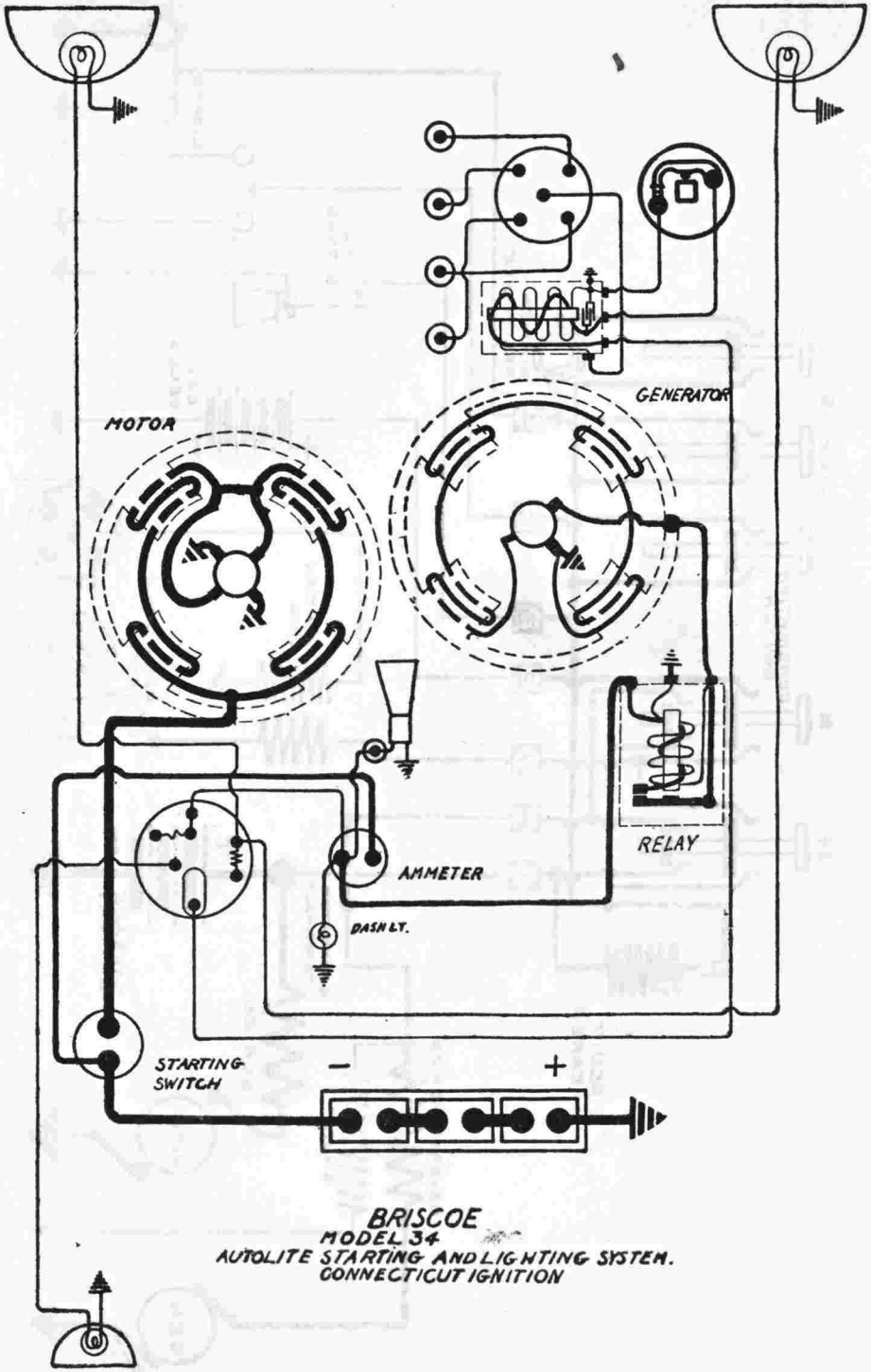
Shunt field should draw 1.7 amperes. Running freely as a motor, generator should draw 2.7 amperes and turn at 450 R. P. M. Much higher speed indicates damp, grounded or short circuited field coils. Greater current or lower speed indicates tight bearings or damp, grounded or short circuited armature windings or commutator.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay—Relay should close at 550-600 R. P. M., of generator armature. Charging current should be .5-1.5 amperes at closing, and discharge current 0-1 ampere at opening of relay contacts. Clean relay contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a strip of well worn No. 00 sand paper, and then draw a piece of unglazed paper between them to remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 20 cp. Tail lamp is 6-8 volt, 2 cp. Dash lamp is 6-8 volt, 2 cp.





BRISCOE
MODEL 34
AUTOLITE STARTING AND LIGHTING SYSTEM.
CONNECTICUT IGNITION

BRISCOE
MODEL 4-34 (1920-21-22)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—Prest-O-Lite, Type 613-WHN-2, 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Connecticut, Model 16, clockwise rotation. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1½ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model MG-1013. Starter is connected to the engine through a Bendix drive. Running free at 4000 R.P.M., taking 40-60 amperes, 6 volts. Cranking the engine at 125 R.P.M., taking 150 amperes, 5 volts. Lock torque, 13 pound-feet, taking 450 amperes, 3-4 volts.

Starter Data

Torque	R.P.M.	Amperes
2 lb. ft.	1280	135
4 lb. ft.	900	210
6 lb. ft.	600	275
8 lb. ft.	400	335
10 lb. ft.	180	390
13 lb. ft.	Lock	450

OILING.—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month.

GENERATOR.—Model GJ-1013. Generator current regulation is by third brush system. Maximum output is 12-16 amperes, reached at 1700 R.P.M. of the armature or 22 miles per hour.

Cold Test		Hot Test		Generator Data	
Amperes		R.P.M.	Amperes		R.P.M.
0		500	0		460
8		750	6		840
12		960	9		1050
16		1400	12		1360
16.5		1700	12.7		1700
12		3400	10		3400

Above readings are obtained with generator charging a battery of 1.300 solution.

Oiling.—Repack timer drive housing with arctic cup grease once every season. If car is driven over 5000 miles in one season, this care must be given to every 5000 miles. Do not use oil as it will dirty the commutator. The front bearing is automatically lubricated from the timing gears.

RELAY.—Relay closes at 9 miles per hour or 580 R.P.M. of armature and opens at 7 miles per hour or 360 R.P.M. of armature. Relay contacts separate .030 to .045 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

FUSES.—Fuses are 20 ampere.

Buick

Models C-24 and C-25 (1915) (Serial Nos. 100000 to 144715)
Delco Generating, Starting and Lighting System
Delco Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts separate .010 to .012 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper. The copper pigtail must always be intact.

Oiling.—Put 5 or 6 drops of light engine oil in the upper ball bearing, accessible when distributor head and rotor are removed, every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles. If the track of the distributor rotor button is not well polished apply a small amount of vaseline with a soft cloth.

Timing.—Breaker contacts separate when piston entering power stroke in on top dead center, spark control lever midway between the fully advanced and fully retarded position. (First see that the breaker assembly is fully retarded when the control lever is in the fully retarded position.)

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps are .028 to .030 inch.

Starter-Generator.—Starter and generator are combined into one unit, but are electrically separate. Starter is connected to the engine by a set of reduction gears and a pinion shifted by the operator. Two overrunning clutches are provided. In connection with the ignition switch a circuit is closed allowing current to flow through the generator windings, causing the armature to revolve slowly, facilitating the meshing of the reduction gears. One clutch permits this rotation, and also permits a relatively high speed of the armature, necessary when operating as a starter. The second overrunning clutch prevents the engine driving the armature through the reduction gears. Depressing the starting pedal meshes the reduction gears, opens the generator circuit and allows the motor brush to come in contact with the commutator, closing the starter circuit and cranking the engine. When the pedal is released, a spring reverses these operations.

Generator.—Generator current regulation is by reverse series field.

Amperes	Generator Data, Motor-Generator No. 56	R. P. M.
Neutral		350
4		500
12		1000
16-22		1500

When operating as a motor with the overrunning clutch as the only retarding force, generator draws 4 amperes.

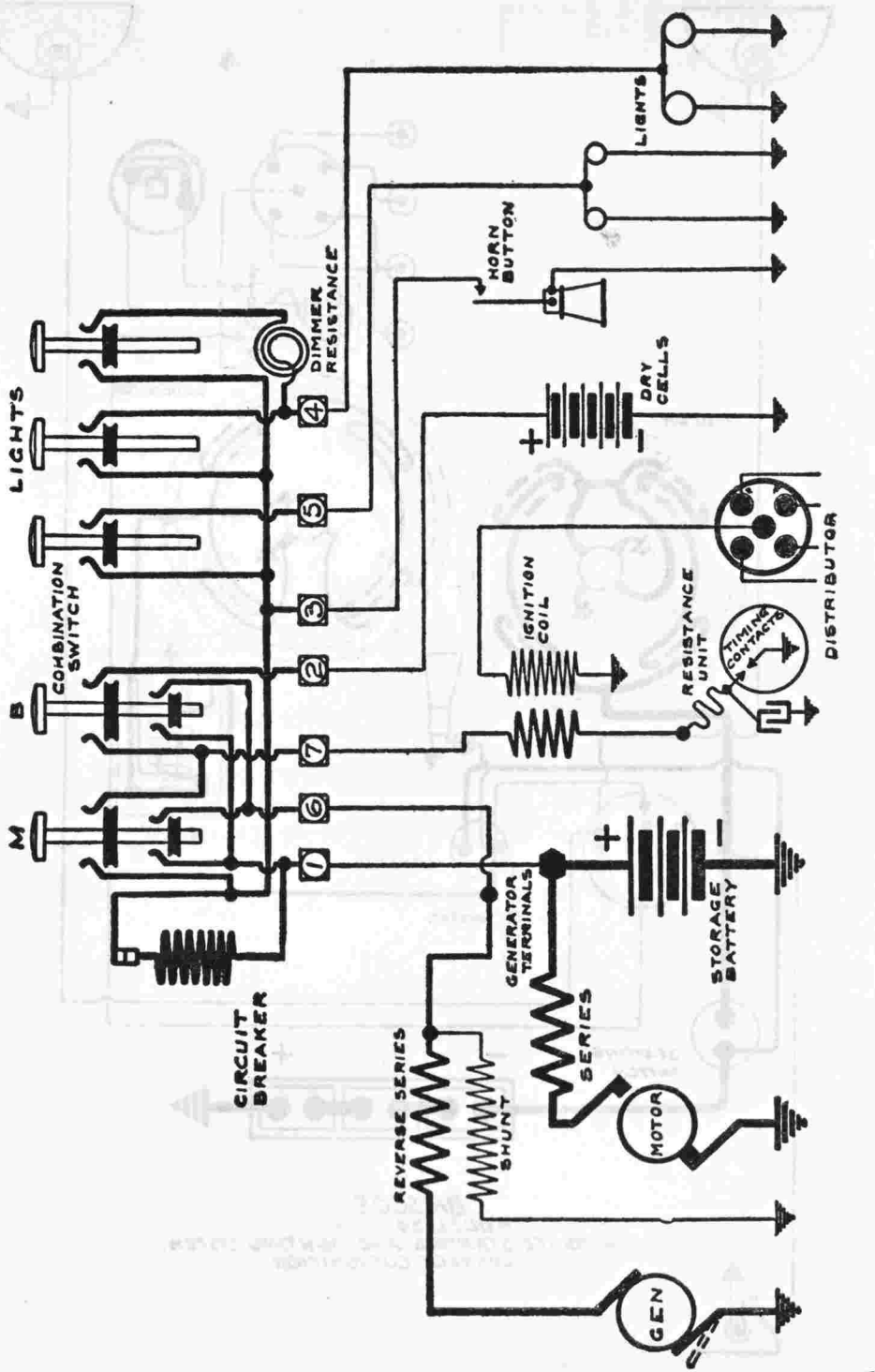
Oiling.—Put 5 or 6 drops of light engine oil in each of starter-generator oilers every two weeks. At the same time turn down the grease cup two turns. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles. Every six months renew the grease in the distributor gear housing.

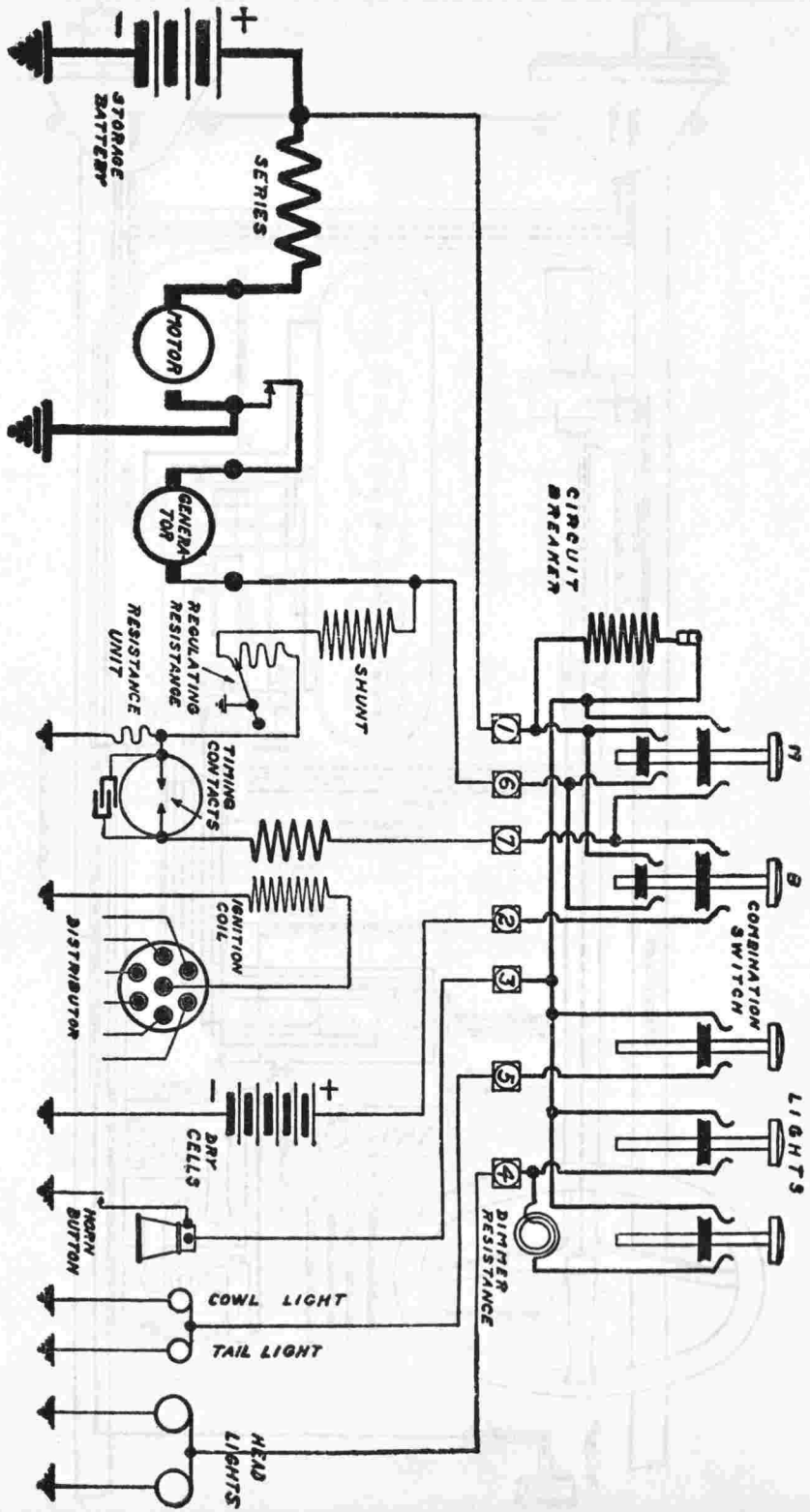
Relay.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch. The overrunning clutch at driving end allows generator to operate as a motor when battery's pressure is above that of generator. The noise made by the clutch serves to attract the operator's attention to open the ignition switch. The opening and closing of the generator-battery circuit by the operator takes the place of the relay.

Lamps.—Head lamps are 6-8 volt, 15 cp. Tail and dash lamps are each 6-8 volt, 2 cp.

Circuit Breaker.—There is a vibrating circuit breaker on the back of the lighting switch which takes the place of fuses in the lighting circuits. It requires a current of 25 amperes to start this device vibrating, but when vibrating 3 to 5 amperes will cause it to continue.

Model Numbers.—Motor-generator is No. 56. Ignition coil is No. 2111. Combination





Buick

Models C-36, 37, 54 and 55 (1915) Serial Nos. 100000 to 144715

Delco Generating, Starting and Lighting System

Delco Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded. There is also a set of dry cells so connected that they may be switched into the ignition circuit should other pressure sources fail.

Ignition.—Breaker contacts separate .010 to .012 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper. The copper pigtail must always be intact.

Oiling.—Put 5 or 6 drops of light engine oil in the upper ball bearing, accessible when distributor head and rotor are removed, every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Timing.—On the C-54 and C-55 Models, the breaker contacts separate when the engine is turned to the 7 degree mark on flywheel (about 1 inch past dead center), spark control lever and breaker assembly in the fully retarded position. On the C-36 and C-37 Models the breaker contacts separate when piston entering power stroke is on top dead center, spark control lever midway between the fully advanced and fully retarded positions. (First see that the breaker assembly is fully retarded when the control lever is in the fully retarded position).

Firing Order.—The firing order of the C-36 and C-37 Models is 1, 3, 4, 2. The firing order of the C-54 and C-55 Models is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—Spark plug gaps are .027 to .030 inch.

Starter-Generator.—Starter and generator are combined into one unit, but are electrically separate. Starter is connected to the engine through a set of reduction gears and a pinion shifted by the operator. Two overrunning clutches are provided. In connection with the ignition switch, a circuit is closed, allowing current to flow through the generator windings, causing the armature to revolve slowly, facilitating the meshing of the reduction gears. One clutch permits this rotation, and also permits a relatively high speed of the armature, necessary when operating as a starter. The second overrunning clutch prevents the engine from driving the armature through the reduction gears. Depressing the starting pedal meshes the reduction gears, opens the generator circuit and allows the motor brush to come into contact with the commutator, closing the starter circuit, and cranking the engine. When the pedal is released a spring reverses these operations.

Generator.—Generator voltage regulation is by automatic field rheostat. Motor-generator No. 51 is used on the Models C-36 and C-37 and No. 52 on the C-54 and C-55 cars.

GENERATOR DATA

Motor-Generator No. 51		Motor-Generator No. 52	
Amperes	R. P. M.	Amperes	R. P. M.
Neutral	350	Neutral	510
6-11	500	7-15	750
16-20	900-1050	13-22	1100-1300
9-14.5	1500	12-18	1500

The No. 51 generator, when operating as a motor with the overrunning clutch as the only retarding force, should take 4.5 amperes and under the same conditions the No. 52 generator takes 5.5 amperes. Charging rate is varied by changing the regulating resistance spool.

Oiling.—Put 5 or 6 drops of light engine oil in each of motor-generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles. Once a year remove the name plate and lubricate the spiral gears with soft cup grease, limiting the amount so that none will work through to the regulating resistance, interfering with its operation.

Relay.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

Lamps.—On the C-36 and C-37 Models the head lamps are 6-8 volt, 18 cp. Dash and tail lamps are each 6-8 volt, 2 cp. On the C-54 and C-55 Models the head lamps are 6-8 volt, 21 cp. Dash and tail lamps are each 6-8 volt, 2 cp.

Circuit-Breaker.—There is a vibrating circuit breaker on the back of the combination switch which takes the place of fuses in the lighting circuits. It requires a current of 25

BUICK

MODELS D-44, D-45, D-46, D-47, D-54 AND D-55 (1916)
.(SERIAL NOS. 144,717 TO 254,501)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Batery is 6 volt, 85 ampere-hour on the D-44, 45, 46 and 47 models, and 6 volt, 100 ampere-hour on the D-54 and D-55 Models. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery whell, finishing on a hard oil stone.

OILING.—Put 5 or 6 drops of light engine oil in the oil hole on side of distributor housing every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles. If the track of the distributor rotor button is not well polished, apply a very small amount of vaseline with a soft cloth.

TIMING.—Breaker contacts separate when engine is turned to the 7 degree mark on the flywheel, (approximately one inch after dead center,) with spark control lever and breaker assembly in fully retarded position.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

SARK PLUG GAPS.—Spark plug gaps are .028 inch to .030 inch.

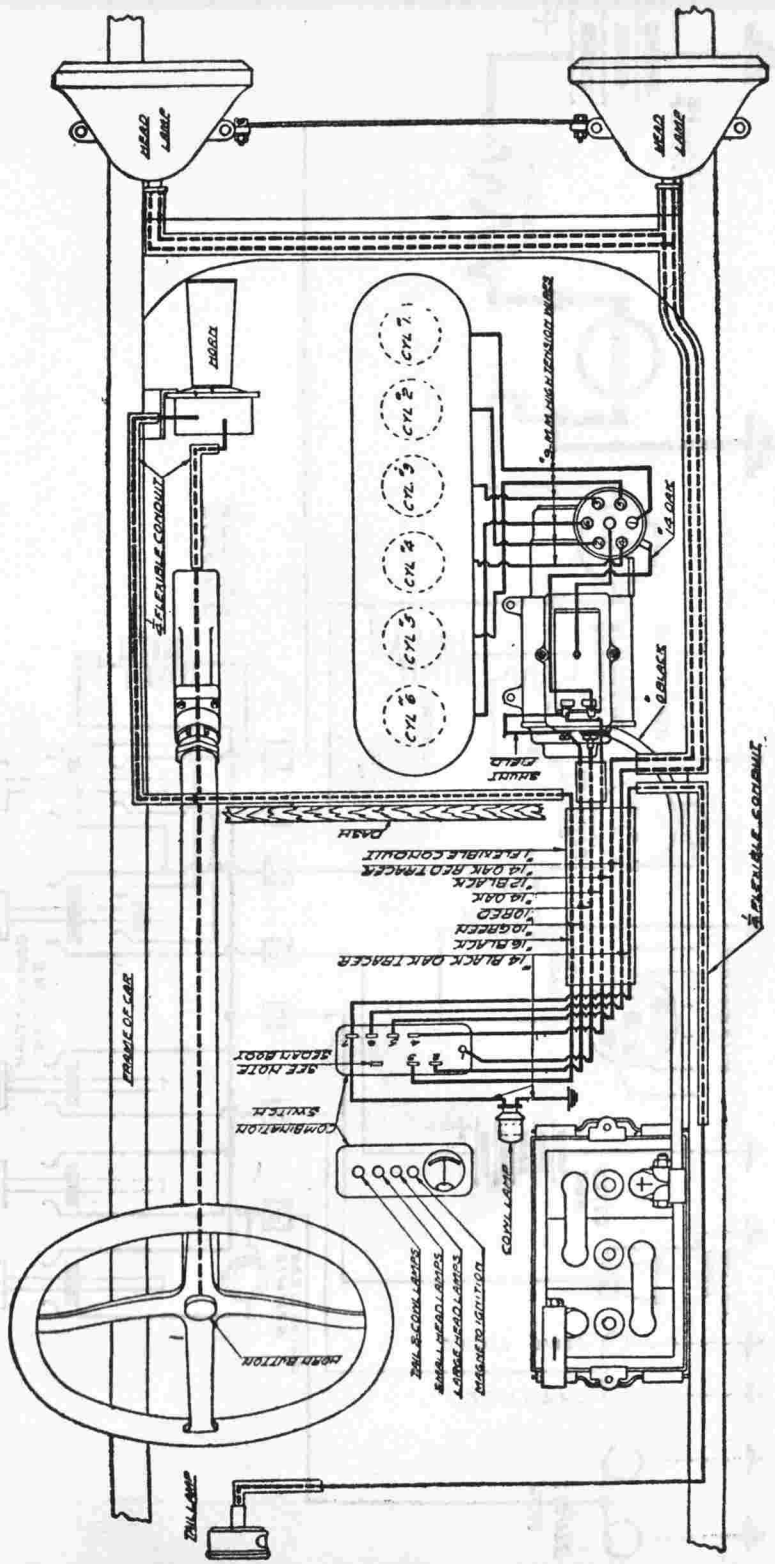
STARTER GENERATOR.—Starter and generator are combined into one unit, but are electrically separate. Starter is connected to the engine through a set of reduction gears and a pinion shifted by the operator. Two overrunning clutches are provided. In connection with the ignition switch, a circuit is closed, allowing a current to flow through the generator windings, causing the armature to revolve slowly, facilitating the meshing of the reduction gears. One clutch permits this rotation, and also permits a relatively high speed of the armature, necessary when operating as a starter. The second overrunning clutch prevents the engine from driving the armature through the reduction gears. Depressing the starting pedal meshes the reduction gears, opens the generator circuit, and allows the motor brushes to come into contact with the commutator closing the starter circuit, and cranking the engine. When the pedal is released, a spring reverses these operation.

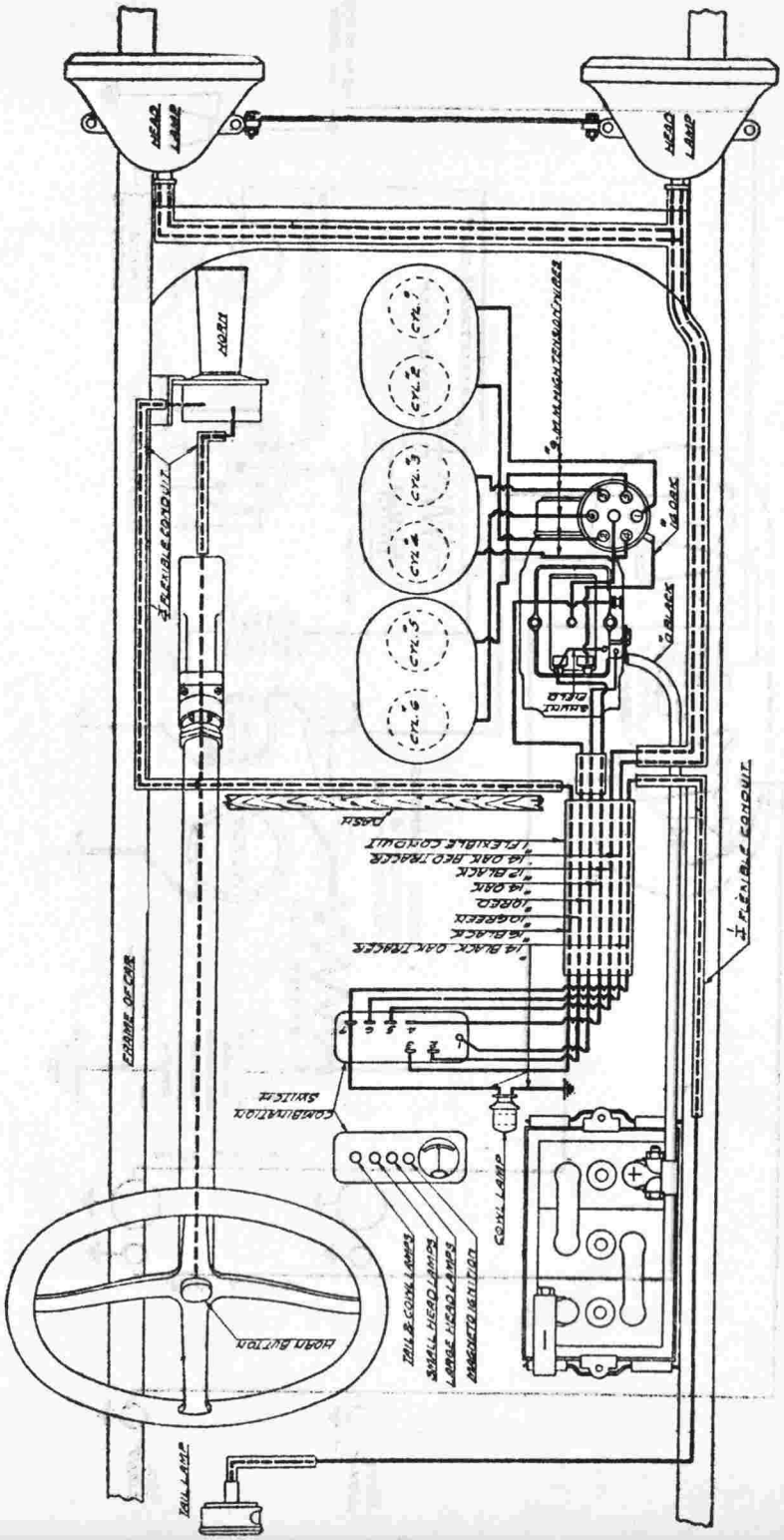
GENERATOR.—Generator current regulation is by third brush system. Motor-Generator No. 70 is used on the D-44, 45, 46 and 47 Models, and No. 69 is used on the D-54 and D-55 Mod

Generator Data.

Motor-Generator No. 70.		Motor-Generator No. 69.	
Amperes	R. P. M.	Amperes	R. P. M.
Neutral	600	Neutral	400
7.5- 8.5	825	9-10	740
12.0-15.0	1500	11-11.5	1000
11.5-14.5	1800	12-14.5	1400
		11-14.5	1800

Generator begins to supply current at 7-8 miles per hour and reaches its maximum output of 14-16 amperes at 20-25 miles per hour. Charging rate is changed by loosening the two srews in the third brush arm, and moving the brush in a clockwise direction (looking at commutator end), to increase the charging rate and in a counter clockwise direction to decrease the charging rate. Operating freely as a motor with the overrunning clutch as the only retarding force, generator draws 4.5 amperes.





Buick

MODELS D-44, D-45, D-46, D-47, D-54 AND D-55 (1916)
(SERIAL NOS. 144,717 TO 254,501)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

Continued from preceding page.

GENERATOR—Continued.—To remove generator clutch loosen screw in end of armature shaft and remove lock washer and key washer. Insert armature in a hole in a horizontal bench or box. The hole should be 1/4 inch larger than the armature. Allow the armature end frame to drop about 2 inches, being careful to have the end frame come squarely in contact with the bench. Hold armature from below so that it will not fall to the floor. Clutch is held together by retaining spring wire, which, when removed, allows the clutch to be disassembled for inspection. On the D-44, 45, 46 and 47 Models one of the generator brushes is raised during the cranking operation. On the D-54 and D-55 Models the generator circuit is opened by a switch when starting pedal is depressed.

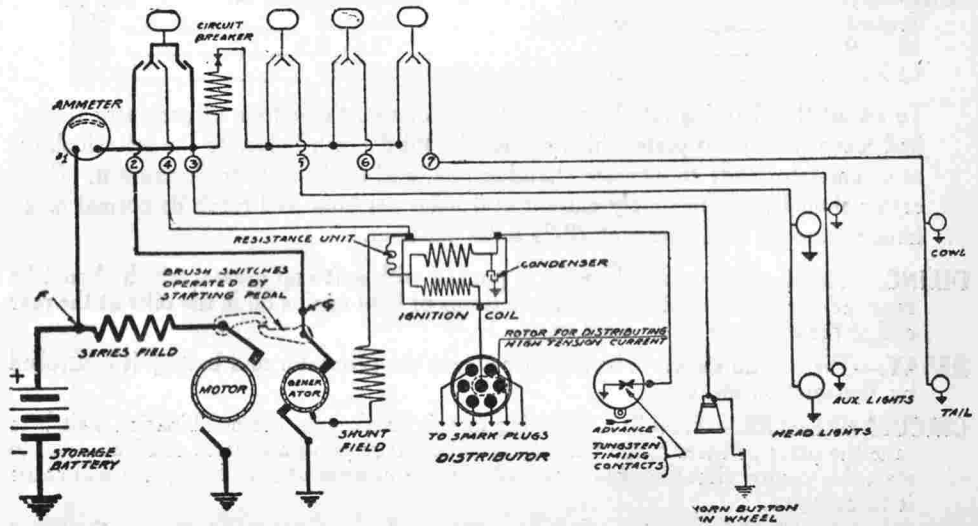
OILING.—Put 5 or 6 drops of light engine oil in each of the starter-generator oilers every two weeks. At the same time turn down the grease cup two turns. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles. Renew the grease in distributor gear housing every six months.

RELAY.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch. The overrunning clutch at driving end allows generator to operate as a motor when battery's pressure is above that of generator. The noise made by the clutch serves to attract the operator's attention to open the switch. The opening and closing of the generator-battery circuit by the operator takes the place of the relay.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Tail and Dash lamps are each 6-8 volt, 2 cp.

CIRCUIT BREAKER.—There is a vibrator circuit breaker on the back of the lighting switch which takes the place of fuses in the lighting circuits. It requires a current of 25 amperes to start this device vibrating, but when vibrating, 3 to 5 volts will cause it to continue.

MODEL NUMBERS.—Motor-generator is No. 69 on the D-54 and 55 cars, and No. 70 on the D-44, 45, 46 and 47 cars. On both models the ignition coil is No. 2138. Combination switch is No. 1057 or 1066. Battery is Exide 2-X-C-13-1 on the D-44, 45, 46 and 47 cars, and Exide 3-X-C-15-1 on the D-54 and 55 cars.



Buick

MODELS D34 AND D35 (1917)
DELCO GENERATING STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Battery is 6 volt, 90 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts should separate .018 inch. They are made of tungsten. Should they become badly burned or pitted, affecting the ignition, remove and resurface them by drawing across a piece of fine emery cloth laid on a flat surface, as on the bed of a drill press, finishing on a very hard oil stone. Clean all oil from contacts before again putting into service.

TIMING.—Breaker cam should be set so that when the flywheel marking "SC" is in line with the indicator the contacts will just open when the slack in the distributor gears is rocked forward and will close when the unit is rocked backward, spark control lever and assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—The spark plug gaps should be .028 inch to .030 inch.

OILING.—The distributor bearings are of the oilless type, and need no lubrication. If the rotor button and its track are not well polished, apply a very small amount of vaseline.

STARTER-GENERATOR.—Motor and generator are combined into one unit, but are electrically separate. The motor is connected to the engine through a non-automatic mechanical shift. The raising and lowering of a motor brush serves as a starting switch. When the ignition switch is closed, the generator runs as a motor in order to facilitate the meshing of the gears. When the starter pedal is depressed the gears are drawn into mesh, the generator circuit is broken by the raising of the generator brush, and the motor brush is allowed to come into contact with the commutator, thus applying the full battery pressure to the motor and cranking the engine.

GENERATOR.—Generator current regulation is by third brush method.

Generator Data. Model No. 94.

Cold-Amperes	R.P.M.	Warm-Amperes	R.P.M.
Neutral	560 or less	Neutral	600
8 - 9.5	900	7.5- 8.5	900
12.5-16	1500	11.5-15	1500

To adjust the charging rate loosen the two screws on the bottom of generator frame, and move the slotted plate which carries the third brush holder to the left (looking at commutator end) to increase charging rate, and to the right to decrease it. Generator should begin to supply current at 8 miles per hour and reach its normal maximum output of 15 amperes at 20-25 miles per hour.

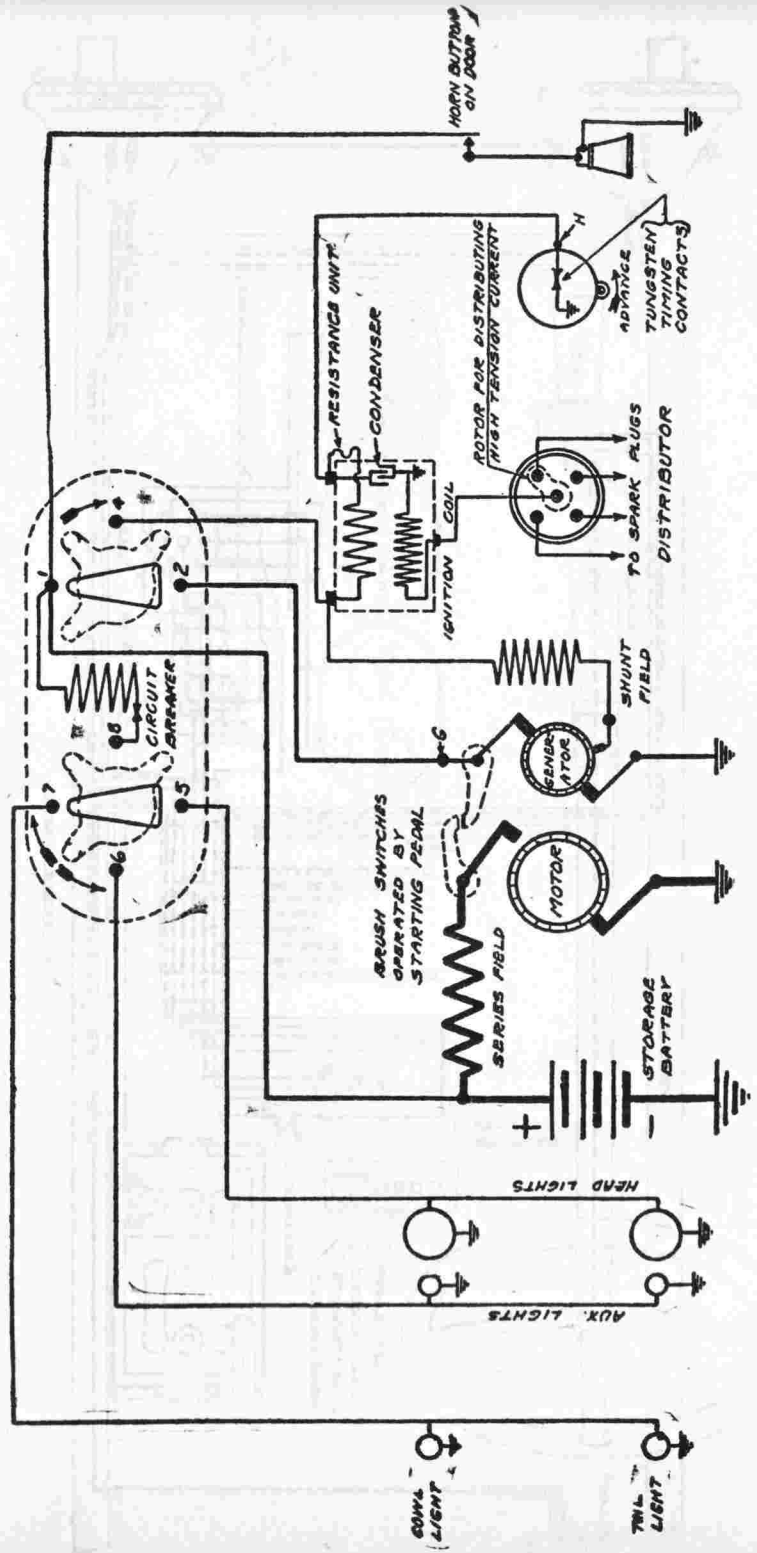
OILING.—The distributor gear housing is packed with soft cup grease, which should be renewed every six months. Put 4 or 5 drops of light engine oil in the oiler at the rear end of the armature shaft every week.

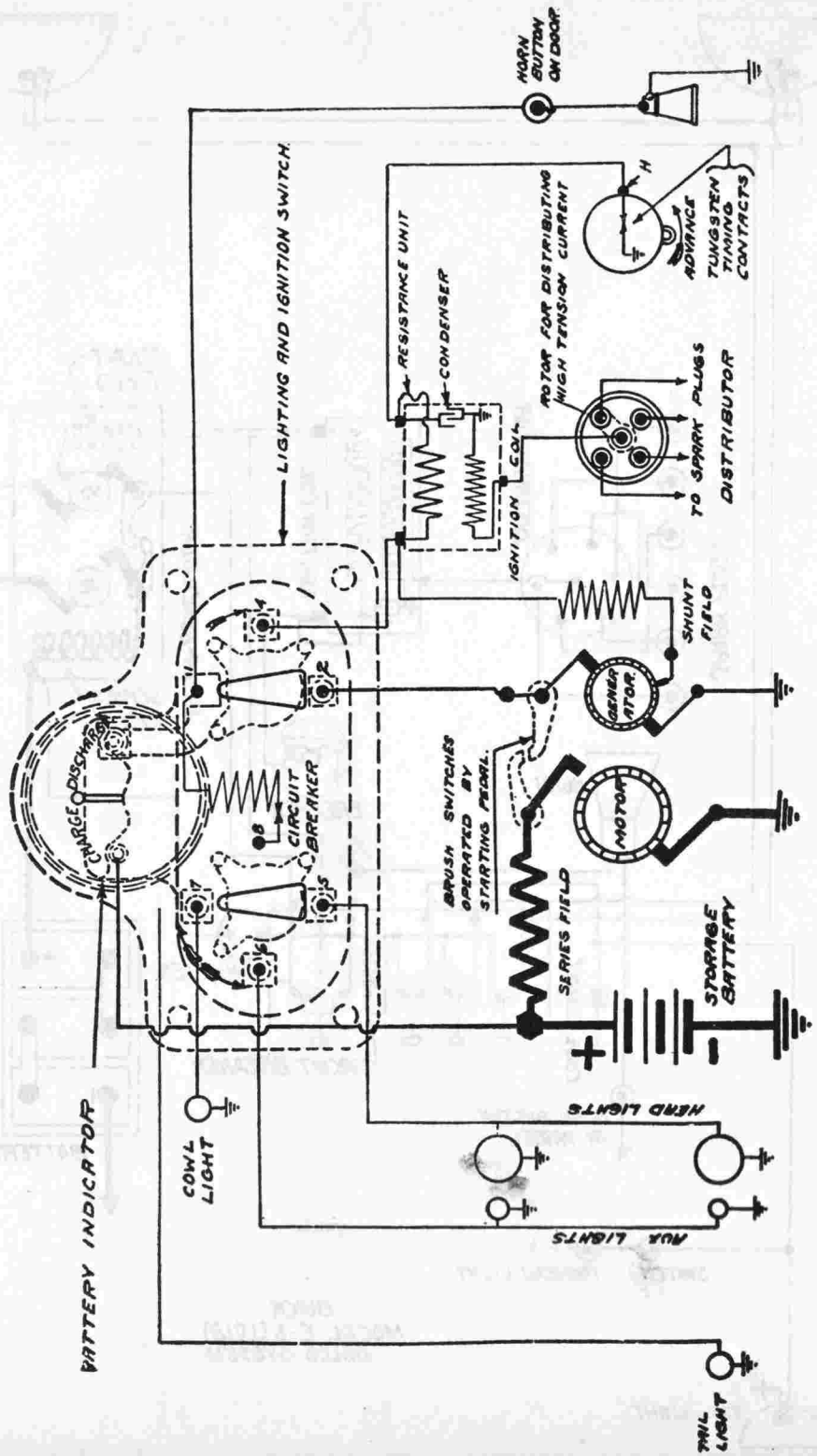
RELAY.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

CIRCUIT BREAKER.—There is a vibrating circuit breaker on the combination switch to take the place of fuses in the lighting circuits. It requires a current of 25 amperes to start this device vibrating, but when vibrating a current of 3 to 5 amperes will cause it to continue.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are 6-8 volt, 2 cp.

MODEL NUMBERS.—The motor-generator is No. 94. Motor clutch is No. 12,647. Igni-





Buick

MODELS E-4-34 AND E-4-35 (1918)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Battery is 6 volt, 84 ampere-hour. The negative (—) terminal is grounded.

IGNITION—Coil Model No. 2157. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—A wick oiler is provided for lubricating the distributor shaft bearings. Fill the oil cup with light engine oil every two weeks. If the track of the rotor button in the distributor head is not well polished apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the seven degree mark on the flywheel (one inch from the top dead center mark) is at the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .028 to .030 inch.

STARTER-GENERATOR.—Model No. 121. Starter and generator are combined into one unit but are electrically separate. Starter is connected to the engine through a set of reduction gears meshed by the operator.

GENERATOR.—Generator current regulation is by third brush system. Generator begins to supply current at 560-600 R.P.M. of the armature or 7-9 miles per hour, and reaches its maximum current output of 12-16 amperes at 1500 R.P.M. of the armature or 20-25 miles per hour.

Cold Test	Generator Data	Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
Neutral	560	Neutral	600
8.0- 9.5	825	7.5- 8.5	950
12.5-16.0	1500	12.0-15.0	1500
11.0-14.5	1800	11.5-14.5	1800

To vary the charging rate loosen the two screws on the bottom of the generator frame and move the slotted plate, which carries the third brush holder, to the left (looking at commutator end) to increase the charging rate, and to the right to decrease it.

OILING.—Put 4 or 5 drops of light engine oil in each of the starter-generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles. The distributor gear housing is packed with soft cup grease which should be renewed every six months. In cold weather, add a few drops of light oil to keep the grease soft.

RELAY.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are each 6-8 volt, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires a current of 25 amperes to start this device vibrating. While vibrating, the current flow is 3-5 amperes.

Buick

Model E-6 (1918). (Serial Nos. 343783 to 480995)
Model H-6 (1919). (Serial Nos. 480996 and up)
Model K-6 (1920)
Delco Starting and Lighting System
Delco Ignition

Battery.—Battery is 6 volt, 90 ampere-hour on the 1918 models and 6 volt, 100 ampere-hour on the 1919 and 1920 models. The negative (—) terminal is grounded.

Ignition.—Breaker contacts should separate about .018 inch. They are of tungsten metal. They will operate properly even though very irregular, due to the fact that the rough surfaces fit each other perfectly. Their natural color is dark gray, not silver. Should they become badly burned or pitted, affecting the ignition, remove and resurface them by drawing across a piece of fine emery cloth laid on a flat surface, as on the bed of a drill press, finishing on a very hard oil stone. Clean all oil from contacts before again putting into service.

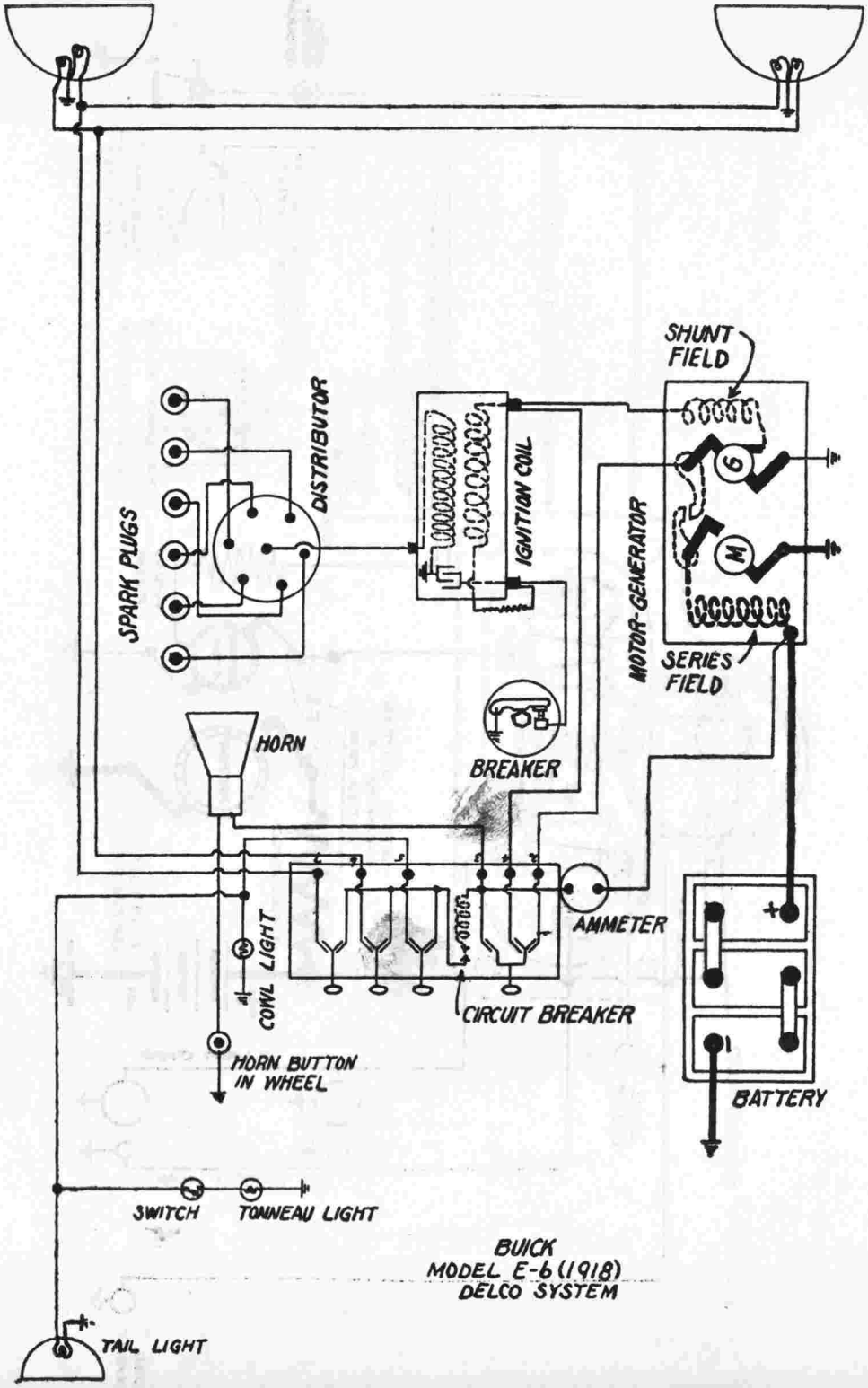
Timing.—Breaker cam should be so set that when the engine is turned to the seven degree mark on the flywheel (which is about one inch after upper dead center), the contacts will just open when the unit is moved forward as far as the slack in the gears will allow and again close when the breaker is rocked back, with the spark lever in the fully retarded position.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

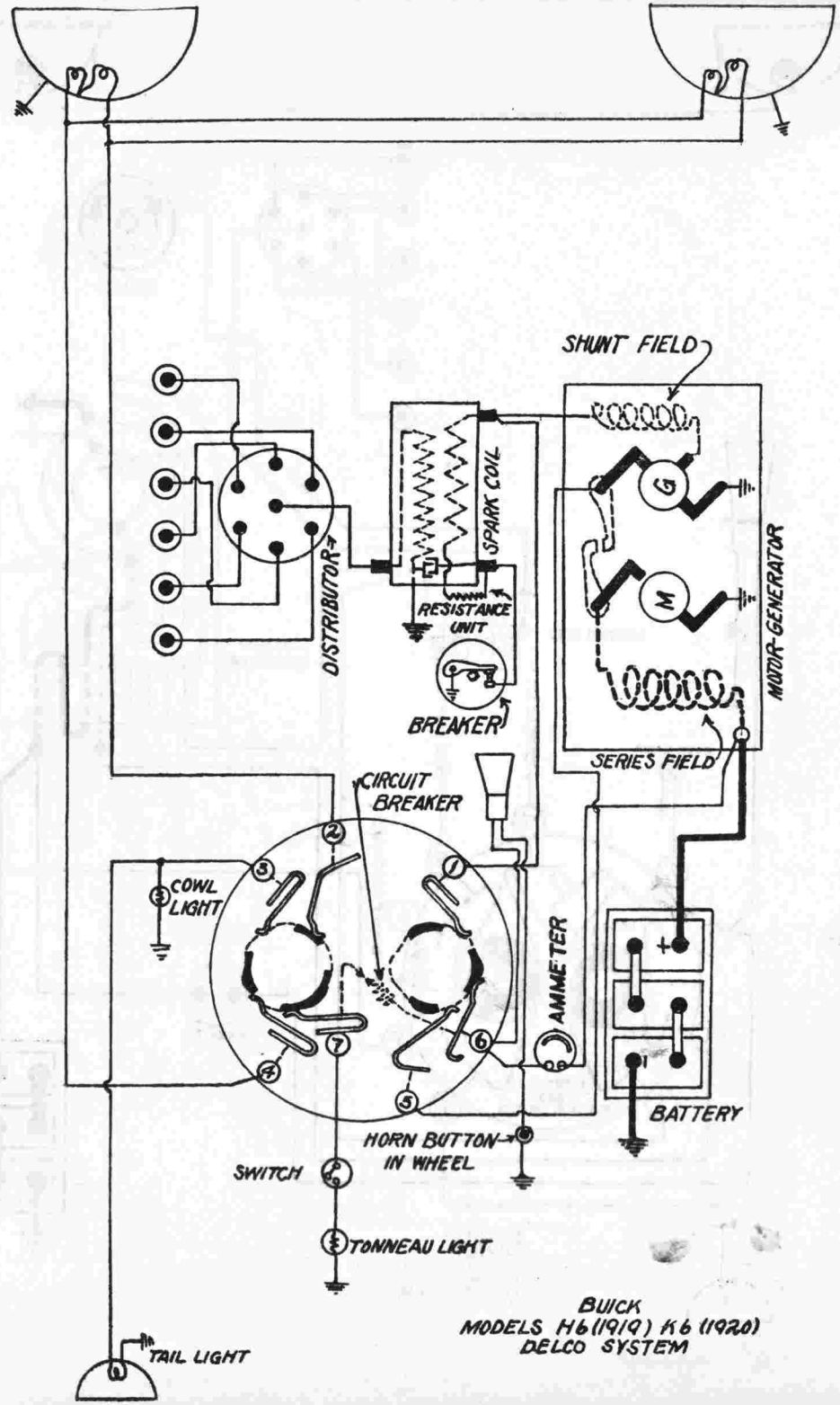
Spark Plug Gaps.—The spark plug gaps should be .030 inch.

Oiling.—An oiler is provided for lubricating the bearings on the distributor shaft. This should receive 4 or 5 drops of engine oil every week. If rotor button and the track which it follows are not well polished, lubricate with a small amount of vaseline.

Starter-Generator.—Motor and generator are combined within one frame, but are electrically separate, there being two armature and field windings and two commutators. The motor is connected to the flywheel by a non-automatic mechanical shift. Raising and lowering of one motor brush acts as a starting switch. When the ignition switch is closed the generator runs as a motor slowly to facilitate meshing of the starting gears. When the starting pedal is depressed the gears are drawn into mesh, the generator circuit is broken by the raising of the generator brush, and the motor brush is allowed to come into contact with the commutator, thus completing the motor circuit in the order named. There is an over-running clutch to prevent the engine driving the motor. Should the generator fail to motor when the ignition switch is closed, remove the cover from the front of the machine and try to turn the armature. If the armature cannot be turned with the fingers, the clutch is sticking and must be taken down and repaired. If the armature turns freely, look for defective connections at the generator and battery terminals and see that the ignition switch is making proper contact. There is an over-running clutch to allow the generator to run as a motor during the cranking operation or when it is not being driven fast enough to produce a pressure equal to, or greater than that of the battery.



BUICK
MODEL E-6 (1918)
DELCO SYSTEM



Buick

Model E-6 (1918). (Serial Nos. 343783 to 480995)
Model H-6 (1919). (Serial Nos. 480996 and up)
Model K-6 (1920)
Delco Starting and Lighting System
Delco Ignition

Continued from preceding page.

GENERATOR DATA, MODEL NO. 117

Cold—Amperes	R. P. M.	Warm—Amperes	R. P. M.
Neutral	500	Neutral	520
8.0- 9.5	825	7.5- 8.5	825
12.5-16	1500	12.0-15	1500
11.0-14.5	1800	11.5-14.5	1800

Generator current regulation is by third brush method. Position of the third brush is adjustable by means of two screws on bottom of frame. Generator should begin to supply current at 8 miles per hour and reaches its maximum output of about 16 amperes at 20-25 miles per hour. Ammeter indicates amount of charge and discharge.

Oiling.—Put 4 or 5 drops of engine oil in the oiler provided for lubricating the armature shaft every week. The distributor driving gear housing is packed with soft cup grease, which should be replenished every six months. In very cold weather it is advisable to add lubricating oil to soften the grease. The grease cup for the lubrication of the starting gears, shaft and over-running clutch should be given two turns every two weeks.

Circuit-Breaker.—There is a vibrating circuit-breaker to take the place of fuses in the lighting circuit. It should take 25 amperes to start this device vibrating, but a current of 3-5 amperes will cause it to continue vibrating.

Lamps.—The head lamps are 6-8 volts, 18 cp. Dimmer lamps are 6-8 volts, 6 cp. Dash and tail lamps are 6-8 volts, 2 cp. Tonneau lamp is 6-8 volts, 2 cp.

Model Numbers.—Motor-generator is No. 117. Motor clutch is No. 12224. Ignition coil is No. 2157. The combination switch on the E-6 models (1918) is No. 1066 or 1103, on the H-6 models (1919) it is No. 1133, and on the K-6 models (1920) it is No. 1158. Storage battery on the E-6 (1918) models is Exide, type 3-XC-13-1. U. S. L., type HD-313-P is used on the H-6 (1919) models, and Willard, type SJWN-4, on the K-6 (1920) models.

BUICK

MODEL 21-SIX (1921) AND 22 SIX (1922)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—(21SIX) Willard, Type SJWH-4 (22-SIX) Exide, Type 3-XC-15-1 6 volt 100 ampere hour. The negative (—) terminal is grounded. The starting capacity is 98 amperes for 20 minutes. The lighting capacity is 5 amperes for 17 hours.

IGNITION.—Coil Model No. 2159. Distributor is integral with the motor-generator. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, they must be removed and resurfaced with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone. The condenser is mounted within the breaker housing, and the resistance unit on the side of the housing.

Oiling:—Apply a small amount of grease on the distributor track two or three times during the first 2000 miles. After this it will be necessary to keep the glazed surface wiped with a clean cloth. Apply a small amount of vaseline on the breaker cam each 1000 miles. See also starter-generator oiling.

Timing:—Breaker contacts begin to separate when the seven degree mark on the flywheel (which is approximately one inch after top dead center) is at the indicator spark control lever and distributor drive shaft in the fully retarded position.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Diameters 7/8 inch. Gaps are .030 inch.

STARTER-GENERATOR:—No. 184. Starter and generator are combined into one unit. Depressing the starting pedal meshes the reduction gears, opens the generator circuit, and allows the motor brush to come in contact with the commutator, closing the starter circuit and cranking the engine. When the pedal is released, a spring reverses these operations. Direction of rotation is counter-clockwise, looking at commntator end. The pressure of the upper brush on the commutator should be 4½ to 5 pounds and 2¼ to 2¾ pounds on the lower brush.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	75
8 "	Lock	3.1	—

Regulation and Output.—Generator current regulation is by the third brush system.

Generator Data. Motor-Generator No. 184

Amperes	Cold Test R.P.M.	Amperes	Hot Test R.P.M.
Neutral	500	Neutral	520
8.0- 9.5	825	7.5- 8.5	825
12.5-16.0	1500	12.0-15.0	1500
11.0-14.5	1800	11.5-14.5	1800

To adjust the charging rate, loosen the two screws on the bottom of generator frame and move the slotted plate which carries the third brush holder to the left (looking at commutator end) to increase charging rate, and to the right to decrease it.

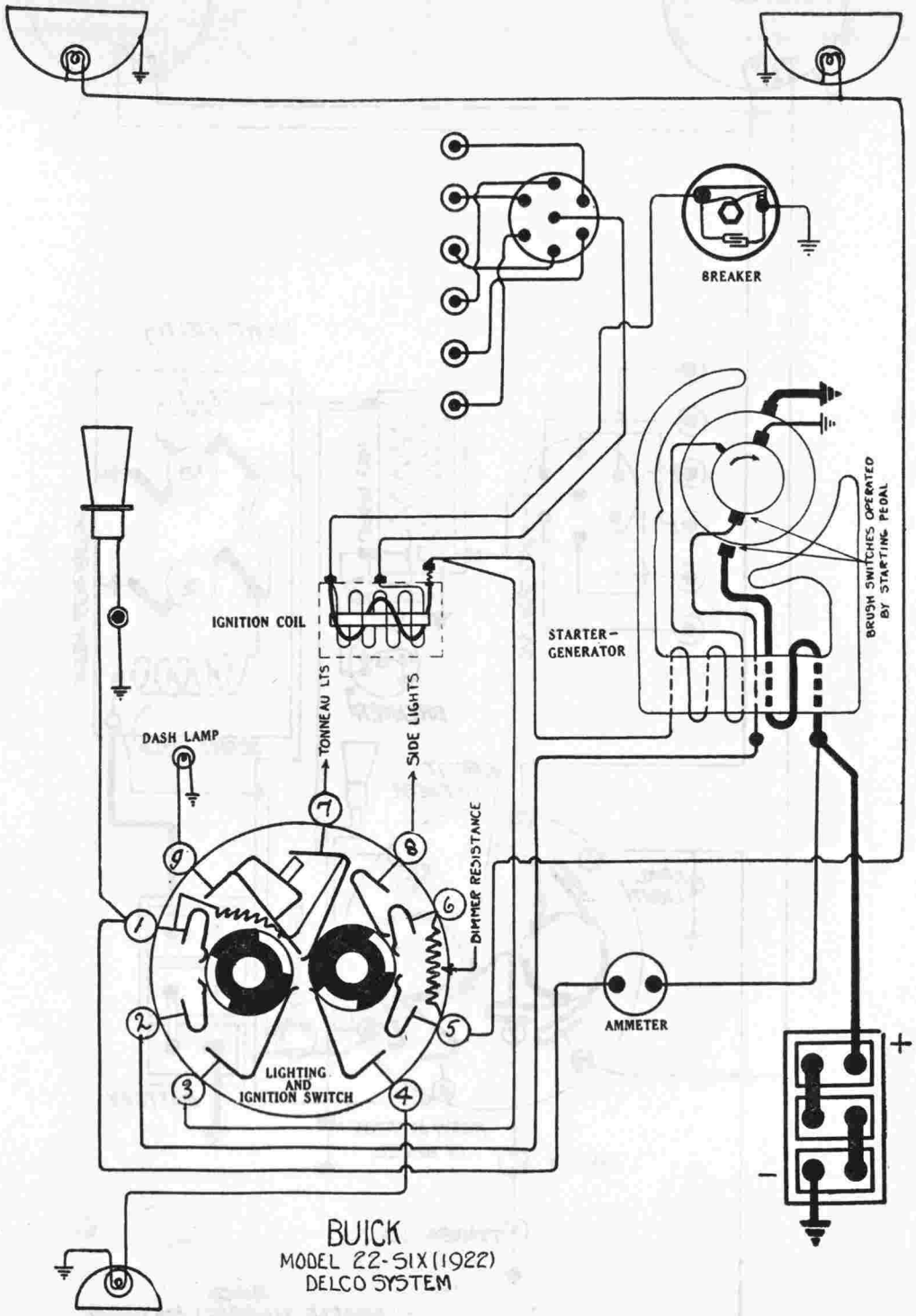
Motoring freely with over-running clutch, taking a current of 5.5 amperes, 6 volts. Field current is 2.5 amperes.

Oiling:—Put 4 or 5 drops of light engine oil in oiler provided for lubricating the rear armature shaft bearing every two weeks. Remove the front end cover over the commutators and put 3 or 4 drops of light engine oil in the exposed oil hole. Put 4 or 5 drops of light engine oil in the upper distributor shaft bearing oiler. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles. Refill the starting gear grease cup with soft cup grease and turn down two turns every month. Every six months, remove the plate on the side of the distributor housing and refill with soft cup grease to a level just above the manual advance ring.

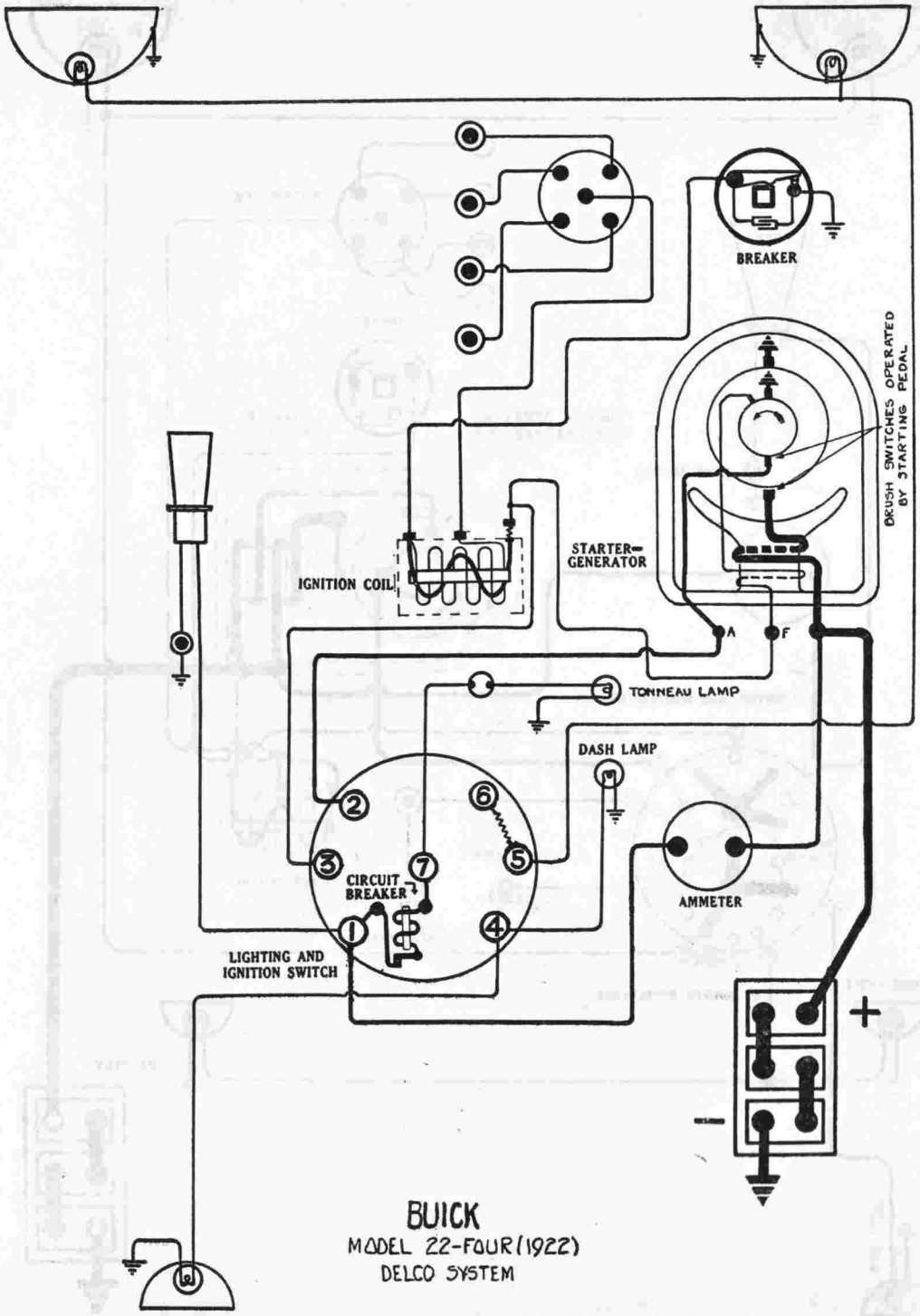
RELAY:—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch. The overrunning clutch at the driving end allows generator to operate as a motor when battery's pressure is above that of generator. If engine is killed when stopping, the noise made by the clutch serves to attract the operator's attention to open the ignition switch.

LAMPS:—Head lamps are 6-8 volt, 21 cp. Dash, tail, dome and side lamps are each 6-8 volt, 2 cp. On the 21-Six dimmer lamps connected to No. 6 terminal of the switch are used instead of the resistance. Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 5 cp.

COMBINATION SWITCH:—Model No. 1159. A vibrating circuit breaker, mounted on the rear of switch, takes the place of fuses. It requires 25 amperes to start the



BUICK
MODEL 22-SIX (1922)
DELCO SYSTEM



BUICK

MODEL 22-FOUR (1922)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY:—Exide, Type 3-XC-13-1. 6 volt, 84 ampere hour. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. 2159. Distributor is integral with the motor-generator. Breaker contacts separate .0225 to .0275 inch. They are made of tungsten. When the condition of the contacts affects the ignition, they must be removed and resurfaced with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone. The condenser is mounted within the breaker housing, and the resistance unit on the side of the housing.

Oiling:—See motor-generator oiling.

Timing:—Breaker contacts begin to separate when the seven-degree mark on the flywheel (which is approximately one inch after top dead center) is at the indicator, spark control lever and distributor drive shaft in the fully retarded position.

Firing Order:—The firing order is 1-3-4-2.

Spark Plugs:—Diameter, 7/8 inch. Spark gaps are .030 inch.

STARTER-GENERATOR:—Model No. 231. Starter and generator are combined into one unit, but are electrically separate. Depressing the starting pedal meshes the reduction gears, opens the generator circuit, and allows the motor brush to come in contact with the commutator, closing the starter circuit and cranking the engine. When the pedal is released, a spring reverses these operations.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	5.5	90
6 "	Lock	3.5	450

GENERATOR:—Generator current regulation is by the third brush system. The maximum charging rate should not exceed 18 amperes, hot adjustment, under any circumstances. To adjust the charging rate loosen clamp screw on third brush carrier (to right of bearing, looking at commutator end). Move carrier to left to increase charging rate, and to the right to decrease the charging rate. Tighten the clamp screw after position adjustment.

Test Data

Amperes	R.P.M.	M.P.H.
8-9	825	.....
0	600	.....
Max. 14-16	1500	20
12-15	1800	.....

Motoring freely at 250 R.P.M., taking 5-6 amperes, 6 volts, with over running clutch.

FIELD TEST:—Field draws 1.5-2 amperes, 6 volts.

Oiling:—Put 4 or 5 drops of light engine oil in oiler provided for lubricating the rear armature shaft bearing every two weeks. Remove the front end cover over the commutator and put 3 or 4 drops of light engine oil in the exposed hole. Put 4 or 5 drops of light engine oil in the upper distributor shaft bearing oiler. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles. Refill starting gear case cup with soft cup grease and turn down two turns every month. Every six months, remove the plate on the side of the distributor housing and refill with soft cup grease to a level just above the manual advance ring.

RELAY:—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch. The overrunning clutch at the driving end allows generator to operate as a motor when battery's pressure is above that of generator. If engine is killed when stopping, the noise made by the clutch serves to attract the operator's attention to open the ignition switch. The opening and closing of the generator-battery circuit by the operator takes the place of the relay.

LAMPS:—Head lamps are 6-8 volt 21 cp. Dome lamp is 6-8 volt, 5 cp. Dash and tail lamps are 6-8 volt, 2 cp.

CIRCUIT BREAKER:—A circuit breaker mounted on the back of the switch takes the place of fuses. A current of 25-30 amperes causes this device to operate. While

BUICK

MODEL 23-4 (1923) 24-4 (1924)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Exide, Type 3-XC-13-1, 6 volt, 84 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2159. Distributor is integral with the motor-generator. Breaker contacts separate .0225 to .0275 inch. They are made of tungsten. When the condition of the contacts affects the ignition, they must be removed and resurfaced with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone. The condenser is mounted within the breaker housing, and the resistance unit on the side of the housing.

Oiling.—See motor-generator oiling.

Timing.—Breaker contacts begin to separate when the seven-degree mark on the flywheel (which is approximately one inch after top dead center) is at the indicator, spark control lever and distributor drive shaft in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plugs.—Diameter, 7/8 inch. Spark gaps are .030 inch.

STARTER.—Motor-generator Model Nos. 231 and 236. Starter and generator are one unit, but are electrically separate. Starter is connected to the engine through a set of reduction gears meshed by the operator. Two overrunning clutches are provided. In connection with ignition switch, a circuit is closed, allowing the current to flow through the generator windings, causing the armature to revolve slowly, aiding the meshing of the reduction gears. One clutch permits this rotation, and also permits a relatively high speed of the armature, necessary when operating as a starter. The second overrunning clutch prevents the engine from driving the armature through the reduction gears. Depressing the starting pedal meshes the reduction gears opens the generator circuit, and allows the motor brush to come in contact with the commutator, closing the starter circuit and cranking the engine. When the pedal is released, a spring reverses these operations.

GENERATOR.—Generator current regulation is by the third brush system. The maximum charging rate should not exceed 18 amperes, hot adjustment, under any circumstances. To adjust the charging rate loosen clamp screw on third brush carrier (to right of bearing, looking at commutator end). Move carrier to left to increase charging rate, and to the right to decrease the charging rate. Tighten the clamp screw after position adjustment.

Test Data

	Amperes	R.P.M.	M.P.H.
	8-9	825	___
	0	600	___
Max.	14-16	1500	20
	12-15	1800	___

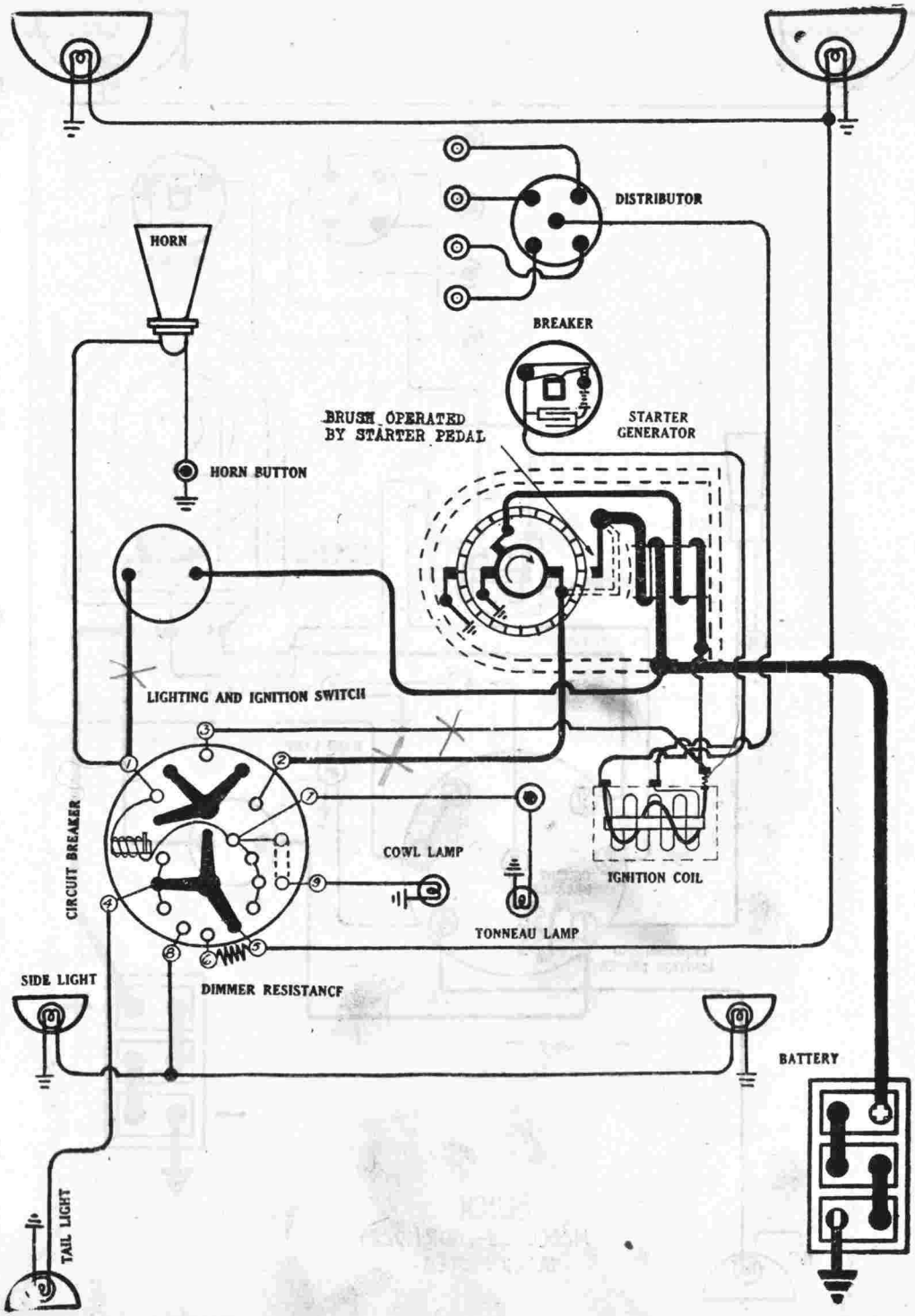
FIELD TEST.—Field draws 1.5-2 amperes, 6 volts.
Motoring freely at 250 R.P.M.,taking 5-6 amperes, 6 volts, with over running clutch.

Oiling.—Put 4 or 5 drops of light engine oil in oiler provided for lubricating the rear armature shaft bearing every two weeks. Remove the front end cover over the commutator and put 3 or 4 drops of light engine oil in the exposed oil hole. Put 4 or 5 drops of light engine oil in the upper distributor shaft bearing oiler. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles. Refill starting gear grease cup with soft cup grease and turn down two turns every month. Every six months, remove the plate on the side of the distributor housing and refill with soft cup grease to a level just above the manual advance ring.

RELAY.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch. The overrunning clutch at the driving end allows generator to operate as a motor when battery's pressure is above that of generator. If engine is killed when stopping, the noise made by the clutch serves to attract the operator's attention to open the ignition switch. The opening and closing of the generator-battery circuit by the operator takes the place of the relay.

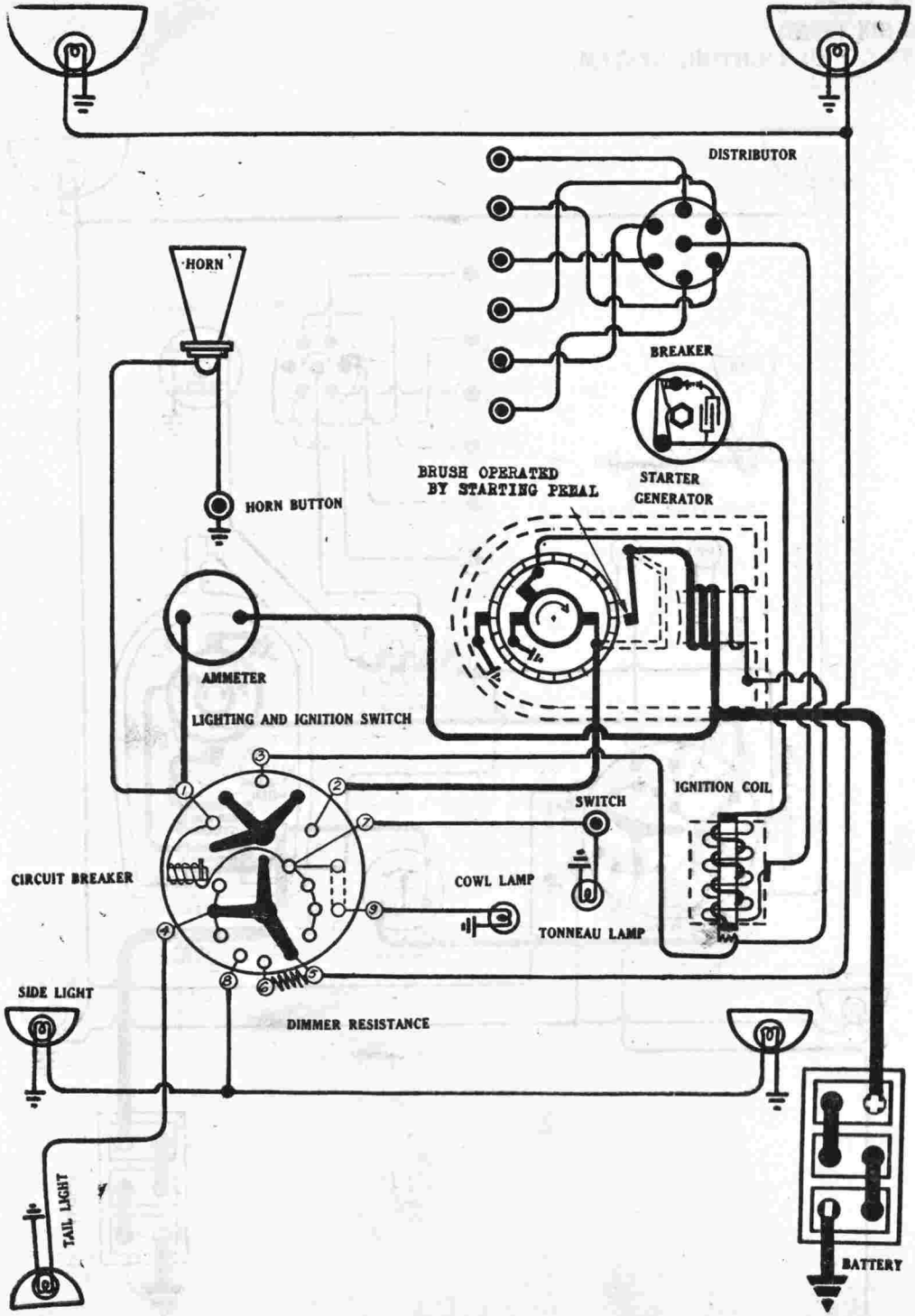
LAMPS.—Head lamps are 6-8 volt, 21 cp. Dome lamp is 6-8 volt, 5 cp. Dash and tail lamps are 6-8 volt, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start the vibrator, but 3-5 amperes will cause it to continue.



BUICK

MODEL 23-6 (1923)
MODEL 24-6 (1924-25)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION



BATTERY.—Exide, Type 3-XC-15-1, 6 volt, 100 ampere-hour. The negative (—) terminal is grounded. The starting capacity is 114 amperes for 20 minutes. The lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION.—Ignition Coil No. 2176. Distributor is integral with motor-generator. Breaker contacts separate .020 to .025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file or on a medium hard oilstone. The tension of the breaker arm spring is 13-16 ounces. The automatic advance starts at 580 R.P.M. and reaches a maximum of 16-20° at 1333 R.P.M. The total automatic and manual advance is 51°

Oiling.—Apply a small amount of grease on the distributor track two or three times during the first 2000 miles. After this it will be necessary to keep the glazed surface wiped with a clean cloth. Apply a small amount of vaseline on the breaker cam each 1000 miles. See also starter-generator oiling.

Timing.—Breaker contacts begin to separate when the seven-degree mark on the flywheel (which is approximately one inch after top dead center) is at the indicator spark control lever and distributor drive shaft in the fully retarded position.

Firing Order.—The firing order is 1.4.2.6.3.5.

Spark Plugs.—Diameter 7/8 inch. Spark gaps are .030 inch.

STARTER-GENERATOR:—No. 249. Starter and generator are combined into one unit. Depressing the starting pedal meshes the reduction gears, opens the generator circuit, and allows the motor brush to come in contact with the commutator, closing the starter circuit and cranking the engine. When the pedal is released, a spring reverses these operations. Direction of rotation is counter-clockwise looking at commutator end Th- pressure of the upper motor brush on the commutator should be 4½ to 5 pounds and 2¼ to 2¾ pounds on the lower brush.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	75
8 "	Lock	3.1	—

GENERATOR.—Motor-Generator Model No. 249. The third brush system is employed for current regulation.

Generator Test Data

	Amperes	R.P.M.	M.P.H.
	0	600	7- 8
	8-9	825	
Max.	14-16	1600	20-25
	12-15	1800	

To adjust charging rate, remove end cover and loosen the third brush adjusting screw one or two turns. Then shift the third brush in the direction of armature rotation to increase the charging rate and in the opposite direction to decrease it. After making the adjustment tighten the adjusting screw. Generator motoring freely with overrunning clutch takes a current of 5.5 amperes at 6 volts. Field current is 2.5 amperes. The pressure of the generator brushes on the commutator should be 1½ to 1¾ pounds each.

Oiling.—Put 4 or 5 drops of light engine oil in oiler provided for lubricating the rear armature shaft bearing every two weeks. Remove the front end cover over the commutators and put 3 or 4 drops of light engine oil in the exposed oil hole. Put 4 or 5 drops of light engine oil in the upper distributor shaft bearing oiler. If the car is driven more 500 miles in two weeks, these attentions must be given every 500 miles. Refill the starting gear grease cup with soft cup grease and turn down two turns every month. Every six months, remove the plate on the side of the distributor housing and refill with soft cup grease to a level just above the manual advance ring.

RELAY.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch. The overrunning clutch at the driving end allows generator to operate as a motor when battery's pressure is above that of generator. If engine is killed when stopping, the noise made by the clutch serves to attract the operator's attention to open the ignition switch.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dash, tail and side lamps are 6-8 volt, 2 cp.

COMBINATION SWITCH.—Model No. 1159. A vibrating circuit breaker, mounted on the rear of the switch, takes the place of fuses. It requires 25 amperes to start the vibrator While vibrating, the current is 3-5 amperes.

BUICK

STANDARD SIX (1925)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM.

DELCO IGNITION.

BATTERY:—Exide, Type 3-XC-13-1, 6 volt, 90 ampere hour. The starting capacity is 98 amperes for 20 minutes. The lighting capacity is 5 amperes for 16.8 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. 2176. The distributor is mounted on the motor-generator. Breaker contacts separate .020 to .025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file or on a medium hard oilstone. The tension of the contact arm spring should be 13-16 ounces. The automatic advance starts at 580 R.P.M. and reaches a maximum of 14-18° at 1800 R. P. M. The total automatic and manual advance is 41°.

Mounting:—Distributor is mounted at rear of motor-generator on right of engine. To remove distributor remove head with cables attached. Then disconnect primary lead and manual advance rod. Remove advance lever hold-down screw and lift distributor from place.

Oiling:—Put a small bit of medium heavy cup grease on the face of the breaker cam and wipe out the distributor head with a small amount of grease, removing all excess and polishing the rotor track with a soft clean cloth, every 1000 miles. See also motor-generator oiling.

Timing:—Breaker contacts begin to separate when Piston No. 1 entering power stroke reaches a position at which the 7 degree mark on the flywheel is opposite the mark on the flywheel housing. The 7 degree mark is approximately one inch past the dead center mark 1-6 on the flywheel. To set ignition timing, crank engine over until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Fully retard spark lever and continue to crank engine over until the 7 degree mark on the flywheel is opposite the indicator on the flywheel case. Then loosen the knurled plug at the lower end of the distributor shaft and loosen the timing adjustment screw visible after the plug is removed. Then rotate the cam until the contacts begin to separate. Tighten the adjustment screw and replace the plug. Make certain that the segment opposite the rotor is connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .020-.025 inch.

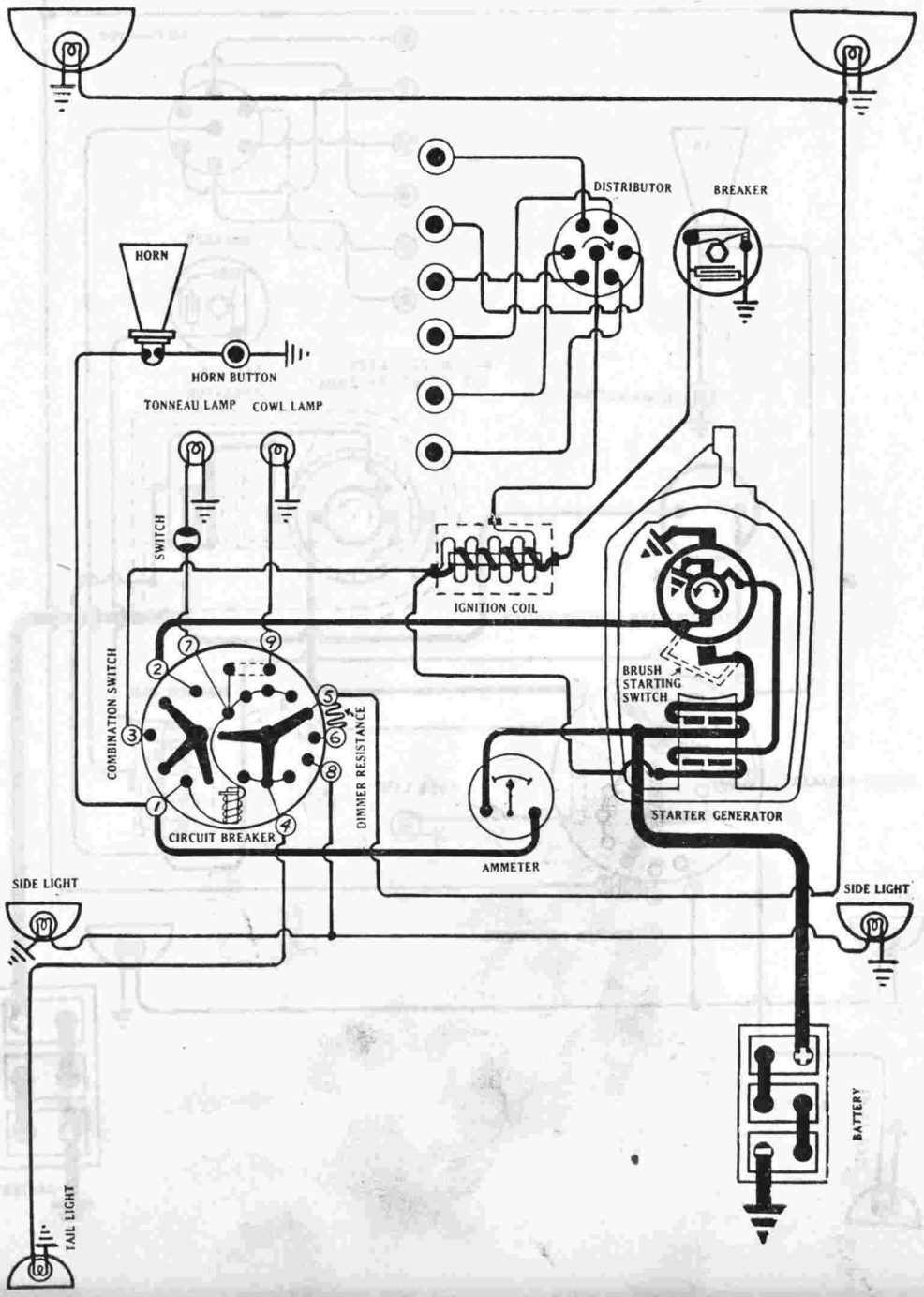
STARTER:—Motor-generator Model 283. The starter is connected to the engine through a set of reduction gears and a mechanically operated pinion shift. Closing the ignition switch completes the generator circuit and allows the machine to motor, assisting the meshing of the pinion. An over-running clutch permits this rotation When the starter pedal is depressed, it opens the generator circuit, meshes the starter pinion and completes the motor circuit allowing the machine to crank the engine. When the pedal is released, a spring reverses these operations. A second over-running clutch prevents the engine driving the motor-generator through the starter gears. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Running Free	6	70
6 " "	Lock.	3	—

The brush pressure should be 5-6 pounds on the upper starter brush and 2¼ to 2¾ pounds on thte lower brush.

GENERATOR:—Generator current regulation is by the third brush system. The average output required is 15 amperes. To adjust the charging rate remove the generator



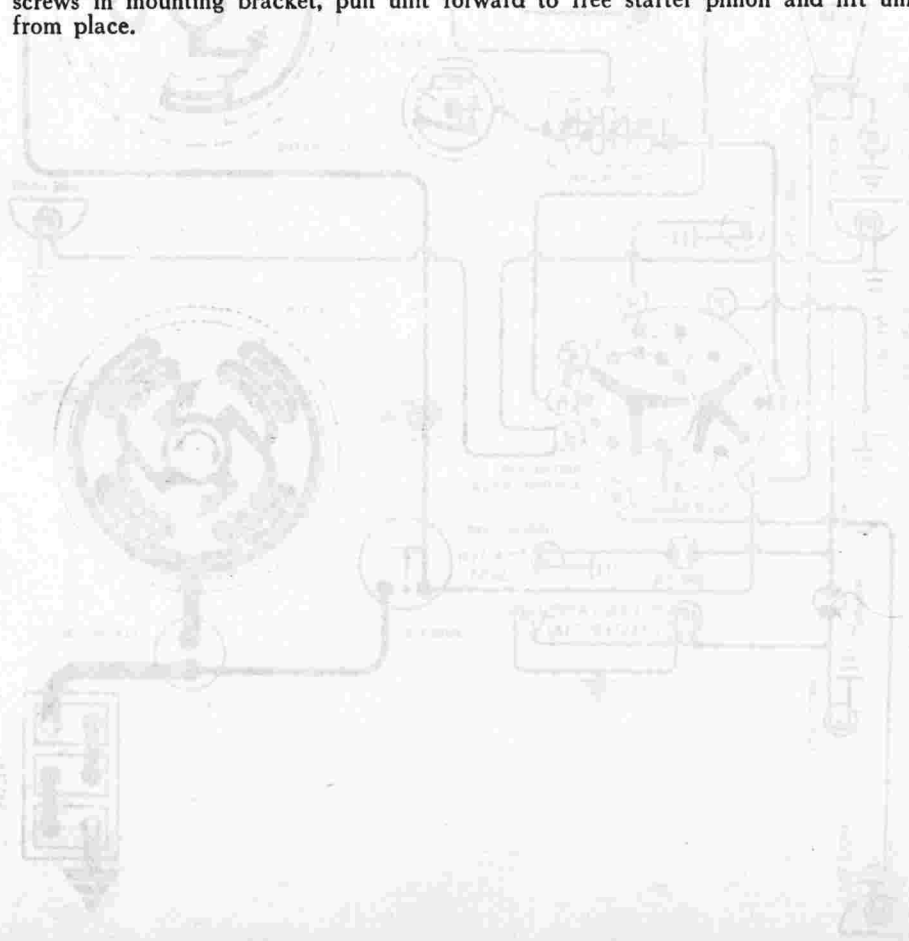
end cover and loosen the third brush plate adjusting screw one or two turns. Then shift the third brush in the direction of rotation (counter-clockwise) to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the adjusting screw after making the adjustment.

Generator Data.

Amperes.	R.P.M.
6.5	825
20.	1500

The pressure of the generator brushes on the commutator should be 1¾ pounds each.

Mounting:—Motor-generator is mounted by special bracket at right of engine. To remove motor-generator disconnect manual advance rod and remove distributor head. Remove cover, disconnect all leads and tape to prevent short circuits. Remove pump shaft coupling pin and drive coupling forward. Remove hold-down screws in mounting bracket, pull unit forward to free starter pinion and lift unit from place.



Oiling:—Put 8 or 10 drops of light engine oil in the bearing oiler at each end of the generator every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Give the Zerk connections on the distributor housing and the starter gear housing a charge of lubricant every 500 miles. Once each year dissassemble, clean and repack the starter and generator clutches with vaseline.

RELAY:—No relay is used. The circuit between the battery and generator is controlled by the ignition switch. The over-running clutch allows the generator to operate as a motor when the voltage of the battery is higher than that of the generator. If the ignition switch is left in the 'on' position with the motor stopped, the noise made by the over-running clutch warns the operator to open the switch.

LIGHTING:—Combination switch No. 1234. Head lamps are each 6-8 volt, 21 cp. Dash dome, tonneau and tail lamps are each 6-8 volt, 3 cp. Side lamps are also 6-8 volt, 3 cp.

CIRCUIT BREAKER:—A vibrating circuit breaker mounted on the back of the switch takes the place of fuses. A current of 25-30 amperes causes this device to operate. While vibrating the current is 10-15 amperes.

BUICK

STANDARD SIX AND MASTER SIX (1926-27)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY.—Exide, 3-XC-13-1, 6 volt. Starting capacity is 98 amperes for 20 minutes. Lighting capacity is 5 amperes for 16.8 hours. The negative (—) terminal is grounded **Exide, Type 3-XC-15-1,** 6 volt. Starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded. Battery is located on right side under floor boards.

IGNITION.—Coil Model 2188. Distributor Model 17046. Breaker contacts separate .015-.0225 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone or with a fine, flat jeweler's file. The distributor has both manual and automatic advance. Automatic advance begins at 450 R.P.M. and reaches a maximum of 15-19° at 2200 R.P.M. Manual advance is 25°. The breaker arm spring tension is 16-20

Mounting.—Distributor is mounted on the rear of the generator at the right of the engine. To remove, disconnect manual advance rod and remove manual advance stop screw. Then lift distributor from its mounting.

Oiling.—A Zerk oiler is located on the side of the distributor shaft housing. Give this a charge from the pressure gun every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

Timing.—Breaker contacts begin to separate when piston No. 1 on compression stroke reaches a position at which the 17° mark on the flywheel is opposite the indicator on the flywheel case. This is 17° before top dead center. The manual advance lever must be in the fully advanced position. To set timing remove the plug at the bottom of the distributor shaft housing and loosen the timing adjustment screw. Then rotate the breaker cam until the contacts begin to separate. Tighten the screw after making the adjustment.

Valve Timing.—INLET VALVES.—Head diameter, 1⅞ inches; stem diameter, ⅜ inch; stem length, 6⅛ inches; tappet clearance, .008 inch (hot); valve lift, 21/64 inch; intake opens at 25° 50 minutes before top dead center and closes 81° 23 minutes past lower dead center.

EXHAUST VALVES.—Head diameter, 1⅝ inches; stem diameter, ⅜ inch; stem length, 6⅛ inches; tappet clearance, .008 inch (hot); spring pressure, 56 to 68 pounds (valve closed); valve lift, 5/16 inch; exhaust opens at 101° 36 minutes before lower dead center and closes 45° past top dead center. Stem guides are removable. Oversize valve stems are made.

NOTE.—On 114½ inch wheel base model, head diameter is 1 7/16 inches; and stem length is 5⅝ inches.

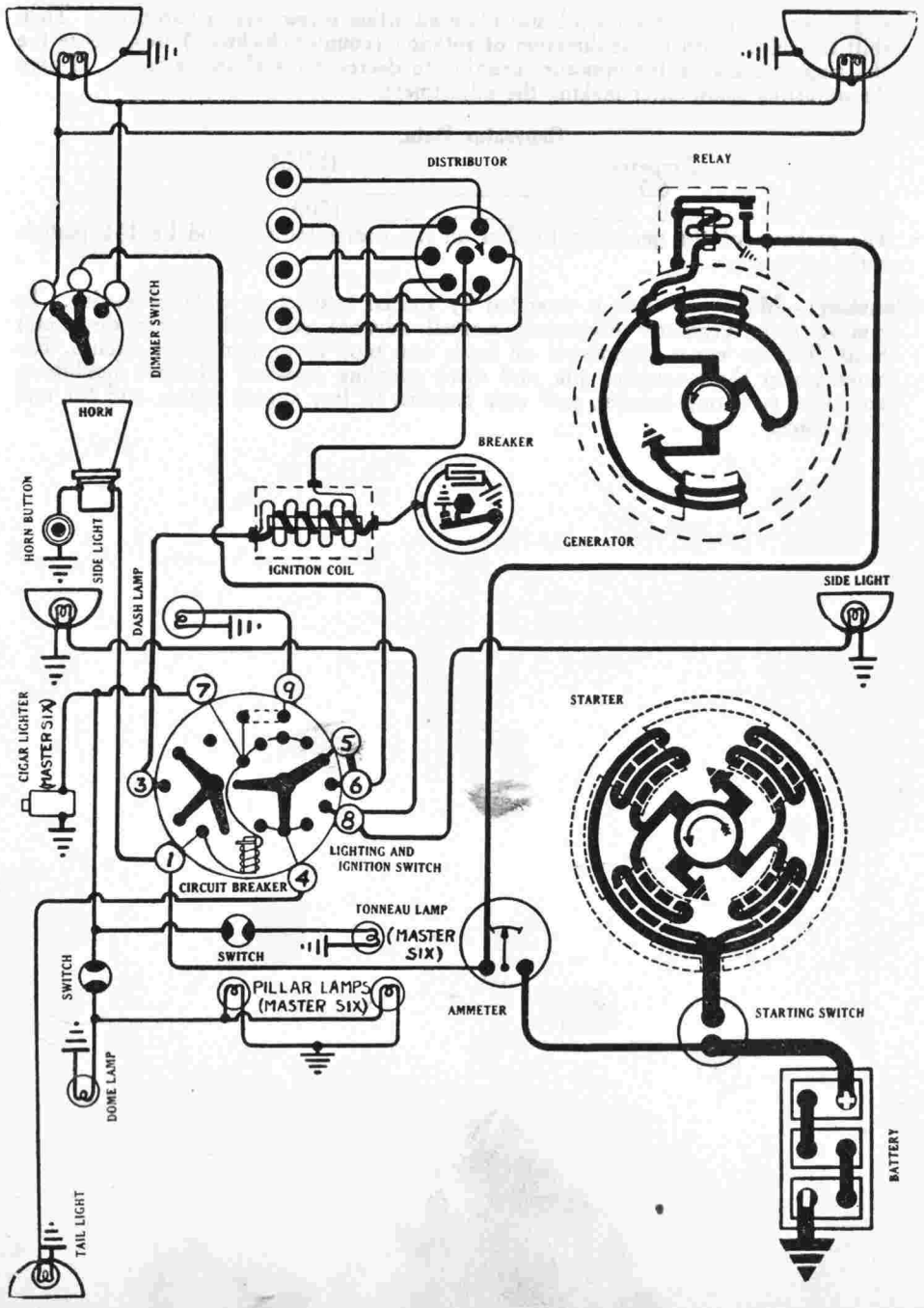
Firing Order.—The firing order is 1-4-2-6-3-5.

Spark Plugs.—Spark plug diameters are ⅞ inch. Gaps are .020 inch.

STARTER.—Model 316. Starter is connected to the engine through a mechanically operated pinion shift incorporated in the starting switch and an overrunning clutch which prevents the engine driving the starter. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 2¼-2½ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	6.0	60
1.5 "	1800	4.9	150
2.5 "	1400	4.7	200
5 "	825	4	300
18.25 "	Lock	3.2	500



BUICK

STANDARD AND MASTER SIX (1926-27)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

Mounting.—Starter is mounted at right of engine by flange mounting. To remove starter, disconnect pedal return spring and pedal rod and remove three flange mounting screws. Then slide starter forward and lift from place.

Oiling.—Starter bearings are self oiling. They require no attention.

GENERATOR.—Model 317. The direction of rotation is counter-clockwise, looking at the commutator end. Current regulation is by the third brush system. To adjust the output, remove the generator cover band and shift the third brush by means of the handle on the third brush mounting plate. Moving the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. The mounting plate is held in any desired position by friction clamp washers. The maximum charging rate of 18 amperes is reached at 1700 R.P.M. of the generator or 25 M.P.H.

Generator Data

Cold Test (75° F.)			Hot Test (170° F.)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
4	6.8	700			
7	7.1	750			
10	7.4	940	13	7.6	1800
18	8.3	1700			
8		3000			

Motoring freely at 300 R.P.M. generator draws 4.5-5 amperes at 6 volts. Shunt field current is 3 amperes at 6 volts. Generator brush tension should be 1¼-1¾ pounds each.

Oiling.—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the generator every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. The drive end is oiled by splash from the timing gear case.

Mounting.—Generator is mounted at right of engine. To remove generator, drain radiator, disconnect pump coupling and remove water pump. Then remove three flange mounting screws and slide generator to rear.

RELAY.—Model 5766. Relay is mounted on the generator. Relay contacts close at 600 R.P.M. of the generator at 8 M.P.H. with a generator voltage of 7.5 volts and open at 580 R.P.M. or 6 M.P.H. with a discharge current of 0-2 amperes. Charging current at closing of contacts is 1-2 amperes. Relay contacts separate .012 inch. Air gap between relay armature and coil core is .009-.010 inch, contacts closed.

LIGHTING.—Head lamps are each 6-8 volt, 21 cp. They are double filament, the second filament being used for dimming and controlled by a dimmer switch on the steering column. Dash and side lamps are 6-8 volt, 3 cp. S.C. Tail lamp is 6-8 volt, 3 cp. D.C.

Switches.—Dimmer switch is Model 1290. Combination switch on Standard Six is Model 1288. Combination switch on the Master Six is Model 1289.

CIRCUIT BREAKER.—A vibrating circuit breaker is mounted on the back of the switch. A current of 25-30 amperes causes this device to operate. While vibrating the current is 10-15 amperes.

BUICK

SERIES 115 AND SERIES 120-128 (Late 1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Exide (Series 115). Type 3-XC-13-1G, 6 volt, 80 ampere hour. Starting capacity is 98 amperes for 20 minutes. Lighting capacity is 5 amperes for 16.6 hours. **(Series 120-128) Type 3-XC-15-1G,** 6 volt, 100 ampere hour. Starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded. Battery is mounted under front floor boards on right hand frame member.

IGNITION:—Coil Model 2188. Distributor No. 16605. Breaker contacts separate .015-.0225 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 24° (flywheel). Automatic advance begins at 400 R.P.M. and reaches a maximum of 19° (flywheel) at 2200 R.P.M. (crankshaft). Breaker arm spring tension is 16-20 ounces.

Mounting:—Distributor is mounted on the rear of the generator. To remove distributor, disconnect primary lead and manual advance rod. Then remove distributor head with high tension cables intact. Remove manual advance stop screw and lift distributor from place.

Oiling:—Give the Zerk oiler on the side of the distributor housing one charge from the pressure gun every two weeks or each 500 miles. Put a small amount of vaseline on the face of the breaker cam every month.

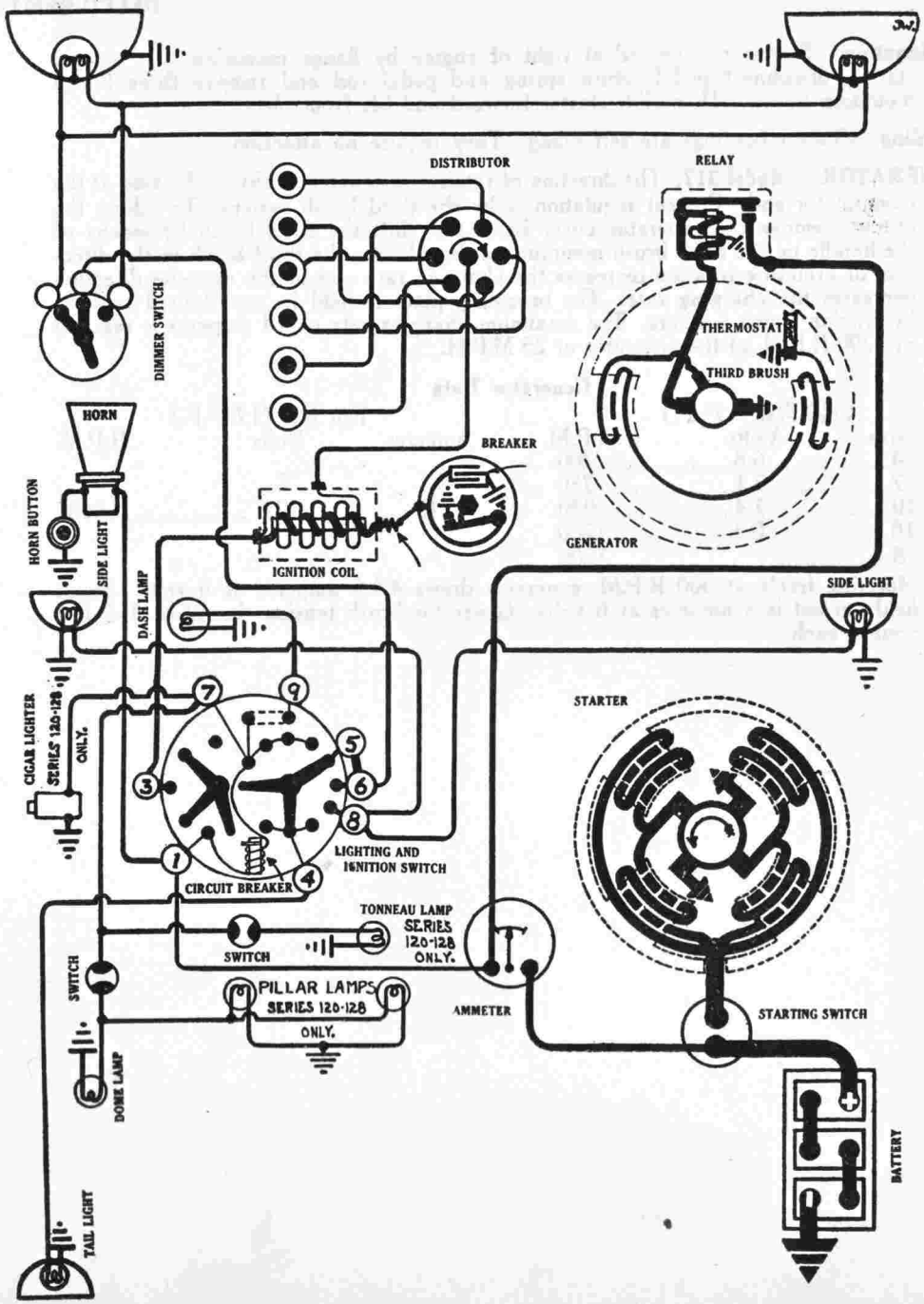
Timing:—(Series 115-120-128). Breaker contacts begin to separate when the piston entering power stroke reaches a position 17° before top dead center with the spark control lever in the fully advanced position. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance the spark control lever and continue to crank engine until the 17° mark on the flywheel is opposite the indicator in the flywheel case. If breaker contacts do not separate at this point, remove the plug at the bottom of the distributor shaft housing and loosen the timing adjustment screw. Then rotate the breaker cam until the contacts begin to separate. Tighten the screw and replace the plug. There is also a 7° mark on the flywheel so that engine can be timed with spark retarded. With manual spark control lever fully retarded the breaker contacts begin to separate when the 7° mark is opposite the indicator on the inspection hole edge. Timing may be set by either mark but it must be remembered that the spark control lever must be fully advanced when contacts separate at the 17° mark and fully retarded when contacts separate at the 7° mark. This will give an identical setting.

Valve Timing:—(Series 115).—INLET VALVES:—Head diameter, 1 7/16 inches; stem diameter, 3/8 inch; valve lift, 21/64 inch; spring pressure, 47-53 pounds closed and 96-105 pounds open; tappet clearance, .008 inch (hot). Inlet valves open 25° 50′ before top dead center and close 81° 10′ after lower dead center.
EXHAUST VALVES:—Head diameter, 1 7/16 inches; stem diameter, 3/8 inch; valve lift, 5/16 inch; spring pressure, 47-53 pounds closed and 96-105 pounds open; tappet clearance, .008 inch (hot). Exhaust valves open 101° 50′ before lower dead center and close 45° 50′ after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

(Series 120-128). INLET VALVES:—Head diameter, 1 7/8 inches; stem diameter, 3/8 inch; valve lift, 21/64 inch; spring pressure, 41-55 pounds closed and 118-134 pounds open; tappet clearance, .008 inch (hot). Inlet valves open 25° 50′ before top dead center and close 81° 10′ after lower dead center.
EXHAUST VALVES:—Head diameter, 1 5/8 inches; stem diameter, 3/8 inch; valve lift, 5/16 inch; spring pressure, 41-55 pounds closed and 118-134 pounds open; tappet clearance, .008 inch (hot). Exhaust valves open 101° 50′ before lower dead center and close 45° after top dead center.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Gaps are .025 inch.



BUICK

SERIES 115 AND SERIES 120-128 (Late 1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

STARTER:—Model 316. Starter is connected to the engine through a manual pinion shift incorporating a roller clutch and connected to the starting switch. The direction of rotation is counter-clockwise, looking at commutator end. Starter brush tension is 2¼-2½ pounds. Starter cranks the engine drawing 175-200 amperes at 5 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	6.0	60
2 "	1750	5.5	175
5 "	775	4.1	300
11.5 "	Lock	2.75	500

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel case. To remove starter, disconnect pedal return spring, pedal rod and starter cable. Then remove three flange mounting cap screws and slide starter forward from place.

Oiling:—Starter bearings are oilless. ..They require no attention.

GENERATOR:—Model 940-D. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field combined with a thermostat. Thermostat contacts open at 160°F. cutting a resistance in the shunt field circuit and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the commutator end plate and shift the third brush. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. The maximum charging rate is 18-20 amperes (cold) reached at 1450 R.P.M. or approximately 25 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
18-20	8.5	1450	9-12	7.5	200

Generator motoring draws 5.5-6 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts directly across field terminals. Brush spring tension is 22-26 ounces.

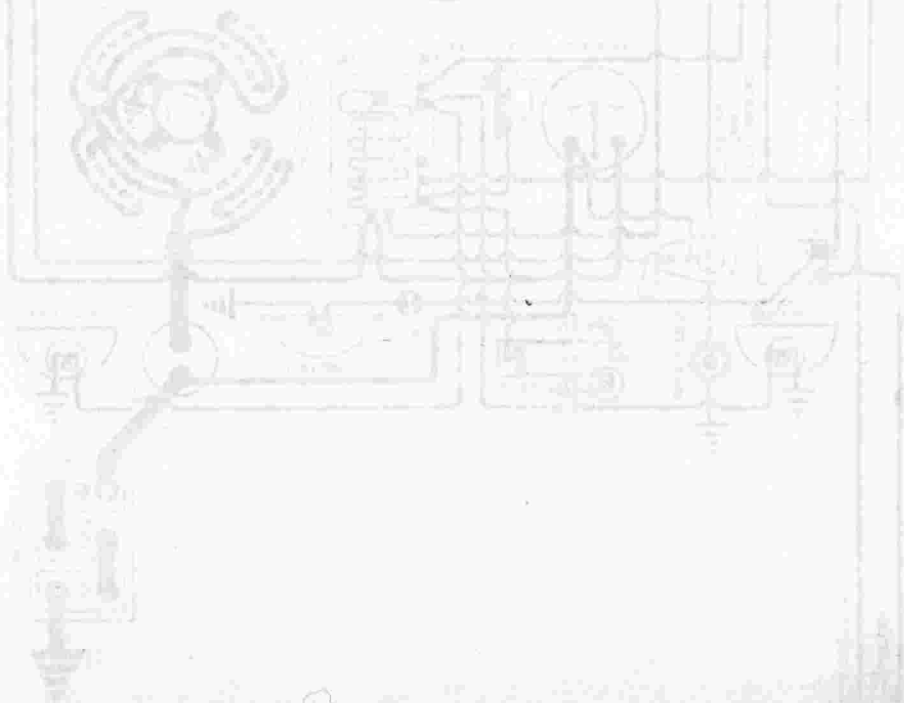
Mounting:—Generator is flange mounted at right of engine. To remove generator, disconnect generator lead and ignition leads or remove distributor. Then drain radiator, disconnect pump coupling, remove pump mounting studs and remove water pump. Then remove three flange mounting cap screws and lift generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in the commutator end oiler every two weeks or each 500 miles. The drive end bearing is oiled by splash from the timing gear case.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay closes when the voltage of the generator reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.020 inch, contacts closed.

LIGHTING:—Delco Switch Model 1288 (Series 115) 1289 (Series 120) and 1312 (Series 128). Dimmer Switch Model 1290. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament for dimming. This is controlled by dimmer switch mounted on the steering column. Dash and side lamps are 6-8 volt, 3 cp. S.C. Tail lamp is 6-8 volt, 3 cp. S.C.

CIRCUIT BREAKER:—Model 5753. Circuit breaker is mounted on the back of the switch. It cuts in at 25-30 amperes limiting the current to 10-15 amperes.



BUICK

MODEL 114½ (1928) SERIAL NUMBERS 1,888,911 UP
MODEL 120 (1928) SERIAL NUMBERS 1,911,026 UP
MODEL 128 (1928) SERIAL NUMBERS 1,921,026 UP
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—(Model 114½) Exide, Type 3-XC-13-IG, 6 volt, 13 plates. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 16.6 hours.

(Models 120, 128) Exide, Type 3-XC-15-IG, 6 volt, 15 plates. Starting capacity (20 minute rate) is 114 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. The negative (—) terminal is grounded. Battery is mounted under the front floor boards on the right frame member.

IGNITION:—Coil Model 2188. Coil is mounted on the generator at the right of engine. Ignition current is 4 amperes at 6 volts with engine stopped and 2 amperes at 6 volts with engine running. A ballast resistor is connected in series with the primary at one terminal of the coil.

Distributor Model 640-A. Breaker contacts separate .018-.024 inch with breaker arm on lobe of cam. Set contact opening by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 24 degrees (engine). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 19 degrees reached at 2400 R.P.M.

Mounting:—Distributor is mounted on rear of generator at right of engine. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Disconnect manual advance rod and remove stop screw in advance arm. Lift distributor from place.

Oiling:—Distributor shaft is oiled from the gear case. Oil gears with Zerk gun through connection on side of gear compartment every 500 miles. Remove the distributor head and rotor and put 4 or 5 drops of light oil in the wick oiler in the center of the shaft and put a small amount of vaseline on the face of the breaker cam every 2000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 17 degrees before top dead center (on the flywheel) with the manual advance lever fully advanced. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance spark lever. Remove cover over peephole in crankcase over flywheel on right of engine and continue to crank engine until the flywheel mark 'ADV 17°' is directly opposite the line on the edge of the hole. The rotor must be opposite the segment connected to the spark plug in cylinder No. 1 (see diagram). If it is not, remove manual advance stop screw and lift distributor to disengage gears. Then rotate rotor and shaft until rotor is directly opposite proper segment, remesh gears and replace stop screw. Then loosen advance arm clamp screw and rotate distributor housing until contacts begin to separate. Connect the segment opposite the rotor to spark plug in cylinder No. 1 and connect remaining plugs in order 4-2-6-3-5 clockwise around the distributor head.

Firing Order:—The firing order is 1-4-2-6-3-5.

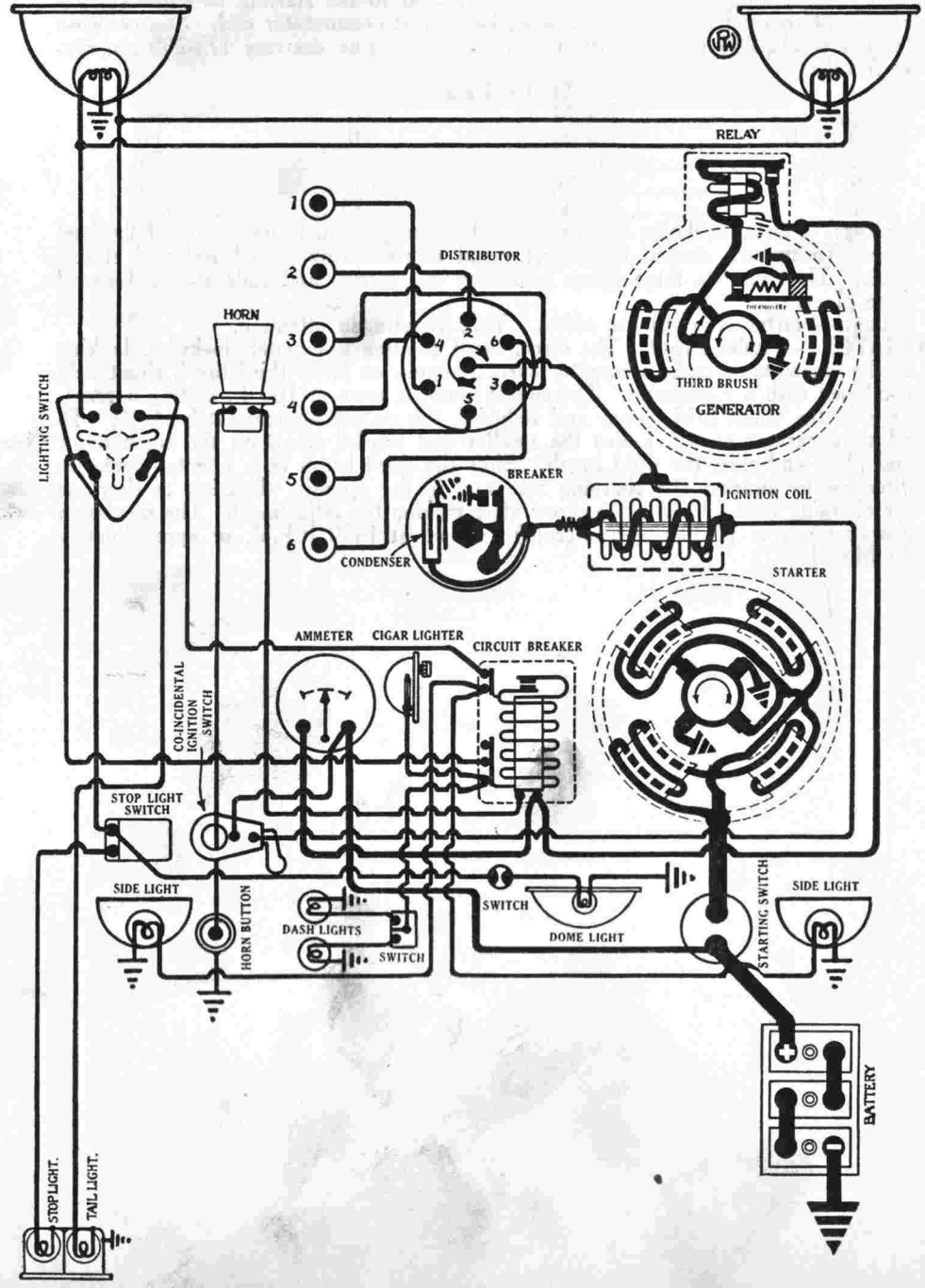
Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are .025 inch.

VALVE TIMING:—(Series 114½). Specifications:—Head diameter, 1 7/16 inches; stem diameter, ⅜ inch; valve lift, 21/64 inch; spring pressure, 53 pounds (valve closed). Tappet clearance, .008 inch (hot).

Timing:—Inlet valves open at top dead center and close 54 degrees after lower dead center. Exhaust valves open 62 degrees before lower dead center and close 25 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

(Series 120 and 128). INLET VALVES:—Head diameter, 1⅞ inches; stem diameter, ⅜ inch; valve lift, 21/64 inch. Spring pressure, 55 pounds (valves closed). Tappet clearance, .008 inch (hot). Inlet valves open at top dead center and close 54 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1⅝ inches; stem diameter, ⅜ inch; valve lift, 21/64 inch. Spring pressure, 55 pounds (valve closed). Tappet clear-



BUICK

MODEL 142½ (1928) SERIAL NUMBERS 1,888,911 UP
MODEL 120 (1928) SERIAL NUMBERS 1,911,026 UP
MODEL 128 (1928) SERIAL NUMBERS 1,921,026 UP
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

ance, .008 inch (hot). Exhaust valves open 62 degrees before lower dead center and close 25 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

STARTER:—Model 725-A. Starter is connected to the engine through a manually operated pinion shift interconnected with the starting switch and a Delco clutch. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15.5 "	Lock	3	600

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect pedal rod and cable and remove 3 flange mounting cap screws. Then slide starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light oil in the commutator end oiler every 1000 miles. The drive end bearings are oilless.

GENERATOR:—Model 940-F. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, remove commutator cover band and loosen the small round headed screw on the end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite diirection to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, maximum charging rate is 18-20 amperes (cold) reached at 1450 R.P.M. or approximately 25 miles per hour.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
18-20	8.5	1450	9-12	7.5	2000

Motoring generator draws 5.5-6 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts directly across field terminals. Brush spring tension is 22-26 ounces.

Mounting:—Generator is flange mounted at right of engine on rear of timing gear case. To remove generator, disconnect all ignition wires and controls or remove distributor. Then disconnect generator lead and water pump coupling. Drain radiator, remove pump mounting studs and remove water pump. Then remove three flange mounting cap screws. Pull generator to rear and lift from place.

Oiling:—Put 8 or 10 drops of light oil in the oiler on the commutator end of the generator every 500 miles. The drive end bearing is oiled by splash from the timing gear case.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at approximately 8 M.P.H. when the generator voltage reaches 6.75-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts must not exceed 3 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Side (parking), tonneau and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63. Dome light is 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash light (direct lighting) is 6-8 volt, 3 cp. S.C. Mazda No. 63. Dash light (indirect lighting) is 6-8 volt, 6 cp. S.C. Mazda No. 81.

Switches:—Lighting switch is Delco-Remy Model 484-A. It is mounted on the lower end of the steering column. Stop and backing light combination switch is Delco-Remy Model 466-B.

CIRCUIT BREAKER:—Delco-Remy Model 410-A. A vibrating circuit breaker is mounted on the back of the dash. It begins to operate with a current of 25-30 amperes and continues to vibrate limiting the current to 10-15 amperes until the short circuit is repaired.

CADILLAC

MODEL 40 (1912). SERIAL NOS. 61,006 TO 75,000

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Battery is 24 volt, 45 ampere-hour. Battery is divided into four groups of three cells each. The controller connects the four groups in series for starting and in parallel for charging. Six dry cells connected in series supply current for the auxiliary ignition. The two-wire system is used.

IGNITION.—There are two dictinct ignition systems, employing two sets of spark plugs. Breaker contacts separate .010 inch. When the contacts are closed, the contact blade and clip separate .015 inch. See that the pigtail conducting the current to the contact blade is not disconnected. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper. An ignition relay is used in the auxiliary ignition circuit.

OILING.—Put 3 or 4 drops of light engine oil in each of the timer bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when the flywheel marking "1 & 4 D. C." is ½ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 2, 4, 3.

SPARK PLUG GAPS.—Spark plug gaps are .020 to .025 inch.

STARTER-GENERATOR.—Model No. 1. Starter and generator are combined into one unit. Starter is connected to the engine through a sliding pinion, meshed with the flywheel gear by the operator. Running freely, starter takes 14 amperes, armature revolving at 1800 R.P.M.

GENERATOR.—Generator current regulation is by reverse series field.

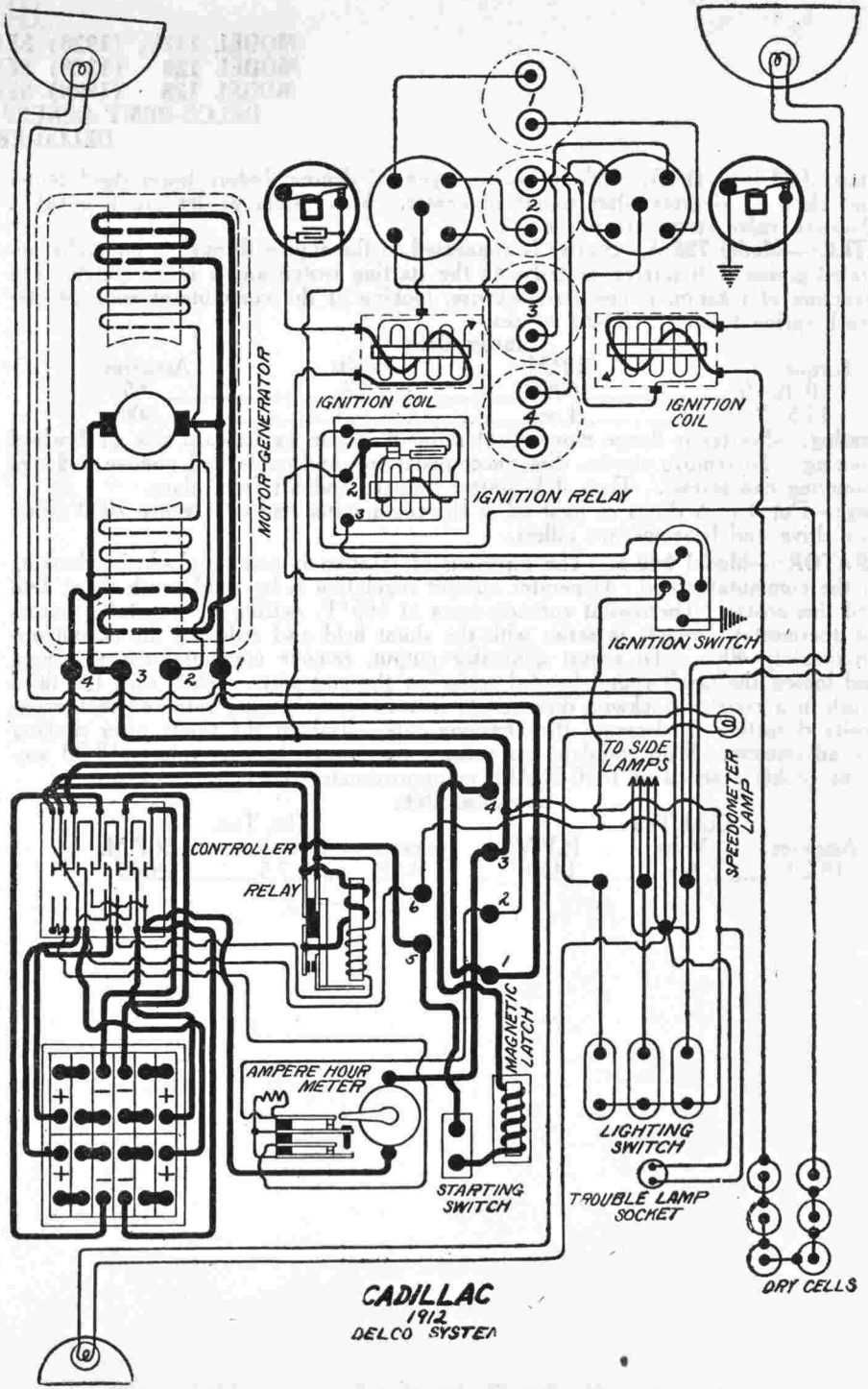
Amperes	Generator Data	R.P.M.
Neutral		300
5		500
12		1000
17-22		1500

Operating freely as a motor with the overrunnning clutch at the driving end as the only retarding force, generator takes 4.5 amperes. Charging rate is varied by changing the value or the shunt resistance, located between the two top terminals on the "Charge" side of the controller switch. Two shunts are available, a single strand which permits a low charging rate, and a double strand which permits a high charging rate. Never substitute copper wire for the resistor, as the generator current will then be excessive. An ampere-hour meter is intended to reduce or stop the charging as the battery becomes fully charged.

OILING.—Put 4 or 5 drops of light engine oil in each of the starter-generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted above the controller switch. Relay closes at 7-9 miles per hour or 300-350 R.P.M. of the armature, and opens at 5-7 miles per hour or 250-300 R.P.M. of the armature. Charging current is 1-3 amperes at closing, and the discharge current is 0-1 ampere at the opening of relay contacts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Side lamps are 6-8 volt, 7 cp. Speedometer



Cadillac

(1913)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Battery is 6 volt, 120 ampere-hour. The two-wire system is used.

IGNITION.—Breaker contacts separate .010 inch. When contacts are closed, contact blade and clip separate .015 inch. See that pigtail conducting current to the contact blade is not disconnected. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 4 or 5 drops of light engine oil in each of the two timer bearings every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control fully retarded. Dry-cell timer contacts close when piston entering power stroke is on top dead center, spark control fully retarded.

FIRING ORDER.—The firing order is 1, 2, 4, 3.

SPARK PLUG GAPS.—Spark plug gaps are .027 to .030 inch.

STARTER-GENERATOR.—Model 4. Starter and generator are combined into one unit, but are electrically separate. Starter is connected to the engine through a set of gears meshed by the operator. Gears are meshed by depressing clutch pedal. A magnetically operated latch, controlled by "Start" button on dash brings pawl into engagement with latch on clutch pedal shaft, connecting it to starter gears. Running freely, starter current is 45 amperes, armature revolving at 2100 R.P.M.

GENERATOR.—Generator voltage regulation is by a mercury tube regulator.

Generator Data. Starter-Generator Model No. 4

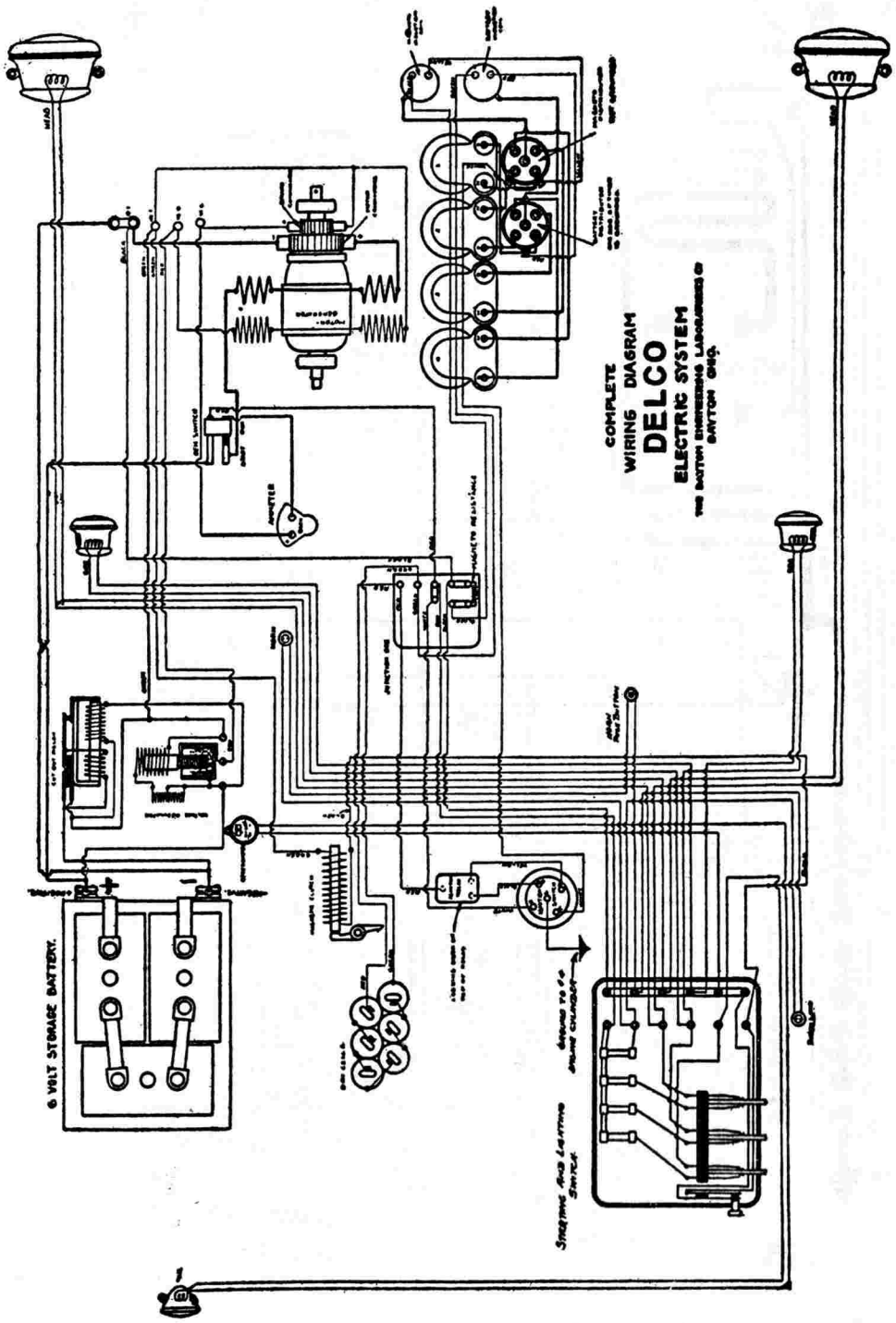
Amperes	R.P.M.
Neutral	290
10	500
22	1000
28-40	1500

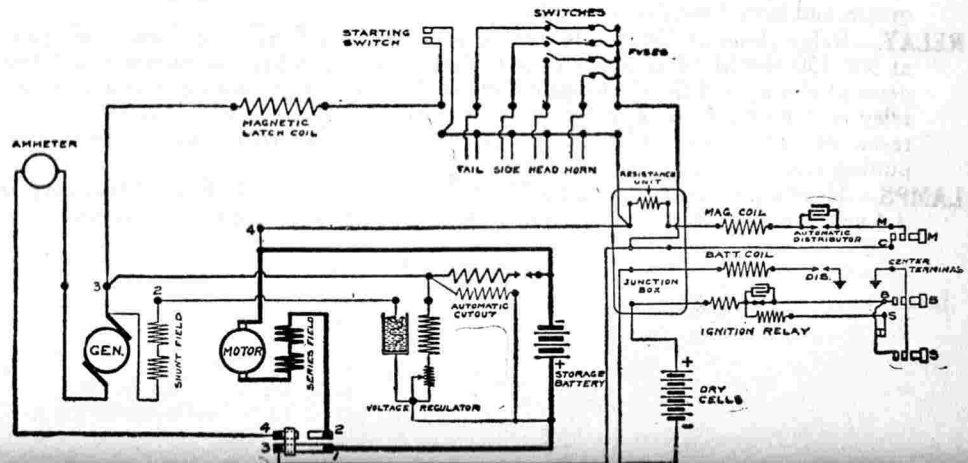
When generator is operating freely as a motor, clutch at driving end the only retarding force, the current flow is 4.5 amperes.

OILING.—Put 4 or 5 drops of light engine oil in each of starter-generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles. Every month refill grease cup on starter gear case with soft cup grease and turn down two times.

RELAY.—Relay closes at 7-9 miles per hour or 290-320 R.P.M. of armature, and opens at 5-7 miles per hour or 250-290 R.P.M. of armature. Charging current is 1-3 amperes at closing and the discharge current 0-1 amperes at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Side lamps are 6-8 volt, 7 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.





CADILLAC

MODEL (1914)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Exide, Type 3-PH-13, 6 volt, 130 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model No. 2104. Breaker contacts separate .010 inch. When contacts are closed contact blade and clip separate .015 inch. See that pigtail conducting current to the contact blade is not disconnected. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put several drops of light engine oil in timer bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 2, 4, 3.

SPARK PLUG GAPS.—Spark plug gaps are .027 to .030 inch.

STARTER.—Starter-Generator Model No. 24. Starter and generator are combined into one unit, but are electrically separate. Starter is connected to engine through a set of reduction gears meshed by the operator. Pressing the "Start" button brings ignition relay into action and connects terminals 8 and 9 on the combination ignition and lighting switch, completing circuit around relay. This applies battery pressure to generator windings, causing armature to revolve slowly, aiding meshing of the gears. Depressing the starting pedal then meshes the gears, opens the generator circuit and completes motor circuit, causing it to crank the engine. Two overrunning clutches are provided. Clutch at driving end permits rotation of armature necessary during cranking operation. The second overrunning clutch prevents engine driving starter through the reduction gears.

GENERATOR.—Generator voltage regulation is by a mercury tube regulator.

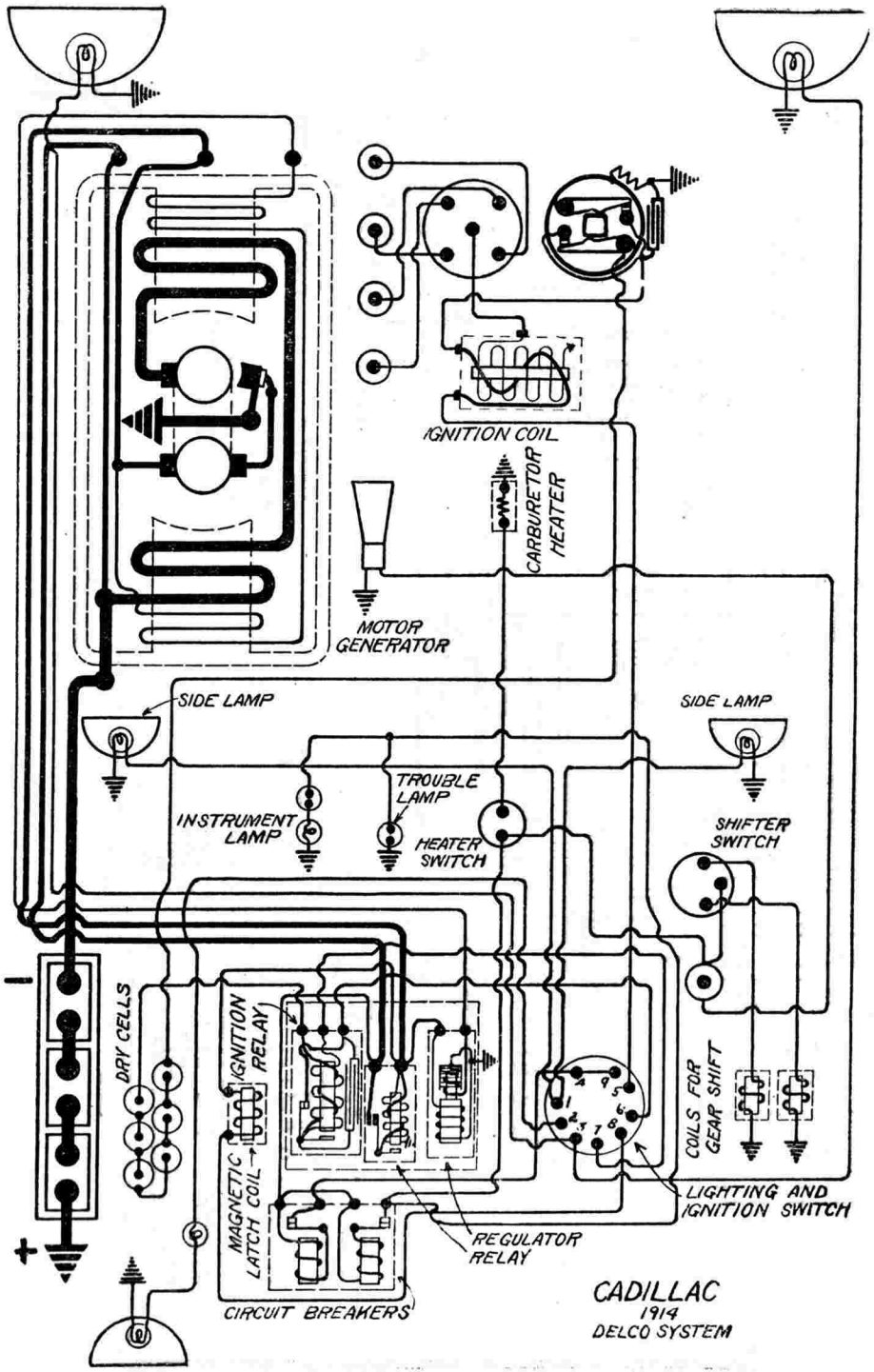
Generator Data. Starter-Generator, Model No. 24

Amperes	R.P.M.
Neutral	350
8	500
18	1000
22	1500

OILING.—Put 4 or 5 drops of light engine oil in each of starter-generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles. Refill grease cup at end of idler gear shaft with soft cup grease and turn down every month.

RELAY.—Relay closes at 350-400 R.P.M. of armature or 7-9 miles per hour, and opens at 300-350 R.P.M. of armature or 5-7 miles per hour. Charging current is 1-3 amperes at closing and the discharge current is 0-2 amperes at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Side lamps are 6-8 volt, 6 cp. Dash lamp is 3-4 volt, 2 cp. Tail lamp is 3-4 volt, 2 cp. All other lamps are 6-8 volt, 6 cp.



Model 51 (1915) (Serial Nos. A-6000 to A-19001)
Delco Generating, Starting and Lighting System
Delco Ignition

Battery.—Battery is 6 volt, 150 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts separate .010 inch. When contacts are closed contact blade and clip separate .015 inch. See that pigtail conducting current to the contact blade is not disconnected. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper.

Oiling.—Every two weeks remove distributor head and rotor button and put 3 or 4 drops of light engine oil on the ball bearing. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Timing.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1L, 2R, 3L, 1R, 4L, 3R, 2L, 4R.

Spark Plug Gaps.—Spark plug gaps are .027 to .030 inch.

Starter-Generator.—Starter and generator are combined into one unit, but are electrically separate. Starter is connected to the engine through a set of reduction gears meshed by the operator.

Generator.—Generator voltage regulation is by automatic field rheostat operated by a governor on the distributor shaft.

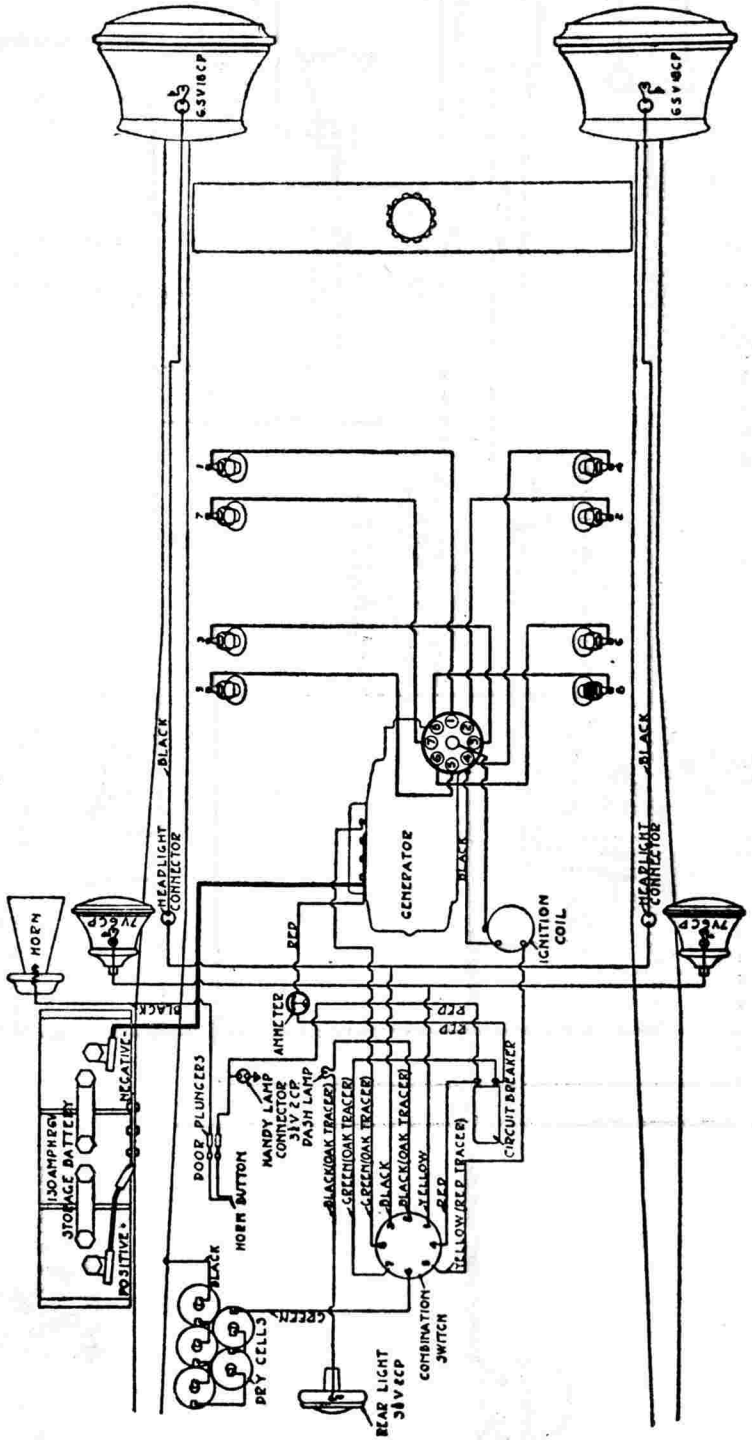
Amperes	Generator Data, Motor-Generator No. 44	R. P. M.
Neutral		350
6-11		500
16-20		800-950
9-14.5		1500

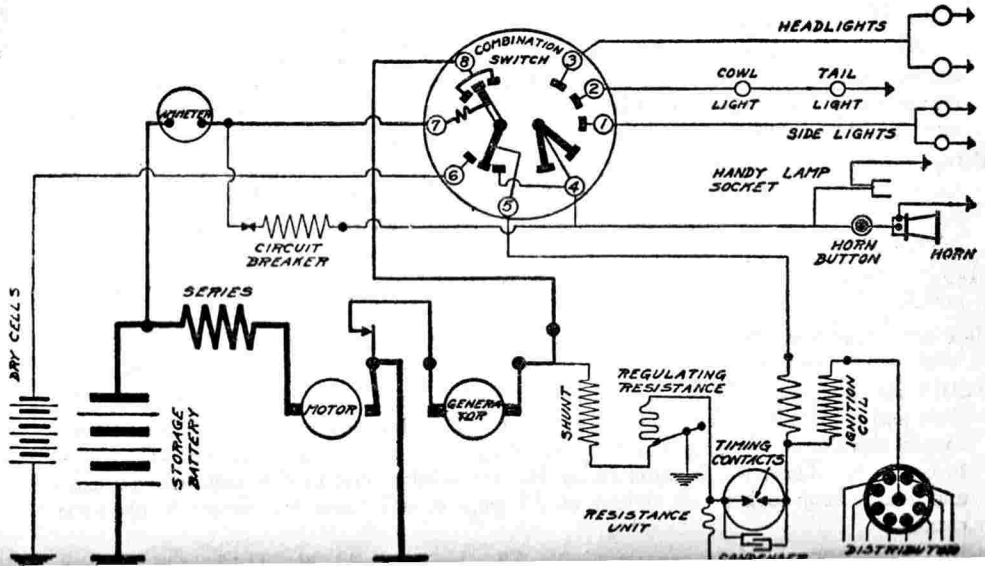
When operated freely as a motor, with the overrunning clutch as the only retarding force, generator takes 4.5 amperes. Generator begins to supply current at 7-10 miles per hour and reaches its maximum output at 20-25 miles per hour. Regulator is treated on Page 73.

Oiling.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles. Once a year remove the name plate and lubricate the spiral gears with soft cup grease. Limit the amount of grease, so that none can work through to the regulating resistance, thereby interfering with its operation.

Relay.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

Lamps.—Head lamps are 6-8 volt, 18 cp. Side lamps are 6-8 volt, 6 cp. Dash and tail lamps are in series and are each 3-4 volt, 2 cp.





Cadillac

Model 53 (1916) (Serial Nos. A20,000 to A38,003)
Delco Starting and Lighting System
Delco Ignition

Battery.—Battery is 6 volt, 150 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate .018 inch. They are made of tungsten. They will operate properly even though very irregular, due to the fact that the rough surfaces fit each other perfectly. Should they become badly burned or pitted, affecting the ignition, remove and resurface them by drawing across a piece of fine emery cloth laid on a flat surface, as on the bed of a drill press, finishing on a very hard oil stone. Clean all oil from contacts before again putting into service.

Timing.—Breaker contacts should separate when flywheel marking "1-GA" is directly under indicator, No. 1 piston of left-hand block entering power stroke, spark control lever and breaker assembly in fully retarded position.

Firing Order.—The firing order is 1L, 2R, 3L, 1R, 4L, 3R, 2L, 4R.

Spark Plug Gaps.—Spark plug gaps should he .028 inch to .030 inch.

Oiling.—Every 2000 miles remove the breather pipe on the ignition unit and pack the gears with soft cup grease. If track of rotor button inside distributor head is not well polished, apply a very small amount of vaseline with a soft cloth.

Starter-Generator.—Starter and generator are combined into one unit, but are electrically separate. Starter is connected to the flywheel through a pinion shifted by the operator. Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current.

Generator.—Generator current regulation is by third brush method.

GENERATOR DATA, MOTOR-GENERATOR NO. 78

Output-Amperes	R. P. M.
Neutral	375
3- 8	500
16-20	1000
12-17	1500
11-16	1800

When motoring with the overrunning clutch as the only retarding force, generator should take 4.5 amperes. To adjust the charging rate, loosen the two screws on the movable arm holding the third brush. If it is desired to increase the charging rate, the arm should be lengthened, and shortened to decrease it.

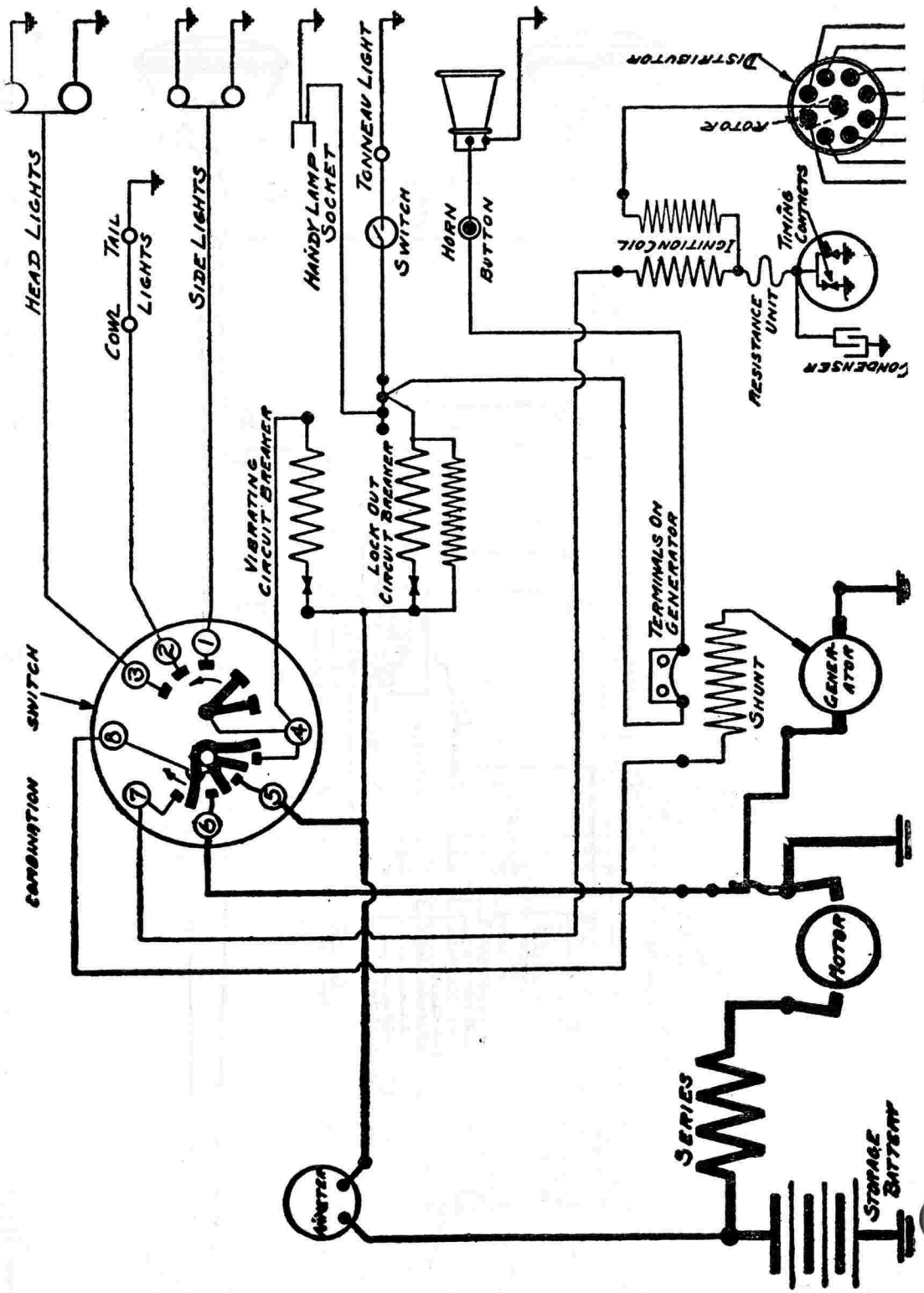
Oiling.—Put 4 or 5 drops of light engine oil in starter-generator oiler every two weeks. At the same time inject Cadillac rear axle and transmission lubricant in elbow oiler at rear of starter shaft with grease gun. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

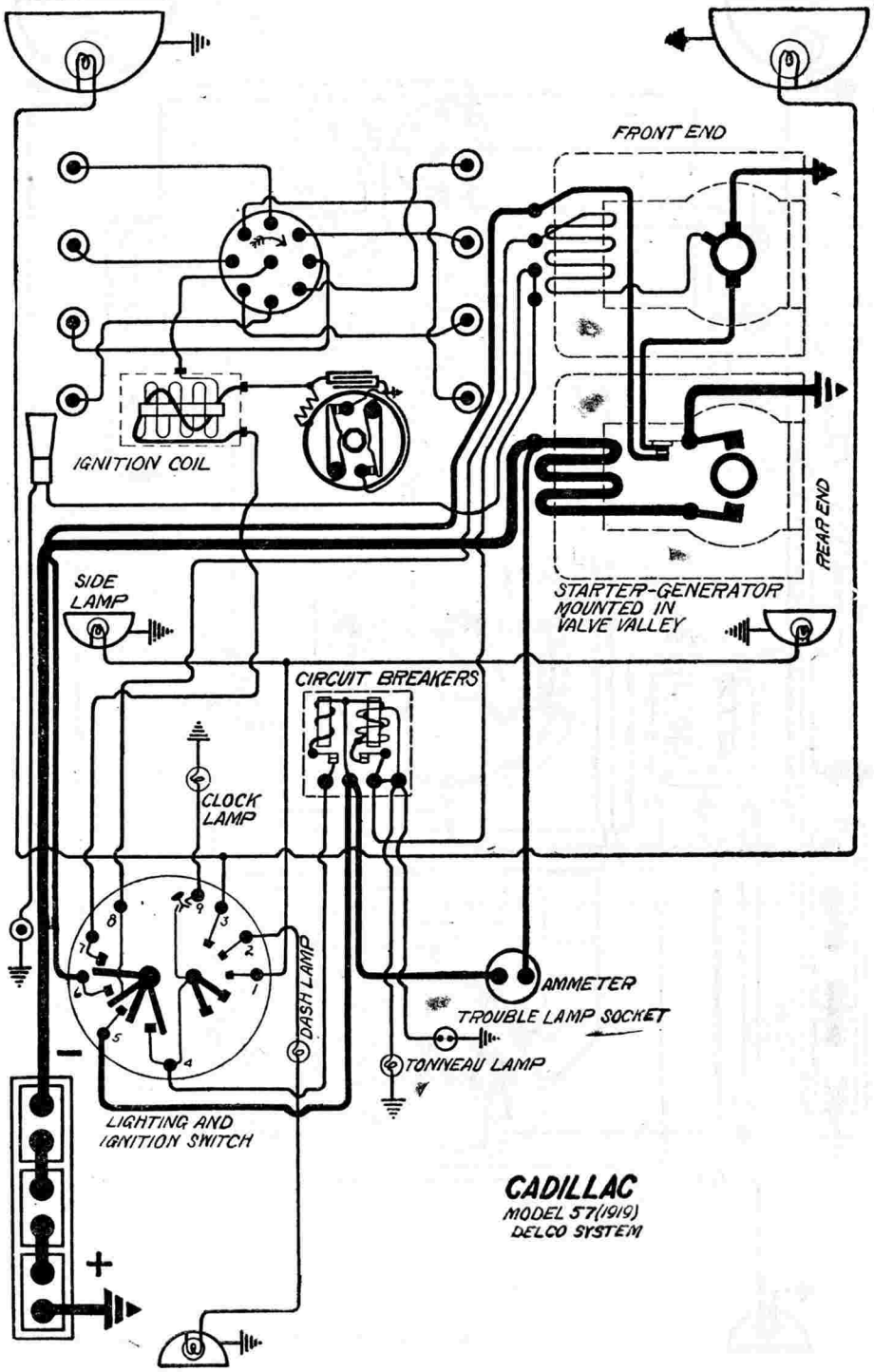
Relay.—There is no relay. Circuit between generator and battery is controlled by ignition switch.

Lamps.—Head lamps are 6-8 volt, 20 cp. Side lamps are 6-8 volt, 6 cp. Tail and dash lamps are in series and are each 3-4 volt, 2 cp. Tonneau lamp is 6-8 volt, 2 cp.

Circuit Breakers.—There is a vibraring circuit breaker in the circuit to the head, side, dash and tail lamps, which takes the place of fuses. It requires a current of 25 amperes to start this device vibrating, but when vibrating a current of 3 to 5 amperes will cause it to continue. There is a lock-out circuit breaker in the circuit to the horn, tonneau lamp and handy lamp socket. A current of 25 amperes will cause this device to open the circuit.

Model Numbers.—Motor generator is No. 78. Ignition coil is No. 2115. Combination





CADILLAC

Model 55 (1917-18) 57 (1918, 1919)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

Battery.—Battery is 6 volt, 150 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate .018 inch. They are made of tungsten. They will operate even though very irregular, due to the fact that the rough surfaces fit each other perfectly. Their natural color is dark gray, not silver. Should they become badly burned or pitted, affecting the ignition, remove and resurface them by drawing across a piece of fine emery cloth laid on a flat surface, as on the bed of a drill press, finishing on a very hard oil stone. Clean all oil from contacts before again putting into service.

Timing.—Breaker contacts should separate when flywheel marking "1-GA" is directly under indicator, No. 1 piston of left-hand block entering power stroke, spark control lever and breaker assembly in fully retarded position.

Firing Order.—The firing order is 1L, 2R, 3L, 1R, 4L, 3R, 2L, 4R.

Spark Plug Gaps.—Spark plug gaps should be .028 inch to .030 inch.

Oiling.—Every 2000 miles remove the breather pipe on the ignition unit and pack the gears with soft cup grease. If track of rotor button inside distributor head is not well polished, apply a very small amount of vaseline with a soft cloth.

Starter-Generator.—Starter and generator are combined into one unit, but are electrically separate. Starter is connected to the flywheel through a pinion shifted by the operator. Two overrunning clutches are provided. In connection with the ignition switch, a circuit is closed allowing a current flow through the generator windings causing the armature to revolve slowly, facilitating the meshing of the reduction gears. One clutch permits this rotation, and also permits a relatively high speed of the armature, necessary when operating as a starter. The second overrunning clutch prevents the engine from driving the armature through the reduction gears. Depressing the starting pedal meshes the reduction gears, opens the generator circuit, and allows the motor brushes to come in contact with the commutator, closing the starter circuit and cranking the engine. When the pedal is released, a spring reverses these operations. When running freely, starter turns at 4000-4500 R. P. M., drawing 50-70 amperes. Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current.

Generator.—Generator current regulation is by third brush system.

GENERATOR DATA. MOTOR-GENERATOR No. 98

Output-Amperes	R. P. M.
Neutral	500
10-12	1000
14-16	1500

When motoring with the overrunning clutch as the only retarding force, generator takes 4.5 amperes. To adjust the charging rate, loosen the two screws on the movable arm holding the third brush. If desirous of increasing the charging rate, the arm should be lengthened, and shortened to decrease it.

Oiling.—Put 4 or 5 drops of light engine oil in starter-generator oiler every two weeks. At the same time inject Cadillac rear axle and transmission lubricant in elbow oiler at rear of starter shaft with grease gun. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Relay.—There is no relay. Circuit between generator and battery is controlled by ignition switch.

Lamps.—Head lamps are 6-8 volt, 20 cp. Side lamps are 6-8 volt, 6 cp. Tail and dash lamps are in series, and are each 3-4 volt, 2 cp. Tonneau lamp is 6-8 volt, 2 cp.

Circuit Breakers.—There is a vibrating breaker in the circuit to the head, side, dash and tail lamps, which takes the place of fuses. It requires a current of 25 amperes to start this device vibrating, but when vibrating a current of 3 to 5 amperes will cause it to con-

CADILLAC

MODEL 59 (1920-1921)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Exide, 6 volt, 130 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model No. 2115. Distributor Model No. 5206. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery clath or against the flat side of an emery wheel, fininshing on a hard oil stone.

Oiling.—Remove the breather pipe at the rear of the distributor housing and pack the gear compartment with soft cup grease every 2000 miles.

Timing.—Breaker contacts begin to separate when piston on comprerssion stroke is 1 21/32 inches in advance of top center, spark control lever and breaker assembly in in the fully advanced position. On the Model 59 (1920) cars, breaker contacts begin to separate when the flywheel marking "1-GA" is at the indicator, No. 1 piston of the left hand block entering power stroke, and the spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1L, 2R, 3L, 1R, 4L, 3R, 2L, 4R.

Spark Plug Gaps.—Spark plug gaps are .023 inch.

STARTER-GENERATOR.—Model No. 162. The direction of rotation looking at commutator end is clockwise, The starter cranks the engine at 90-100 R.P.M., taking 140-150 amperes. The starter is connected to the engine through a set of reduction gears meshed by the operator.

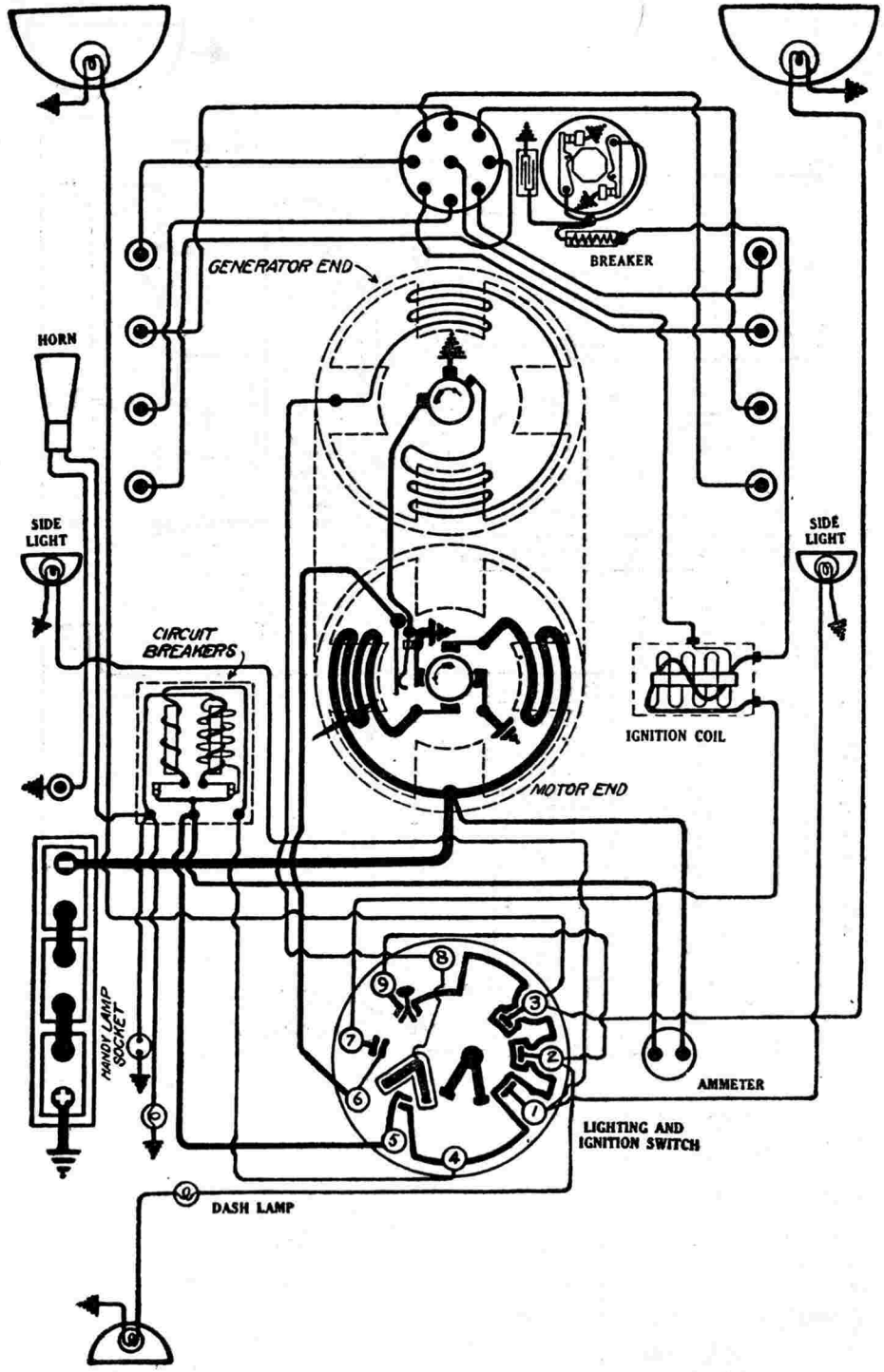
GENERATOR.—Generator current regulation is by the third brush system. Generator begins to supply current at 7 miles per hour, and reaches the maximum current output of 16 amperes at 25 miles per hour or 1500 R.P.M. of the armature. Charging rate is varied by adjustment of the third brush setting. To move the third brush, first loosen the clamp nut on the front end of the generator one or two turns. Remove the cover band over the brushes and turn the third brush adjusting screw. Turn in a clockwise direction to increase the charging rate and in a counter clockwise direction to decrease the charging rate. Reseat the brush and tighten the clamp after the adjustment is made.

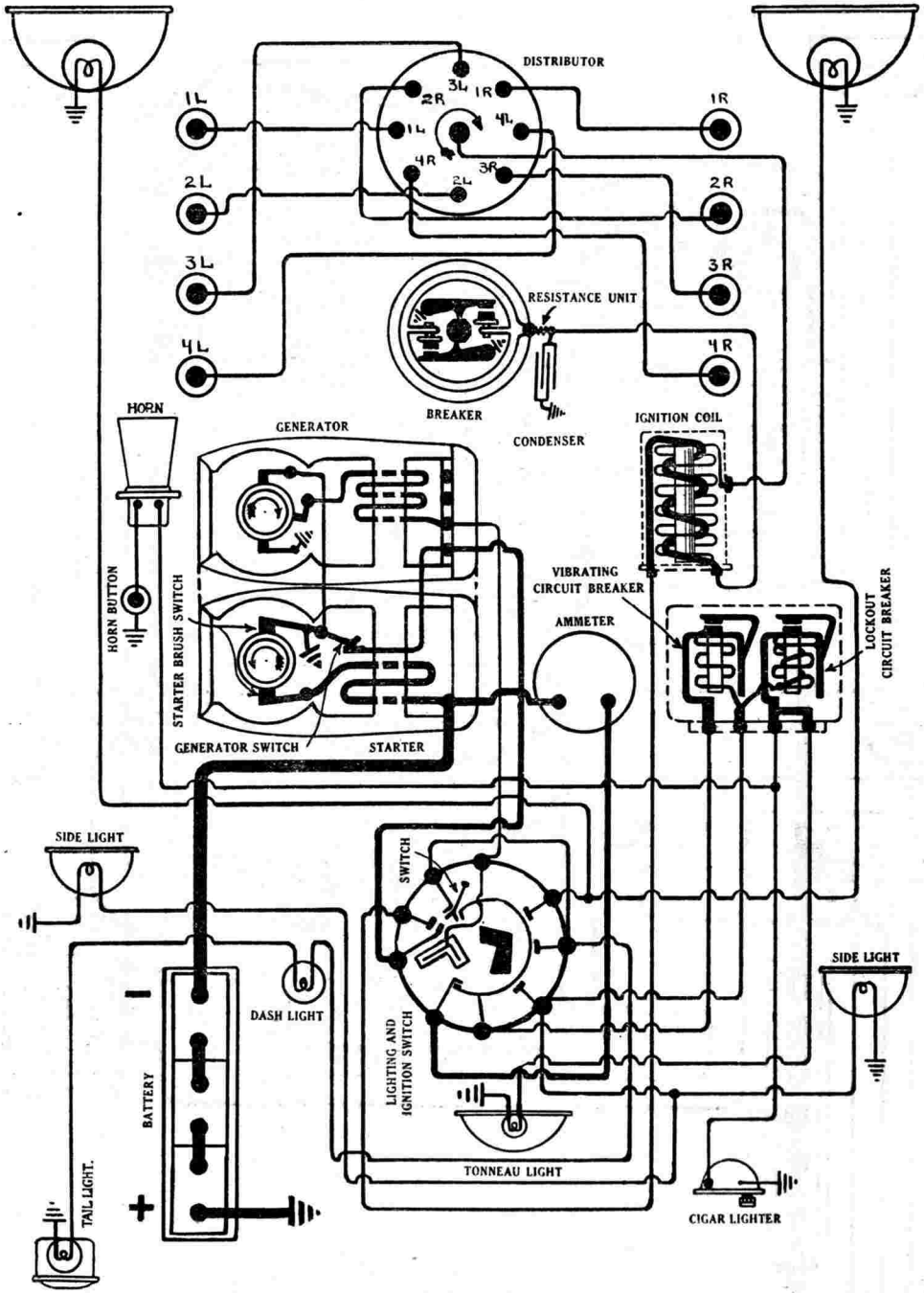
Oiling.—Put 4 or 5 drops of light engine oil in each of the starter-generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

LAMPS:—Head lamps are 6-8 volt, 18 cp. Side and dome lamps are 6-8 volt, 2 cp. Dash and tail lamps are 3-4 volt, 2 cp. On the 1920 cars, the side and dome lamps are 6-8 volt, 6 cp.

CIRCUIT-BREAKER.—A vibrating circuit-breaker takes the place of fuses. It requires 25 amperes to start the vibrator, but 3-5 amperes will cause it to continue.





CADILLAC

MODEL 61 (1922-23)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Exide, Type 3-LXRV-15-2, 6 volt, 130 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Ignition Coil Model No. 2115. Distributor Model No. 5239. Breaker contacts separate .020 inch for new cars; or for a new set of contact arms, and set contact gaps to .015-.018 inch for cars having been driven over 2000 miles on the set of contact arms. They are made of tungsten. If the condition affects ignition, remove and resurface on a medium hard oilstone.

Oiling.—Remove the breather pipe at the rear of the distributor housing and pack the gear compartment with soft cup grease every 2000 miles.

Timing.—Breaker contacts begin to separate when piston on compression stroke is 1 21/32 inches in advance of top center, spark control lever and breaker assembly in the fully advanced position.

Firing Order.—The firing order is 1L, 2R, 3L, 1R, 4L, 3R, 2L, 4R.

Spark Plug Gaps.—Spark plug gaps are .023 inch.

STARTER-GENERATOR.—Model No. 98. The direction of rotation is counter-clockwise, viewed from the starter commutator end. The starter cranks the engine at 90-100 R.P.M., taking 140-150 amperes. The starter is connected to the engine through a set of reduction gears meshed by the operator. Lock torque is 6 lb. ft. at 3 volts. Running free the starter takes 70 amperes at 6 volts. The tension of the starter brushes should be 2¼ to 2¾ pounds each.

GENERATOR.—Generator current regulation is by the third brush system. The direction of rotation is clockwise, viewed from the generator commutator end.

Amperes	**Generator Data.—M.G. 98**	R.P.M.
0		420
2		500
15		1000
17-19		1500
13-17		2000

To adjust the charging rate, loosen the generator cover band and the two screws holding the third brush mounting arm. Shift the third brush in the direction of armature rotation (clockwise) to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screws after making the adjustment. The field current is 2.5 amperes at 6 volts. The tension of each of the generator brushes should be 1¼-1¾ pounds.

Oiling: — Put 8 or 10 drops of light engine oil in each of the motor-generator oilers every two weeks or each 500 miles. Once each year remove and clean the motor and generator clutches and repack with vaseline.

RELAY.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volts, 21 cp. Dimmer and side lamps are 6-8 volts, 4 cp. Dash and tail lamps are in series and are 3-4 volts, 2 cp. Tonneau lamps are 6-8 volts, 2 cp.

CIRCUIT-BREAKER.—A vibrating circuit-breaker takes the place of fuses. It requires 25 amperes to start the vibrator but 10-15 amperes will cause it to continue. A lock-ont circuit breaker protects the horn, backing lamp and signal lamp circuits. A current of 25-30 amperes causes it to open the circuit.

CADILLAC

MODEL V-63 (1923-24-25)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Exide, Type 3-LXRV-15-2G. 6 volt, 130 ampere hour. The positive (+) terminal is grounded.

IGNITION:—Coil Model No. 2179A. Distributor Model No. 5239. Breaker contacts separate .020 inch on new cars or for new set contact arms. Set contact gaps .015-.018 inch on cars having been driven over 2000 miles with one set of contact arms. They are made of tungsten. Resurface contacts with a fine, flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 18-22 degrees. Automatic advance begins at 800 R.P.M. Maximum automatic advance is 16½-18 dgrees reached at 2000 R.P.M.

Mounting:—Distributor is mounted between the cylinder banks on forward end of engine. To remove distributor, disconnect primary lead and manual advance rod. Remove shaft between starter-generator and distributor. Then remove hold-down screws and lift distributor out.

Oiling.—Put 8 or 10 drops of light engine oil in the oiler every two weeks or each 500 miles. The distributor gears and lower bearings are oiled from the timing gear case. Put a small amount of medium heavy grease on the surface of the breaker cam every 1000 miles.

Timing:—Synchronization of Contacts:—Breaker uses two sets of contacts on an eight-sided cam. Both sets of contacts must open at the same time. To synchronize contacts, short out the ignition coil by connecting both primary leads to the same terminal. Connect a 6 volt lamp across each set of contacts. Crank engine slowly. The lamps will light as contacts open. Both lamps should light at the same instant. If they do not, loosen the 3 screws holding the breaker plate in position and shift the plate until the lamps light simultaneously.

Timing Distributor to Engine:—Breaker contacts separate when piston entering firing stroke is 1 21/32 inch before top dead center measured on the flywheel, with the manual advance lever in the fully advanced position. To set timing, crank engine until cylinder No. 1 of the left hand block enters compression stroke. Fully advance spark lever and continue to crank engine until the flywheel mark IG/A is opposite the indicator on the flywheel case. The flywheel mark is 1 21/32 inches before top dead center position. Then loosen lock screw in center of breaker cam and rotate until contacts begin to separate. Tighten the lock screw and make certain that the segment opposite the rotor button is connected to the spark plug in cylinder No. 1 in the left hand block.

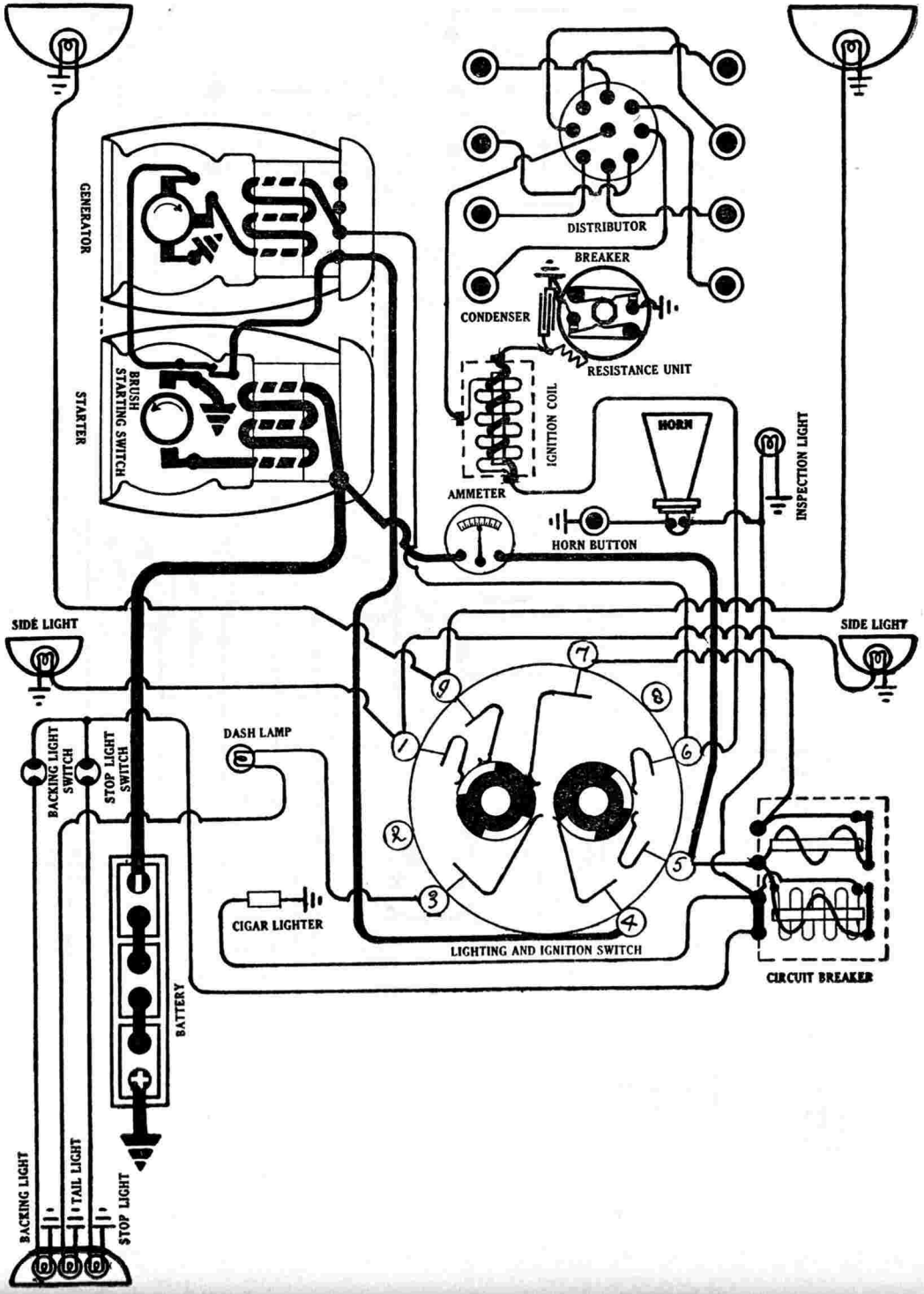
Firing Order:—The firing order is 1L-4R-4L-2L-3R-3L-2R-1R.

Spark Plugs:—Spark plugs are A.C. ⅞ Standard. Gaps are .023 inch.

VALVE TIMING:—INLET VALVES:—Head diameter is 1 11/16 inches; stem diameter is ⅜ inch. Tappet clearance is .004 inch (cold). Inlet valves open at top dead center and close at 46.7 degrees after lower dead center.

EXHAUST VALVES:—Head diameter is 1 11/16 inches; stem diameter is ⅜ inch. Tappet clearance is .006 inch (cold). Exhaust valves open at 46.7 degrees before lower dead center and close at top dead center.

STARTER-GENERATOR:—Model 98. Starter and generator are combined in one frame but are electrically separate. When the ignition switch is closed current flows through the generator winding causing the armature to revolve slowly which assists in meshing the gears. An overrunning clutch at the generator end permits this rotation. Depressing the starting switch meshes the starter gears, opens the generator circuit and completes the starter circuit by bringing the starter brushes in contact with the commutator, allowing the machine to run as a starter to crank the engine. When the pedal is released a spring reverses this operation. The direction of rotation is counter-clockwise, looking at the starter commutator end.



CADILLAC

MODEL V-63 (1923-24-25)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

Starter cranks the engine at 90-100 R.P.M. drawing 140-150 amperes. The tension of the starter brushes should be 2¼-2¾ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	70
6 lb. ft.	Lock	3	....

GENERATOR:—Generator direction of rotation is clockwise, looking at the generator commutator end. Current regulation is by the third brush system. To adjust the generator output, loosen the generator cover band and the two screws holding the third brush mounting arm. Shift the third brush in the direction of armature rotation (clockwise) to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screws after making the adjustment.

Generator Data

Amperes	R.P.M.
0	420
2	500
15	1000
17-19	1500
13-17	2000

Shunt field current is 2.5 amperes at 6 volts. The generator brush spring tension should be 1¼-1¾ pounds.

Mounting:—Starter-generator is mounted on the rear of the engine between the cylinder banks. To remove the starter-generator, relieve the gasoline pressure and disconnect feed line at carburetor and move to side. Disconnct all leads at generator and starter terminals. Disconnect generator drive shaft and remove starter clutch housing cover plate. Remove two large starter clutch housing hold-down screws and starter-generator hold-down screws and lift out.

Oiling:—Put 8 or 10 drops of light engine oil in each of the starter-generator oilers every two weeks or each 500 miles. Once each year remove and clean the motor and generator clutches and repack with vaseline.

LIGHTING:— Delco Switch Model No. 1272. Head lamps are 6-8 volt, 21 cp. Side and inspection lamps are 6-8 volt, 3 cp. Stop and backing lamps are each 6-8 volt, 21 cp. Dash and tail lamps are in series. They are each 3-4 volt, 2 cp.

RELAY:—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

CRCUIT BREAKER:—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start the vibrator but 10-15 amperes will cause it to continue. A lockout circuit breaker protects the horn, backing lamp and signal lamp circuits. A current of 25-30 amperes causes it to open the circuit.

CADILLAC

MODEL 314. SERIAL NUMBERS 100,001 UP (1926)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Exide, Type 3-LXRV-15-2G, 6 volt, 130 ampere hour. The starting capacity is 137 amperes for 20 minutes. Lighting capacity is 5 amperes for 26 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model 2189. Distributor Model 5281. Breaker contacts separate .025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone or with a fine, flat jewelers' file. The tension of the contact arm spring should be 16-20 ounces. Manual advance is 18-22°. Automatic advance begins at 600 R.P.M. and reaches a maximum of 30° at 2800 R.P.M.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Mounting:—Distributor is mounted between the cylinder banks and is driven by spiral gears from the cam shaft. To remove unit, remove hold down screw and lift from position.

Timing.—One set of breaker contacts begins to separate when piston No. 1 on compression stroke reaches a position at which the flywheel marking IG/A-1/5 is opposite the indicator on the flywheel case. This is approximately 1 27/32 inches before top dead center. The manual advance lever must be in the fully advanced position. The other set of contacts open when the engine has turned over 90° (or 45° of the distributor). In this position the flywheel marking IG/A-2/6 is opposite the indicator.

Firing Order:—The firing order is 1L-4R-4L-2L-3R-3L-2R-1R.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Model No. 314. Starter is connected to the engine through a pinion shift incorporated in the starting pedal. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 104 R.P.M. taking 140-150 amperes. Starter brush tension should be 2¼-2½ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6.	60
18.25 lb. ft.	Lock	3.2	....

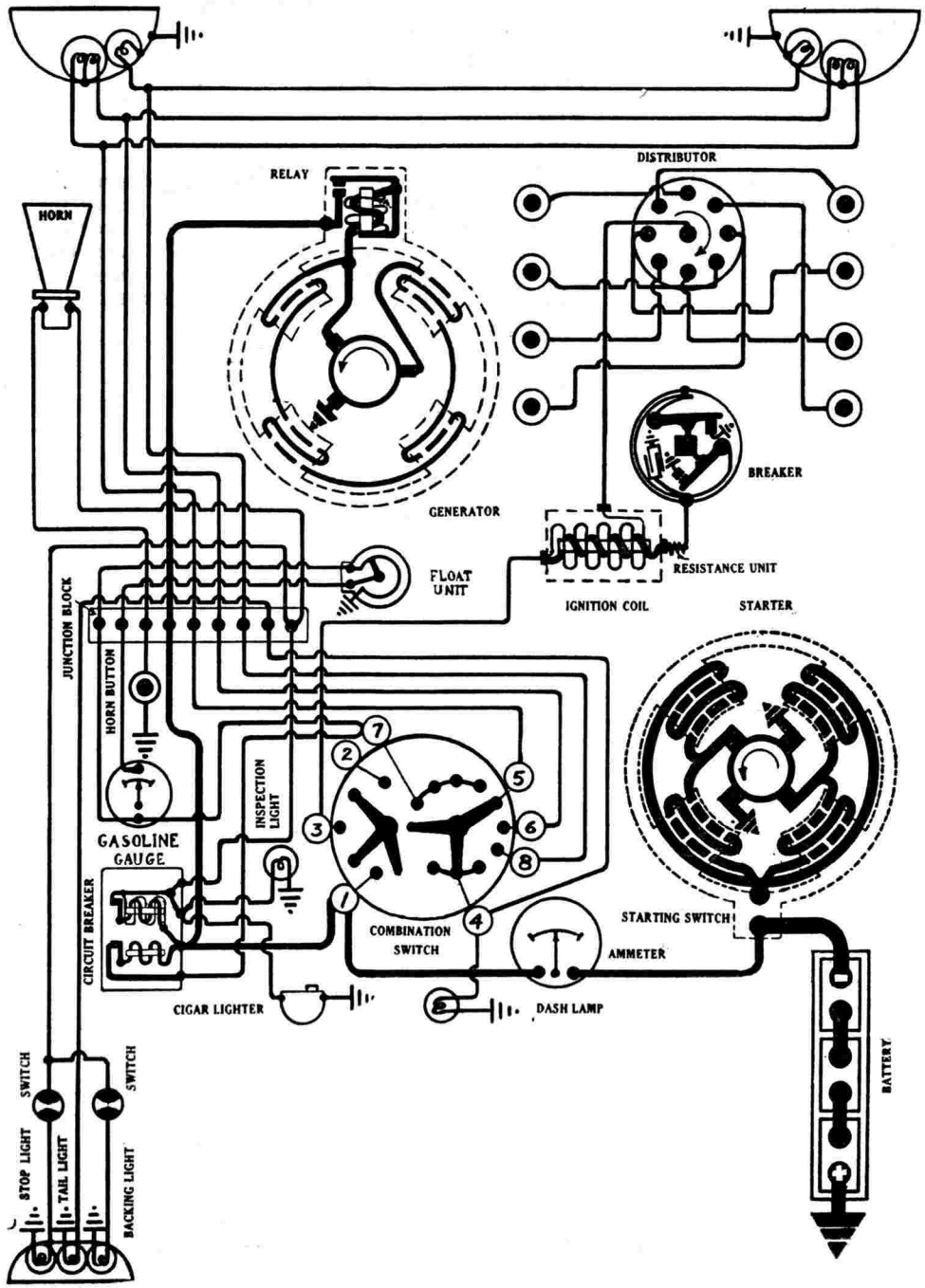
Mounting:—Starter is mounted vertically at the rear of the engine. To remove, loosen set screw in steering column and remove starting pedal button and accelerator pedal. Then remove toe boards and disconnect hand throttle rod and foot throttle rod. Remove three hold down screws and lift starter from place.

Oiling:—Self-lubricating bearings are used. They require no attention.

GENERATOR:—Model No. 315. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the generator output, shift the third brush mounting plate by turning the hexagonal nut on the outside of the generator end plate. Turning the nut in a clockwise direction increase the charging rate and in the opposite direction decreases the charging rate. The maximum output is 15-17 amperes reached at 1000 R.P.M. of the generator armature.

Generator Data

Amperes	Volts	Amperes
2		500
15		1000
15-17	7.5-8	Peak



The brush tension should be 1-1¼ pounds each. Shunt field current is 3 amperes at 7.5 volts.

Mounting:—Generator is mounted at the front of the engine between the cylinder banks and is belt driven. Care must be taken to see that the belt is not tight enough to crowd the generator bearings nor so loose that excessive slipping is possible. To remove generator, loosen the four mounting nuts at the forward end of the generator and lower the unit so that the belt can be removed. Then remove nuts and lift generator from position.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Relay contacts close at 10-12 M.P.H. when the voltage of the generator reaches 6.75-7.5 volts and open with a discharge current of 0-3 amperes. Air gap between relay armature and coil core is .009-.010 inch, contacts closed.

LIGHTING:—Switch Model 1287. Head lamps use a double filament bulb. They are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 3 cp. S.C. Dash, dome, tonneau and tail lamps are 6-8 volt, 3 cp. S.C. Backing and stop lamps are 6-8 volt, 21 cp. S.C.

CIRCUIT BREAKER:—Model 5767. A combined vibrating and lockout circuit breaker is mounted on the dash. The vibrating unit protects the lighting circuit. A current of 25-30 amperes causes it to operate. While vibrating the current flow is 10-15 amperes. The lockout circuit breaker protects the horn, inspection lamp, stop and backing lamp and cigar lighter circuits. A current of 25-30 amperes causes it to open the circuit. While operating the current flow is less than 1 ampere.

CADILLAC

MODEL 314 ENGINE NUMBERS 1-33001 TO 1-41001 (LATE 1926)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO SYSTEM

BATTERY.—Exide, Type 3-LXRV-15-2G. 6 volt, 130 ampere hour. The starting capacity is 137 amperes for 20 minutes. Lighting capacity is 5 amperes for 26 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model 2189. Distributor Model 5281. Breaker contacts separate .027 inch. They are made of tungsten. When the condition of the contacts affects the ignition remove and resurface on a medium hard oilstone or with a fine, flat jeweler's file. The tension of the contact arm spring should be 16-20 ounces. Manual advance is 18-22°. Automatic advance begins at 600 R.P.M. and reaches a maximum of 30° at 2800 R.P.M.

Mounting.—Distributor is mounted between the cylinder banks and is driven by spiral gears from the cam shaft. To remove unit, remove hold down screw and lift from position.

Oiling.—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing.—The distributor has a mark "A" stamped on the flange of the lower housing to distinguish it from the earlier models. One set of breaker contacts begin to separate when piston No. 1 on compression stroke reaches a position at which the flywheel marking "IG/A-1-5" is opposite the indicator on the flywheel case. This point is 1 3/16 inches on the flywheel before top dead center. The manual advance lever must be in the fully advanced position. The breaker system uses two sets of contacts opening alternately at intervals of 45° or 90° of crankshaft travel. The second set of contacts open when the flywheel marking "IG/A-2-6" is opposite the indicator on the flywheel housing.

Firing Order.—The firing order is 1L-4R-4L-2L-3R-3L-2R-1R.

Spark Plugs.—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .032 inch.

STARTER—Model No. 314. Starter is connected to the engine through a pinion shift incorporated in the starting pedal. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 104 R.P.M. taking 140-150 amperes. Starter brush tension should be 2¼-2½ pounds each.

Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6.	60
18.25 "	Lock	3.2	....

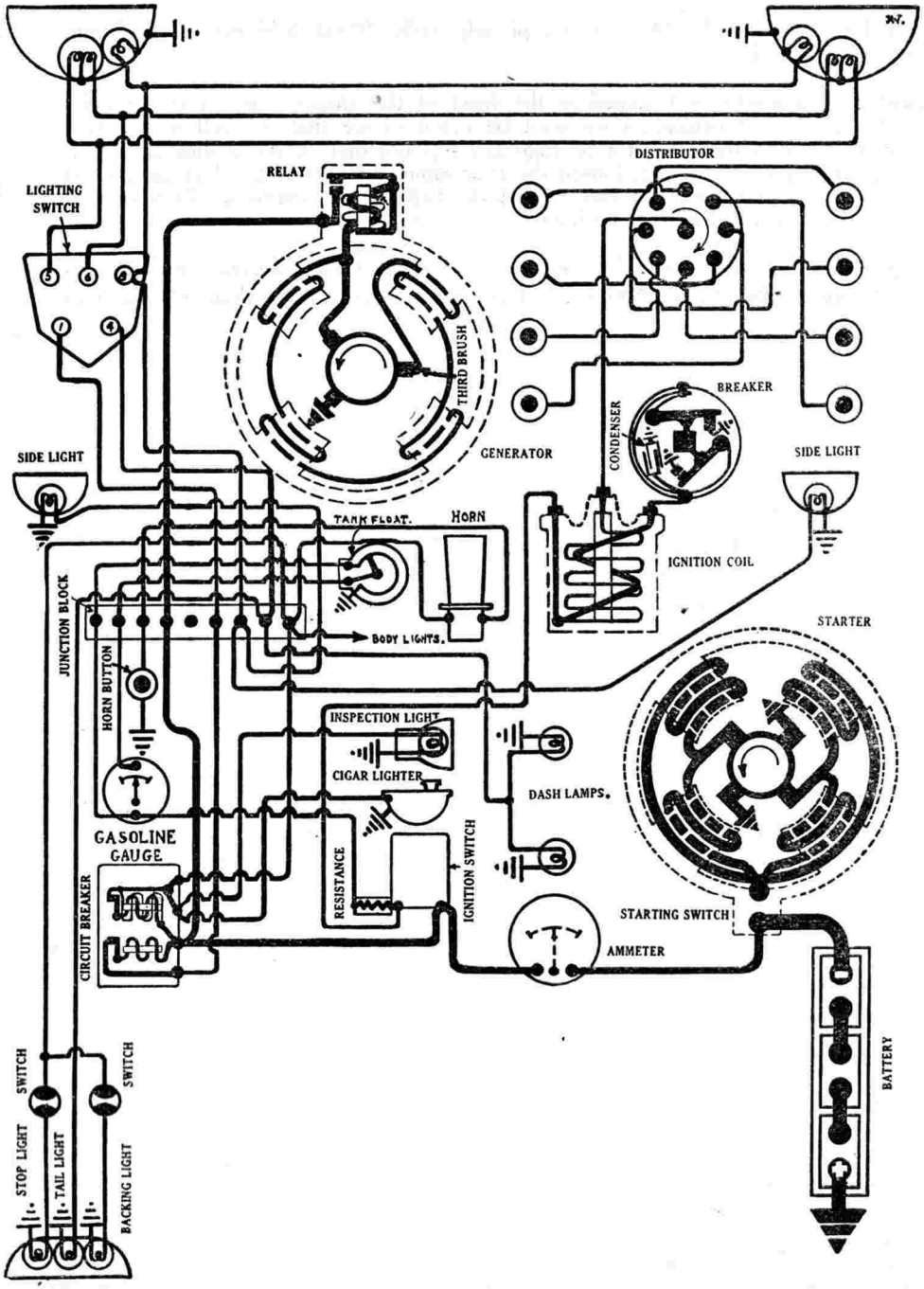
Mounting.—Starter is mounted vertically at the rear of the engine. To remove, loosen set screw in steering column plate. Remove starting pedal button and accelerator pedal. Then remove toe boards and disconnect hand throttle rod and foot throttle rod. Remove three hold down screws and lift starter from place.

Oiling.—Self-lubricating bearings are used. They require no attention.

GENERATOR.—Model No. 315. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the generator output, shift the third brush mounting plate by turning the hexagonal nut on the outside of the generator end plate. Turning the nut in a clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. The maximum output is 15-17 amperes reached at 1000 R.P.M. of the generator armature.

Generator Data.

Amperes	Volts	R.P.M.
2		500
15		1000
15-17	7.5-8	Peak



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The brush tension should be 1-1¼ pounds each. Shunt field current is 3 amperes at 7.5 volts.

Mounting.—Generator is mounted at the front of the engine between the cylinder banks and is belt driven. Care must be taken to see that the belt is not tight enough to crowd the generator bearings nor so loose that excessive slipping is possible. To remove generator, loosen the four mounting nuts at the forward end of the generator and lower the unit so that the belt can be removed. Then remove nuts and lift generator from position.

Oiling.—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY.—Relay contacts close at 10-12 M.P.H. when the voltage of the generator reaches 6.75-7.5 volts and open with a discharge current of 0-3 amperes. Air gap between relay armature and coil core is .009-.010 inch, contacts closed.

LIGHTING.—Switch Model 1303. Head lamps use a double filament bulb. They are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 3 cp. S. C. Dash, dome, tonneau and tail lamps are 6-8 volt, 3 cp. S. C. Backing and stop lamps are 6-8 volt, 21 cp. S. C.

CIRCUIT BREAKER.—Model 5767. A combined vibrating and lockout circuit breaker is mounted on the dash. The vibrating unit protects the lighting circuits. A current of 25-30 amperes causes it to operate. While vibrating the current flow is 10-15 amperes. The lockout circuit breaker protects the horn, inspection lamp, stop and backing lamp and cigar lighter circuits. A current of 25-30 amperes causes it to open the circuit. While operating the current flow is less than 1 ampere.

CADILLAC

MODEL 314 (1927) AFTER ENGINE NUMBER 4-41001
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Exide, Type 3-LXRV-15-2G, 6 volt, 130 ampere hour. The starting capacity is 137 amperes for 20 minutes. Lighting capacity is 5 amperes for 26 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model 2195. Distributor Model 4016. Breaker contacts separate .0225-.0275 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine, flat contact file. Breaker arm spring tension should be 16-20 ounces. Ignition current is .5-2.75 amperes at 6 volts with engine running and 4.8 amperes (cold) at 6 volts with engine stopped. Distributor is semi-automatic. Manual advance is 20° (engine). Automatic advance begins at 600 R.P.M. and reaches a maximum of 30° at 2800 R.P.M.

Mounting:—Distributor is mounted between the cylinder banks at the front end of the engine, and driven from the camshaft through the spiral gears. The coil is mounted on the side of the distributor housing.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing:—One set of breaker contacts begins to separate when piston No. 1 on compression stroke reaches a position where the flywheel mark "IG/A-1-5" is opposite the indicator on the flywheel case. This point is 1 3/16 inches on the flywheel before top dead center; the manual advance lever must be in the fully advanced position. The breaker has two sets of contacts opening at intervals of 45° corresponding to 90° of crankshaft rotation. The second set of contacts separate when the flywheel mark "IG/A-2-6" is opposite the indicator.

Valve Timing:—INLET VALVES:—Head diameter, 1 11/16 inches; stem diameter, 3/8 inch; valve lift, 21/64 inch; tappet clearance, .004 inch (cold); spring pressure, 95 pounds (compressed to 2 15/64 inches). Inlet valves open 18° before top dead center and close 64° 40′ after lower dead center.
EXHAUST VALVES:—Head diameter, 1 9/16 inches; stem diameter, 3/8 inch; valve lift, 21/64 inch. Tappet clearance, .006 inch (cold). Spring pressure, 95 pounds (compressed to 2 15/64 inches). Exhaust valves open 56° 40′ before lower dead center and close 10° after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

Firing Order:—The firing order is 1L-4R-4L-2L-3R-3L-2R-1R.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .032 inch.

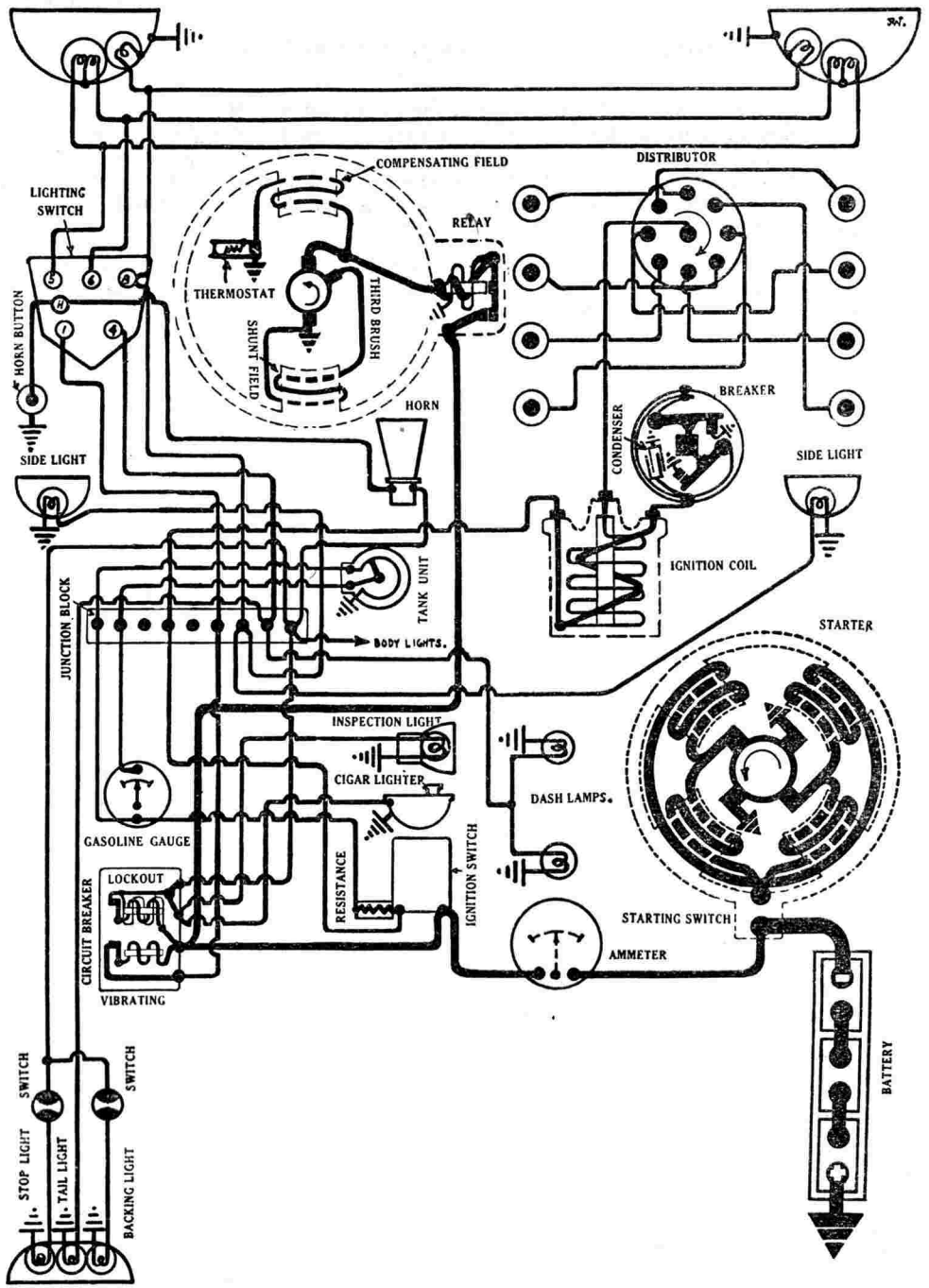
STARTER:—Model 349. Starter is connected to the engine through a mechanical pinion shift. The direction of rotation is clockwise, looking at the commutator end. Starter brush tension is 2¼-2½ pounds each. Starter cranks engine at 104 R.P.M., taking 140-150 amperes.

Starter Data

0 lb. ft.	Free	4	60
19 "	Lock	3	450

Mounting:—Starter is mounted vertically at the rear of the engine. To remove, loosen set screw in steering column plate. Remove starting pedal button and accelerator pedal. Then remove toe boards and disconnect hand throttle rod and foot throttle rod. Remove three hold-down screws and lift starter from place.

Oiling.—Starter bearings are oilless. They require no attention.



CADILLAC

MODEL 314 (1927) AFTER ENGINE NUMBER 1-41001
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

GENERATOR:—Model 370. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Adjustment of the third brush is secured by removing the strap and moving the third brush by hand. Shifting the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. The third brush is held in any desired position by friction washers. Generator is of the split field type with the third brush shunt field wound on only one field pole. A straight shunt field in series with a thermostat is wound on the other field pole. Thermostat contacts open at 175°F., cutting a resistance in the field circuit and rendering the straight shunt field inoperative. Generator then runs as a third brush machine with reduced output. With maximum setting, generator output is 22 amperes at 8.6 volts reached at 1400-1600 R.P.M. Brush spring tension is 16-20 ounces. Third brush shunt field current is 4.5 amperes at 6.5 volts. Straight shunt field current is .75 amperes at 6.5 volts. Generator motoring draws 5 amperes at 6 volts.

Generator Data

Cold Test. 75°F.			Hot Test. 175°F.		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
6	7.8	600	5	6.9	600
16	8.0	1000	14	7.8	1000

Mounting:—Generator is mounted on right of engine and is driven by a silent chain, in tandem with the water pump. To remove generator, remove three screws which hold the generator to the crankcase.

Oiling.—Put 8 or 10 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, this oiling must be done every 500 miles.

RELAY:—Model 266-N. Relay is mounted on top of the generator. Relay contacts close when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0.2-5 amperes. Contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch, contacts closed.

LIGHTING:—Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimmers. Auxiliary head lamps are 6-8 volt, 3 cp. S. C. Dash, dome, tonneau and tail lamps are each 6-8 volt, 3 cp. S. C. Backing and stop lamps are each 6-8 volt, 21 cp. S. C.

SWITCHES:—Lighting switch on foot of steering column is Model 1303. Ignition switch on dash is Model 1285.

CIRCUIT BREAKER:—Model 5767. A combined vibrating and lockout circuit breaker is mounted on the dash. The vibrating unit protects the lighting circuits. A current of 25-30 amperes causes it to operate. While vibrating, the current flow is 10-15 amperes. The lockout circuit breaker protects the horn, inspection lamp, stop and backing lamp and cigar lighting circuits. A current of 25-30 amperes causes it to open the circuit. While operating current flow is less than 1 ampere.

CADILLAC

SERIES 341 (1927) SERIAL NOS. 3-00001 UP
SERIES 341-A (1928)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Exide, Type 3-LXRV-15-2G, 6 volt. Starting capacity is 137 amperes for 20 minutes. Lighting cepacity is 5 amperes for 26 hours. The positive (+) terminal is grounded. Battery is mounted on right side of car on right frame member under the dust shield. This battery is not interchangeable with battery used on Series 314 Cadillac because filler plugs are located on opposite side of cap.

IGNITION:—Coil Model 2195. Distributor Model 4032. Breaker contacts separate .022-.027 inch. They are made of tungsten. Resurface contacts whenever necessary with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Maximum manual advance is 38° (engine) or 20° distributor. Automatic advance begins at 600 R.P.M. (engine). Maximum automatic advance is 20° (engine) reached at 3000 R.P.M. (engine). Breaker arm spring tension is 16-20 ounces. There are two sets of breaker contacts set at an angle of 135° and operating on a four lobed cam. Contacts open alternately at intervals of 45° corresponding to 90° of crankshaft rotation, which is the correct firing interval for the Cadillac engine. This must be accurately set. (See Timing.)

Mounting:—Ignition coil is mounted on side of distributor mounting. Distributor is mounted at front of engine between the cylinder banks. The ignition system is fitted with an Electrolock switch on the dash which must be removed with the distributor when the distributor is taken off the car. To remove the distributor, disconnect manual advance rod and remove head with high tension cables attached. Then remove hold down screw and lift the distributor from place.

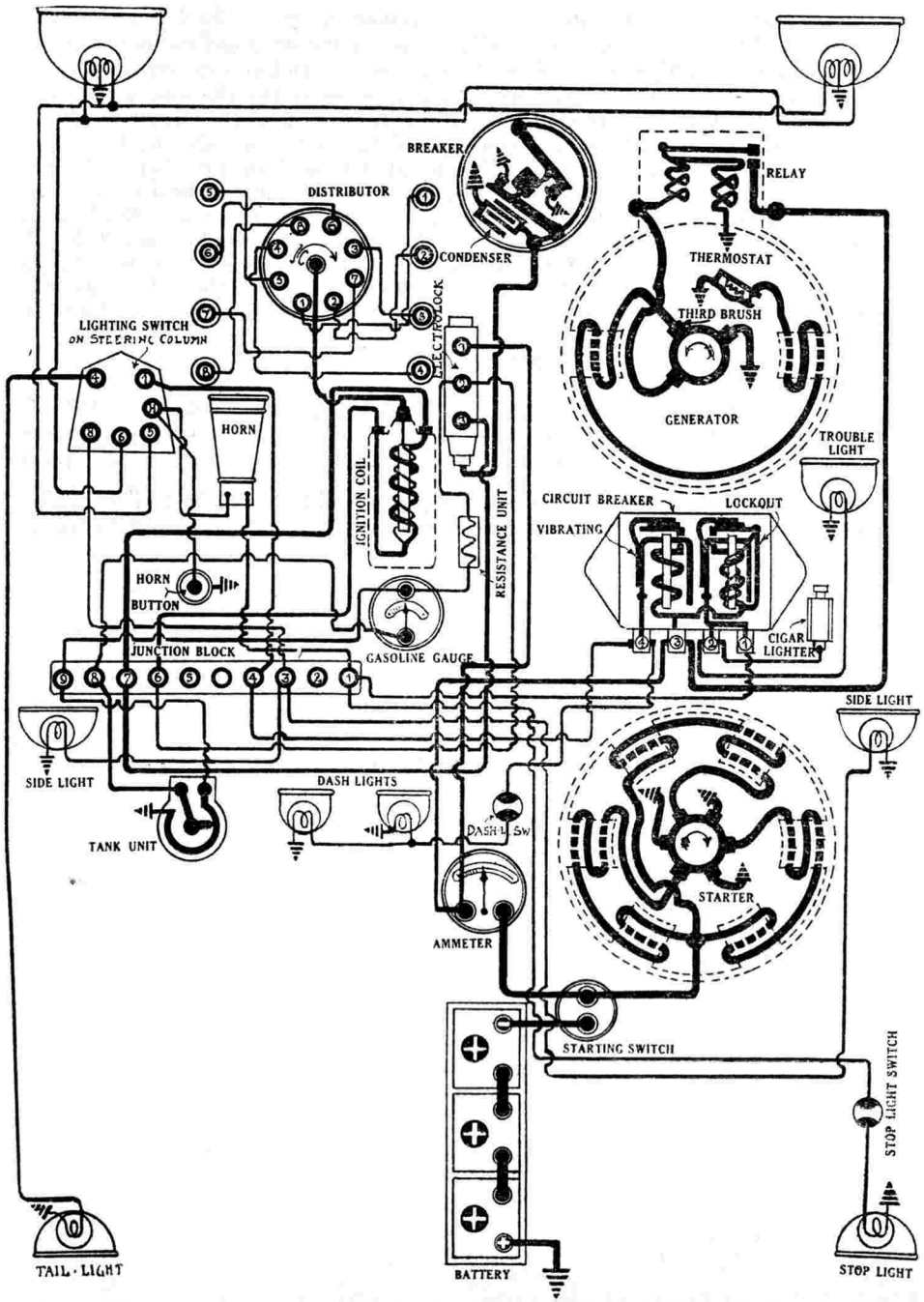
Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every month or each 1000 miles.

Timing:—Synchronization of Contacts:—Use Delco-Remy Tool, Part No. 822572, and follow directions given on Page S-30. This is important and contacts must be synchronized when distributor timing is checked.

Timing Distributor to Engine:—One set of breaker contacts begin to separate when the piston entering power stroke reaches a position 7/8 inch on the flywheel before top dead center with the spark lever fully advanced. With piston No. 1R in firing position the flywheel mark 'IG/A-1-5' will be opposite the indicator on the flywheel case. This mark is 7/8 inch before top dead center. To set timing, crank engine over until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance spark lever. Then continue to crank engine until flywheel mark 'IG/A-1-5' is opposite the indicator on the case. If contacts are not beginning to separate, loosen the taper screw in the center of the cam and rotate cam until one set of contacts open. The other set will be open but just closing. Tighten the screw. The second set of contacts open 45 degrees (distributor) after this point with the flywheel mark IG/A-2-6' opposite the indicator. These directions apply only to standard compression engines. For high compression engines see following paragraph.

Special Directions for Timing High Compression Engines:—On Cadillac engine with high compression heads (with letters 'H.C' cast in head) contacts separate with the piston 1/2 inch (on the flywheel) before top dead center. The engine should be cranked over until a point approximately half way between the 'IG/A-1-5' mark on the flywheel and the top dead center mark is opposite the indicator. Contacts should separate at this point. On engines with high compression heads the spark plug gap must be set at .026 inch.

Valve Timing:—INLET VALVES:—Head diameter, 1 1/2 inches; stem diameter, 3/8 inch; stem length, 6 17/64 inches (over all); valve lift, 23/64 inch; spring pressure, 133-139 pounds compressed to 2 5/32 inches; tappet clearance, .004 inch (cold). Inlet valves open 11° 2' before top dead center and close 58° 38' after lower dead center with cold engine.



CADILLAC

SERIES 341 (1927) SERIAL NOS. 3-00001 UP
SERIES 341-A (1928)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

EXHAUST VALVES:—Head diameter, 1½ inches; stem diameter, ⅜ inch; stem length, 6¼ inches (over all); valve lift, 23/64 inch; spring pressure, 133-139 pounds compressed to 2 5/32 inches; tappet clearance, .006 inch (cold). Exhaust valves open 38° 12′ before lower dead center and close 7° 38′ after top dead center with cold engine. Valve stem guides are removable. Oversize valve stems are not made.

Firing Order:—The firing order is 1L-4R-4L-2L-3R-3L-2R-1R. The right hand cylinder bank is right viewed from the driver's seat. Number one cylinder is nearest the radiator.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Spark plug gaps on standard compression engines are .032 inch. Gaps on high compression engines must be set at .026 inch.

STARTER:—Model 382. Starter is connected to the engine through a mechanical pinion shift interconnected with the starting pedal. The direction of rotation is clockwise, looking at the commutator end. Starter brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
4.5 lb. ft.	750	5	200
19 "	Lock	3	600

Mounting: Starter is mounted at right of engine on rear of flywheel case. To remove starter, disconnect cable and starter pedal linkage and remove three flange mounting capscrews. Then pull starter to rear and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model 384. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field combined with a thermostat. Thermostat contacts open at 165°F. inserting a resistance in the field circuit and reducing the output approximately 2.5 amperes. Generator output is adjusted by shifting third brush. Remove commutator cover band and shift third brush mounting plate in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any position by friction washers. The maximum charging rate of 18-20 amperes at 8.6 volts is reached at 1400-1600 R.P.M. or 22-25 M.P.H.

Generator Data

Cold Test 75°F.			Hot Test 175°F.		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
18-20	8.2-8.62	1450	10-12	7.3-7.7	1600

Shunt field current is 1.8-2.3 amperes at 6 volts. Generator brush spring tension is 16-20 ounces.

Mounting:—Generator is mounted at right of engine and is driven by silent chain in tandem with the water pump. To remove generator, disconnect wire and remove three mounting nuts. Then pull generator to rear and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Model 266-N. Relay is mounted on the generator. Relay closes at 8-10 M.P.H. when the generator voltage reaches 7.75 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Switch Model 1313 is mounted at lower end of steering column. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Stop lamp is 6-8 volt, 15 cp. S.C. Inspection lamp is 6-8 volt, 21 cp. S.C. Side, dash, tail, tonneau, dome, corner and step lamps are each 6-8 volt, 3 cp. S.C.

CIRCUIT BREAKER:—Model 5759. A combination vibrating and lockout circuit breaker is mounted on the dash. The vibrating unit protects the lighting circuits. It begins to operate at 25-30 amperes limiting the current flow to 10-15 amperes. The lockout circuit breaker protects the horn, stop lamp, inspection lamp, cigar lighter and body lamps. It opens the circuit when the current reaches 25-30 amperes and operate with a discharge current of less than 1 ampere.

Case

Model T (1916)
Westinghouse Starting and Lighting System
Westinghouse Ignition

Battery.—Battery is 6 volt, 70 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate .006 inch to .008 inch. Should they become burned or pitted, resurface them with a fine, flat jeweler's file. The springs should exert just enough pressure on the distributor brushes to force them ¼ inch past the top of the holder when the distributor cap is removed, but should retain them firmly so that they do not tend to fall out. Brushes must move freely in their holders. Be sure that both brushes are in place when replacing the rotor. (There is a brush on both the top and bottom side of the rotor.)

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position. Contacts are beginning to separate when end of the rotor is directly opposite the V notch on the rim of the case.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps should be about .023 inch.

Ballast Resistor.—There is a ballast resistor in the ignition switch. A fuse must not be permanently substituted for this resistor. In case it is necessary to operate the car with the ballast defective, a 5 ampere fuse may be used temporarily, but the ballast must be replaced as soon as possible, as continued operation without it will result in serious burning of the timer contacts.

Oiling.—Put 2 or 3 drops of light machine oil in the oiler at the side of breaker assembly every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

Starter.—Starter is connected to the engine through a Bendix drive. It should run at 1500 R. P. M., when delivering 2 pound-feet torque. It should develop 11.5 pound-feet lock torque, taking about 400 amperes.

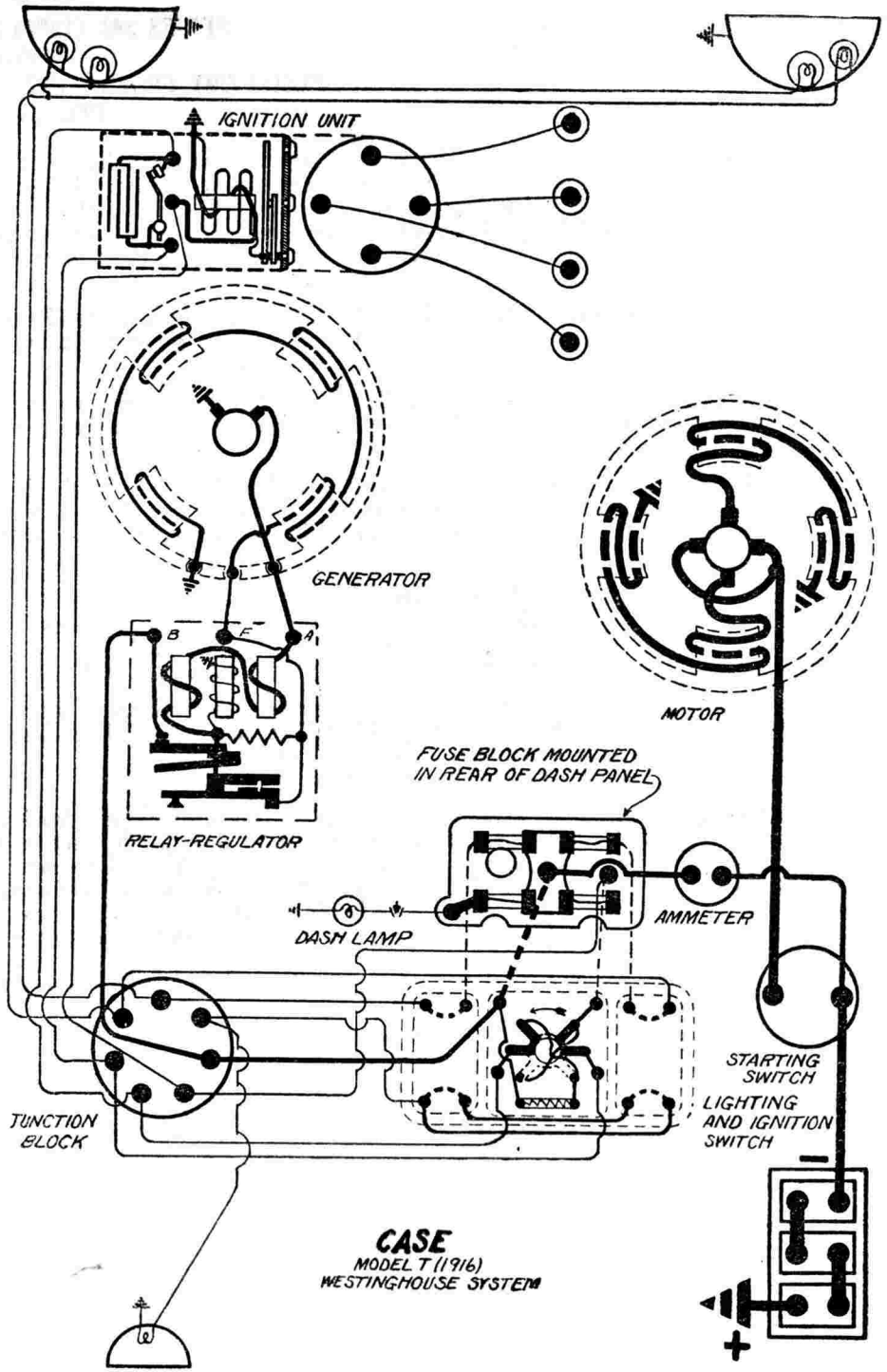
Oiling.—Put 4 or 5 drops of light engine oil in each of the starter oilers every month.

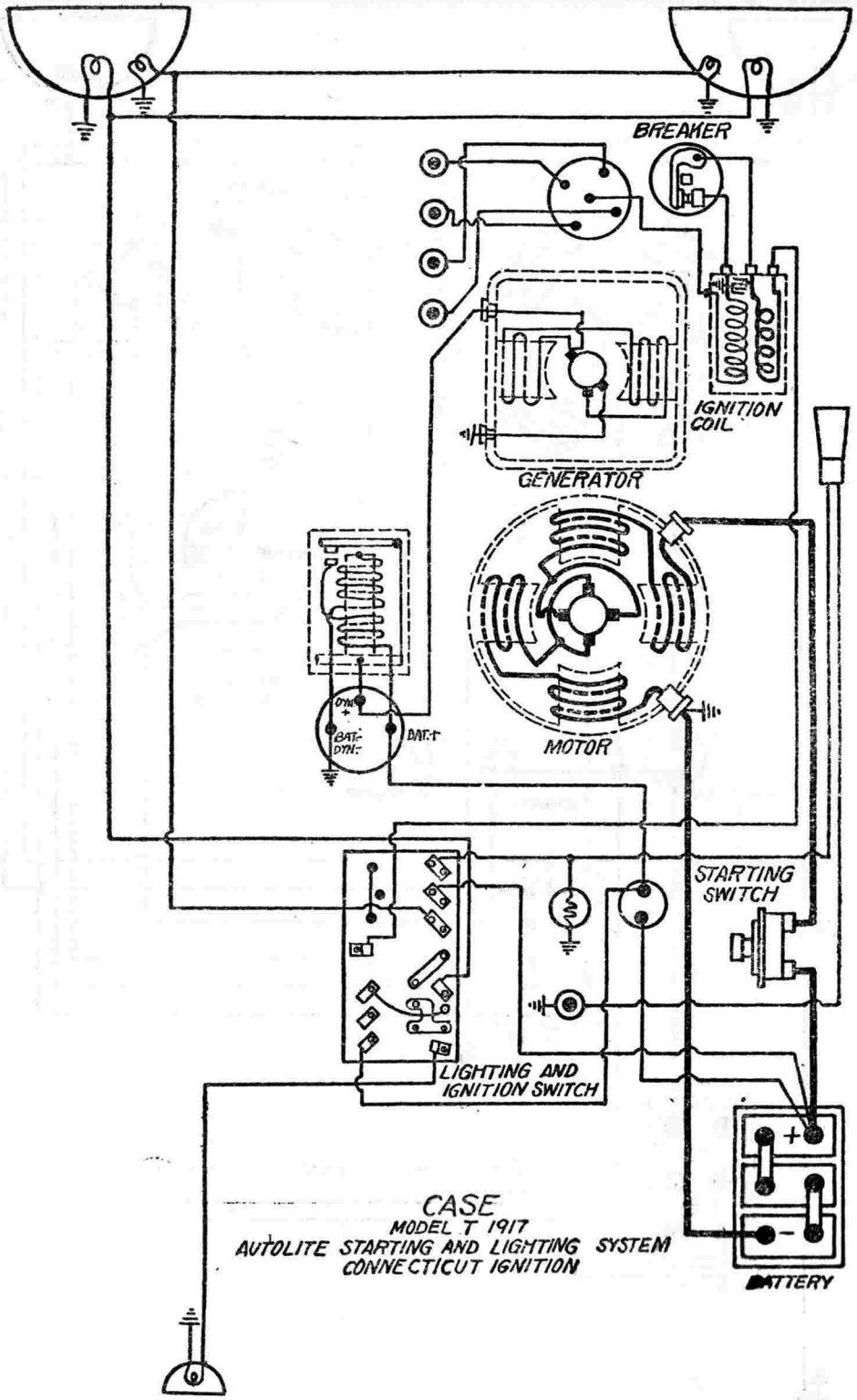
Generator.—Generator voltage regulation is by a vibrating regulator. Relay is combined with the regulator. The charging current should be 1 to 1.5 amperes at closing and the discharge current .5 to 1.25 amperes at opening of relay contacts. The air gap between relay armature (moving member) and coil should be .027 inch to .030 inch. Contacts should separate .013 inch to .017 inch. Adjust by bending the brass prongs. Clean relay and regulator contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface them with a piece of well worn No. 00 sand paper, drawing a piece of unglazed paper between them, to remove all grit, before again putting into service.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps—Head lamps are 6-8 volts, 20 cp. Dash lamp is 6-8 volts, 4 cp. Tail lamp is 6-8 volts, 4 cp. Trouble lamp is 6-8 volts, 4 cp.

Fuses.—Fuses are 20 ampere.





Model T (1917)
Auto-Lite Generating, Starting and Lighting System
Connecticut Ignition

Battery.—Battery is 6 volt, 85 ampere-hour. The negative (—) terminal is grounded at the starting motor.

Ignition.—Breaker contacts should separate .023 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine, emery cloth between them.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps should be .027 inch.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Starter.—Starter is connected to engine through a Bendix drive. Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current.

Oiling.—Starter bearings are packed with grease. Thoroughly clean out and repack with soft cup or ball bearing grease every six months. No oil is required.

Generator.—Generator current regulation is by third brush system.

GENERATOR DATA, MODEL GH

Amperes	R. P. M.
5	760- 820
10	1020-1100
12.5	1200-1300
15	1460-1675
15.0-16	1950-2250

When operating as a motor, generator should take 2.7 amperes, armature revolving at 450 R. P. M. Much higher speed indicates damp, grounded or short circuited field coils. Greater current or lower speed indicates tight bearings or damp, grounded or short circuited armature windings or commutator. Shunt field should take 1.7 amperes. Brush pressure on commutator should be 1 to 1¼ pounds. Should it be necessary to operate generator with excessive resistance in the charging circuit, as with battery disconnected, short circuit generator terminals.

Oiling.—Put 6-8 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Relay.—Relay should close at 8-10 miles per hour, or 550-600 R. P. M., of armature. Charging current should be .5 to 1.5 amperes at closing, and the discharge 0 to 1 ampere at opening of relay contacts. Clean relay contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a strip of well worn No. 00 sand paper, and then draw a piece of unglazed paper between them to remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 20 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash lamp is 6-8 volt, 4 cp. Tail lamp is 6-8 volt, 4 cp. Trouble lamp is 6-8 volt, 4 cp. Single

CASE

MODEL U (1918-19)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WESTINGHOUSE IGNITION

Battery.—Battery is 6 volt, 117½ ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts separate .006 to .008 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper. Adjust the distributor brush springs so that the brushes extend ¼ inch from their holders when the distributor cap is removed, retaining them, however, so that they do not fall out. Brushes must move freely in their holders. See that the brushes on the top and bottom of the rotor are in place when installing rotor.

Oiling.—Put 2 or 3 drops of light machine oil in oiler at side of ignition unit every month. If car is driven more than 1000 miles in a month, oiling must be done every 1000 miles.

Timing.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position. Contacts begin to separate when the end of the distributor rotor is directly opposite the V notch on rim of case.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .023 to .027 inch.

Starter.—Frame No. 711. Starter is connected to engine through a Bendix drive. Torque at 1250 R. P. M., is 2.5 pound-feet. Lock torque is 16 pound-feet, with 525 amperes.

Generator.—Frame No. 760. Generator current regulation is by third brush system. Current output is varied by adjustment of third brush setting. Set the third brush so that at 1100-1500 R. P. M., the maximum current output is 15 to 17 amperes, at 7½ volts. The cold test readings are obtained with the normal setting of third brush, and a generator temperature under 35° C. (95° F.). The hot test readings are obtained after the generator has been operated one hour at 1800 R. P. M., charging a half-charged battery or its equivalent.

GENERATOR DATA

Cold Test

R. P. M.	Generator Output—Amperes	Generator Voltage
500	0	6.5
750	8	6.5
1250	15-17	7.5
2500	7-11	6.5-7.5

Hot Test

R. P. M.	Generator Output—Amperes	Generator Voltage
1250	12-14	7.5
2500	7-11	6.5-7.5

Field current is 2.8 to 3.25 amperes, 6 volts. Field resistance is 1.9 to 2.25 ohms at 25° C. (77° F.).

Field Test, Generator Operating—Cold Test

R. P. M.	Generator Output Amperes	Generator Voltage	Field Current
1250	15-17	7.5	1.5-2.4

Hot Test

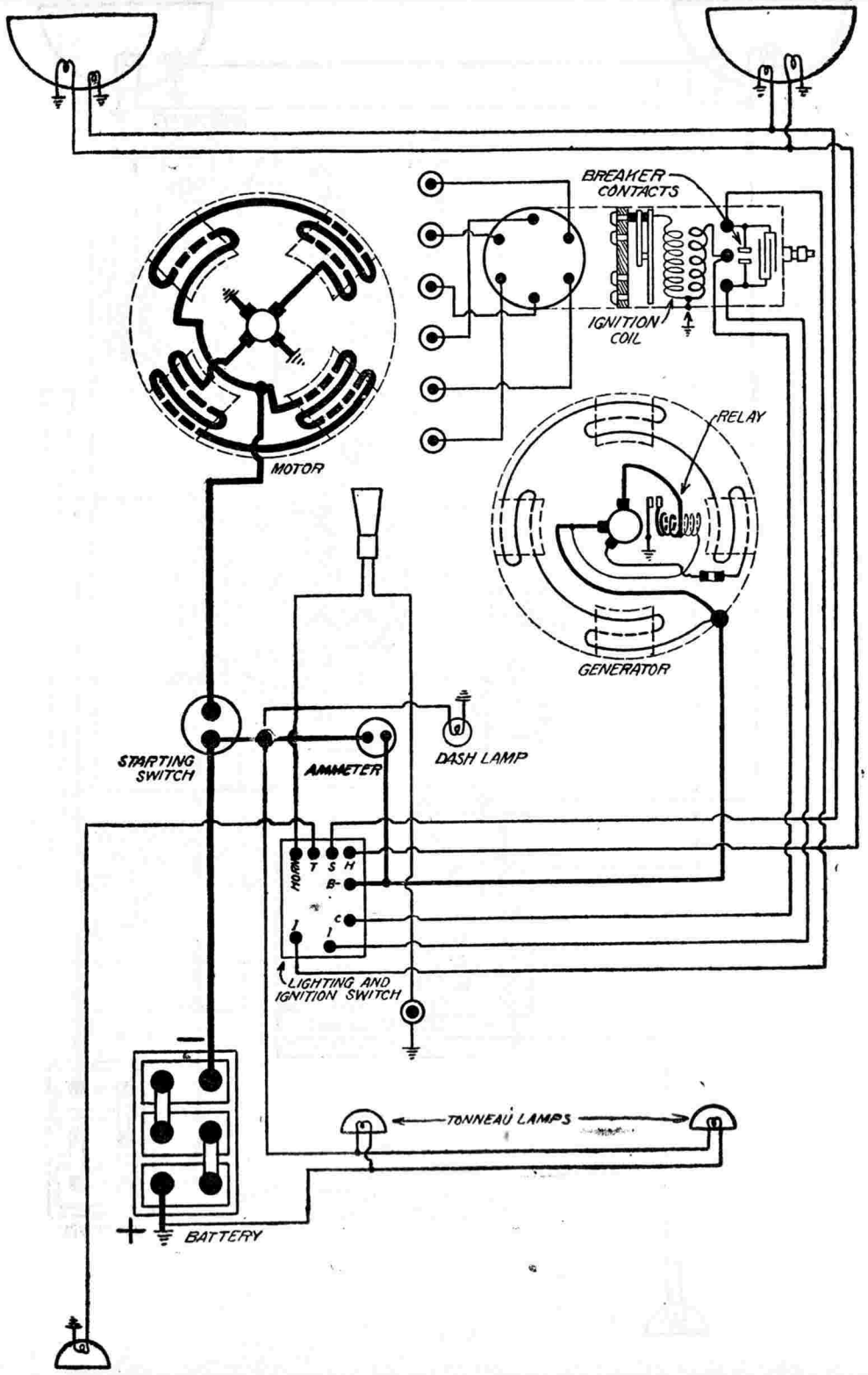
R. P. M.	Generator Output Amperes	Generator Voltage	Field Current
1250	12-15	7.5	1.5-2.2

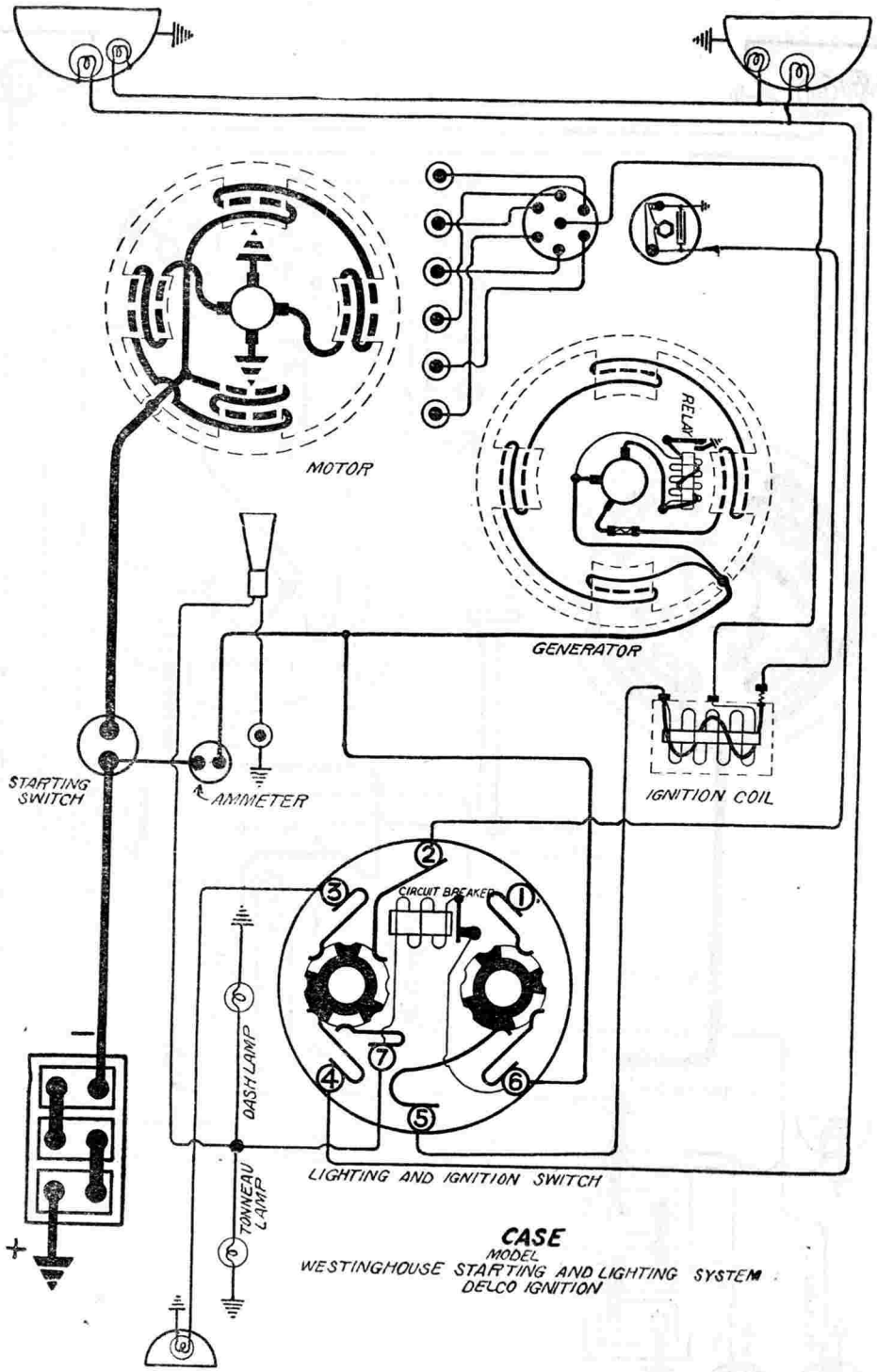
Operating freely as a motor, current flow is 3.5 to 5 amperes, 6 to 6.6 volts.

Oiling.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—Relay closes at 8-10 miles per hour or 500-550 R. P. M. of armature, and opens at 6-8 miles per hour, or 450-500 R. P. M. of armature. Charging current is 1 to 2 amperes at closing, and the discharge current 0 to 2 amperes at opening of relay. Air gap between relay armature (moving member) and coil core is .031 inch, contacts separated. Contacts separate .013 to .018 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 2 cp. Tonneau lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.





CASE
MODEL
WESTINGHOUSE STARTING AND LIGHTING SYSTEM
DELCO IGNITION

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SJRG, 6 volt, 118 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model No. 2159, Distributor Model No. 5157. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 4 or 5 drops of light engine oil in each of the ignition head oilers every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the flywheel marking "1-6" is at the indicator, spark control one-third advanced.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .028 inch.

STARTER.—Frame No. 710. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 125 R.P.M., taking 275 amperes

Starter Data

Torque	R.P.M.	Amperes
0 lb. ft.	4000	40
4 lb. ft.	1000	180
8 lb. ft.	700	280
14 lb. ft.	Lock	450

OILING.—Put 5 or 6 drops of light engine oil in each of starter oilers every month.

GENERATOR.—Frame No. 760. Generator current regulation is by third brush system. Current output is varied by adjustment of third brush setting. Set the third brush so that at 1100-1500 R.P.M. the maximum current output is 15 to 17 amperes, at 7½ volts. The cold test readings are obtained with the normal setting of third brush, and a generator temperature under 35°C. (95°F.). The hot test readings are obtained after the generator has been operated one hour at 1800 R.P.M., charging a half-charged battery or its equivalent.

Generator Data.—Cold Test.

R.P.M.	Amperes	Voltage
500	0	6.5
750	8	6.5
1250	15-17	7.5
2500	7-11	6.5-7.5

Generator Data.—Hot Test

R.P.M.	Amperes	Voltage
1250	12-14	7.5
2500	7-11	6.5-7.5

Field current is 2.8 to 3.25 amperes, 6 volts. Field resistance is 1.9 to 2.25 ohms at 25°C. (77°F.).

Field Test, Generator Operating

Cold Test

R.P.M.	Generator Output Amperes	Generator Voltage	Field Current
1250	15-17	7.5	1.5-2.4

Hot Test

R.P.M.	Generator Output Amperes	Generator Voltage	Field Current
1250	12-15	7.5	1.5-2.2

Operating freely as a motor current flow is 3.5 to 5 amperes, 6 to 6.6 volts.

OILING.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 500-550 R.P.M. of armature, and opens at 6-8 miles per hour, or 450-500 R.P.M. of armature. Charging current is 1 to 2 amperes at closing, and the discharge current 0 to 2 amperes at opening of relay. Air gap between relay armature (moving member) and coil core is .031 inch, contacts separated. Contacts separate .013 to .018 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 20 cp. Dimmer lamps are 6-8 volt, 4 cp. Tail

CASE

MODEL X (1922-23), W (1923)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Willard, Type SJRG-5. 6 volts, 135 ampere-hour capacity. The starting capacity is 140 amperes for 20 minutes. The lighting capacity is 5 amperes for 22½ hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model No. 2159. Distributor Model No. 5251-5252. Breaker contacts separate .020 inch. They are made of tungsten. If the condition of the contact point affects the ignition, remove and resurface on a medium hard oilstone or with a fine jeweler's file.

Oiling:—Put 8 or 10 drops of light engine oil into the distributor oiler every two weeks. If the car is driven more than 500 miles in two weeks, this attention must be given every 500 miles. Repack the distributor housing with medium soft cup grease up to the advance ring and yoke once a season.

Timing:—Breaker contacts just begin to separate when piston No. 1 is at top dead center on compression stroke, spark control lever and breaker assembly fully retarded. Locate the breaker cam carefully, so that when the backlash in the distributor gears is rocked forward the contacts will open, and when the backlash in the gears is rocked backward the contacts will just close. The distributor shaft rotates clockwise when viewed from the top.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—The spark plug gap is .030 inch. Diameters are ⅞ inch.

STARTER:—Model 181-208. The direction of rotation is clockwise, looking at commutator end. The starter is connected to the engine by a Bendix drive and reduction gears. Starter cranks the engine at 110 R.P.M., taking a current of 300 amperes.

Starter Test Data

	Torque	Amperes	Volts
Running Free		50	3.0
Lock Torque	10 lb. ft.	450	2.3

Starter brush tension is 40-50 ounces.

Oiling:—Put 8 or 10 drops of light engine oil into each starter oiler every two weeks. Saturate the wick oiler in the Bendix gear case with light engine oil once each year. Every six months remove the grease plug and repack the reduction gear case with medium heavy cup grease.

GENERATOR:—Model 165, 199, 256. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. To increase the charging rate, move the third brush in the direction of rotation (counter-clockwise) and move the same in the opposite direction (clockwise) to decrease the charging rate. The maximum charging rate is 15-17 amperes, reached at 1600-1800 R.P.M. of armature. The brush tension is 25-30 ounces for the main brushes, and 20-30 ounces for the third brush.

Generator Test Data

Amperes	Volts	R.P.M.
0 (Cuts in)	7-75	650
4-5		800
13-17 (Max.)		1600
9-12		2300

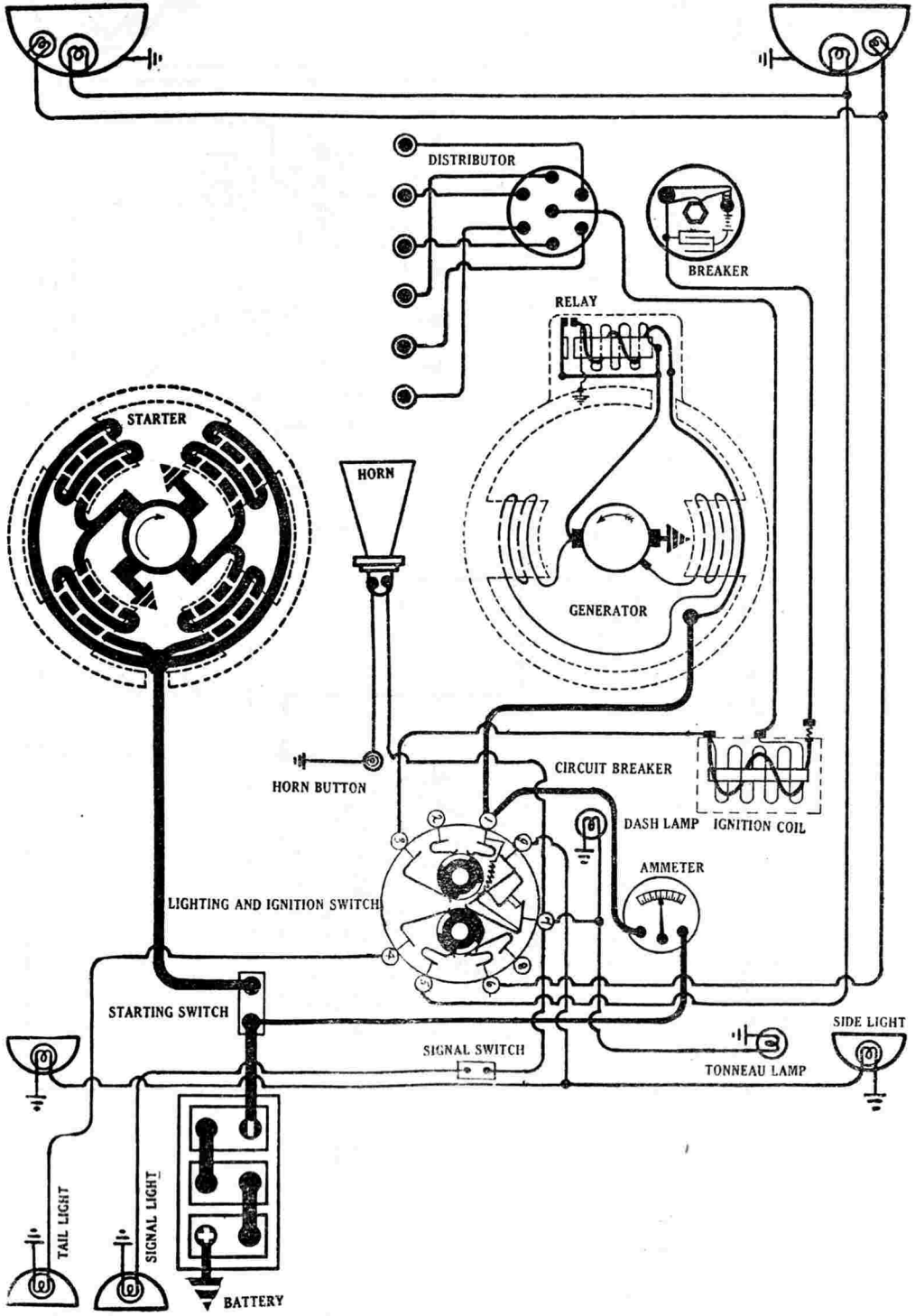
Generator motoring freely takes a current of 4 amperes, at 6 volts, at armature speed of 450 R.P.M. The field draws a current of 3 amperes, at 5 volts.

Oiling:—Put 8 or 10 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miels.

RELAY:—Relay closes at approximately 8-9 M.P.H. or 650 R.P.M. of armature, and opens at approximately 550-600 R.P.M. of armature or 6-8 M.P.H., with a current discharge of 0-3 amperes. The contact gap separates .046-.062 inch. The air gap between relay armature and coil core is .025-.035 inch, contacts fully closed.

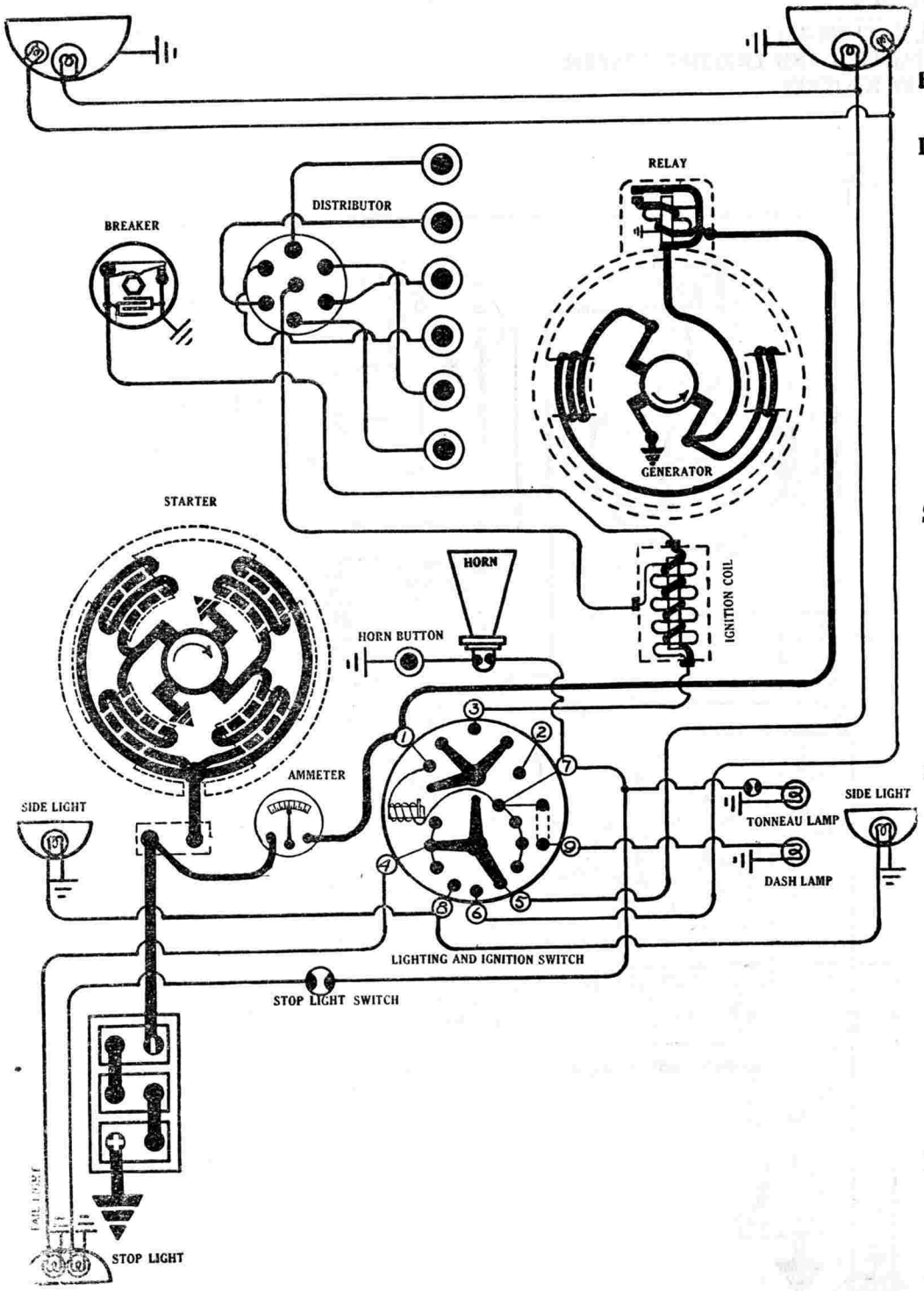
LIGHTING:—Delco Combination Switch No. 1196 is used. Head lights are each 6-8 volts, 21 cp. Dimmer lights are 6-8 volts, 4 cp. Side lights are each 6-8 volts, 2 cp. Signal light is 6-8 volts, 21 cp. Dash and tail lights are each 6-8 volts, 2 cp. Tonneau light is 6-8 volts, 4 cp.

CIRCUIT BREAKER:—A circuit breaker is used in place of fuses. Circuit breaker will operate with a current of 25-30 amperes, and will continue to operate with a current flow not exceeding 15 amperes.



CASE

MODEL X (1923-24-25) J.I.C (1925)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION



BATTERY:—Willard, Type SJRN-4; 6 volt, 127 ampere hour capacity. The starting capacity is 125 amperes for 20 minutes. The lighting capacity is 5 amperes for 22 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model No. 2178. Distributor Model No. 5256. Breaker contacts separate .020 inch. They are made of tungsten. If the condition of the contact point affects the ignition, remove and resurface on a medium hard oilstone or with a fine jeweler's file.

Oiling:—Put 8 or 10 drops of light engine oil into the distributor oiler every two weeks.. If the car is driven more than 500 miles in two weeks, this attention must be given every 500 miles. Every 1000 miles put a small amount of medium heavy cup grease on the surface of the breaker cam and polish the distributor head with a soft clean cloth.

Timing:—Breaker contacts just begin to separate when piston No. 1 is at top dead center on compression stroke, spark control lever and breaker assembly fully retarded. Locate the breaker cam carefully, so that when the backlash in the distributor gears is rocked forward the contacts will open, and when the backlash in the gears is rocked backward the contacts will just close. The distributor shaft rotates clockwise when viewed from the top.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

STARTER:—Model No. 181. The direction of rotation is clockwise, looking at the commutator end. The starter is connected to the engine through a Bendix drive. Starter cranks the engine at 110 R.P.M. taking 275 amperes at 4 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	6	36
27 lb. ft.	Lock	2.75	500

Starter brush tension should be 2¼ to 2¾ pounds each.

Oiling:—Put 8 or 10 drops of light engine oil into each starter oiler every two weeks. Saturate the wick oiler in the Bendix gear case with light engine oil once each year. Every six months remove the grease plug and repack the reduction gear case with medium heavy cup grease.

GENERATOR:—Model No. 258. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. To increase the charging rate, move the third brush in the direction of rotation (counter-clockwise) and move the same in the opposite direction (clockwise) to decrease the charging rate. The maximum charging rate is 15-17 amperes, reached at 1600-1800 R.P.M. of the armature or 22-27 miles per hour. The main brush tension should be 25-30 ounces and the third brush tension, 20-30 ounces.

Generator Test Data

Amperes	Volts	R.P.M.
0 (Cuts in)	7.75	650
4-5		800
13-17 (Max.)		1600
9-12		2300

Generator motoring freely takes a current of 4 amperes, at 6 volts, at armature speed of 450 R.P.M. The field draws a current of 3 amperes, at 5 volts.

Oiling:—Put 8 or 10 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every two weeks.

RELAY:—Relay closes at approximately 8-9 M.P.H. or 650 R.P.M. of armature, and opens at approximately 550-600 R.P.M. of armature or 6-8 M.P.H., with a current discharge of 0-3 amperes. The contact gap separates .046-.062 inch. The air gap between relay armature and coil core is .025-.035 inch, contacts fully closed.

LIGHTING:—Delco Combination Switch Model 1260. Head and stop lamps are 6-8 volt, 21 cp. S.C. Dash, tail and side lamps are 6-8 volt, 2 cp. S.C. Tonneau and dome lamps are 6-8 volt, 2 cp. D.C.

CIRCUIT BREAKER:—A circuit breaker is used in the place of fuses. Circuit breaker will operate with a current of 25-30 amperes, and will continue to operate with

CASE

MODEL J. I. C. (1926-27)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type SJRR-4, 6 volt, 105 ampere hour. Starting capacity is 115 amperes for 20 minutes. Lighting capacity is 5 amperes for 21 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model No. 2178. Distributor Model No. 5256. Breaker contacts separate .020 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone or with a fine jeweler's file. Automatic advance begins at 550 R.P.M. and reaches a maximum of 17-21° at 2000 R.P.M. Manual advance is 30°. The tension of the breaker arm spring should be 13-16 ounces.

Mounting.—Distributor is mounted at right of engine. To remove, disconnect manual advance rod and remove manual advance stop screw. Then remove distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil into the distributor oiler every two weeks. If the car is driven more than 500 miles in two weeks, this attention must be given every 500 miles. Every 1000 miles put a small amount of medium heavy cup grease on the surface of the breaker cam and polish the distributor head with a soft clean cloth.

Timing.—Breaker contacts just begin to separate when piston No. 1 is at top dead center on compression stroke, spark control lever and breaker assembly fully retarded. Locate the breaker cam carefully, so that when the backlash in the distributor gears is rocked forward the contacts will open, and when the backlash in the gears is rocked backward the contacts will just close. The distributor shaft rotates clockwise when viewed from the top.

Valve Timing:—INLET VALVES:—Head diameter, 1⅝ inches; stem diameter, .372 inch; stem length, 5⅝ inches from bottom of seat; tappet clearance, .004 inch cold; spring pressure, 55 pounds; valve lift, .3125 inch; intake opens 12° after top dead center and closes 40° after lower dead center.

EXHAUST VALVES:—Head diameter, 1⅝ inches; stem diameter, .372 inch; stem length, 5⅝ inches from bottom of seat; tappet clearance, .006 inch cold; spring pressure, 55 pounds; valve lift, .3125 inch; exhaust opens 40° before lower dead center and closes 8° after top dead center. The guide stems are removable. No oversize valve stems are made. A variance of .005 inch is allowed in stem diameter.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plugs: — Spark plug diameters are ⅞ inch. Gaps are .025 inch.

STARTER:—Model No. 181. The direction of rotation is clockwise, looking at the commutator end. The starter is connected to the engine through a Bendix drive Starter cranks the engine at 110 R.P.M. taking 275 amperes at 4 volts.

Starter Data

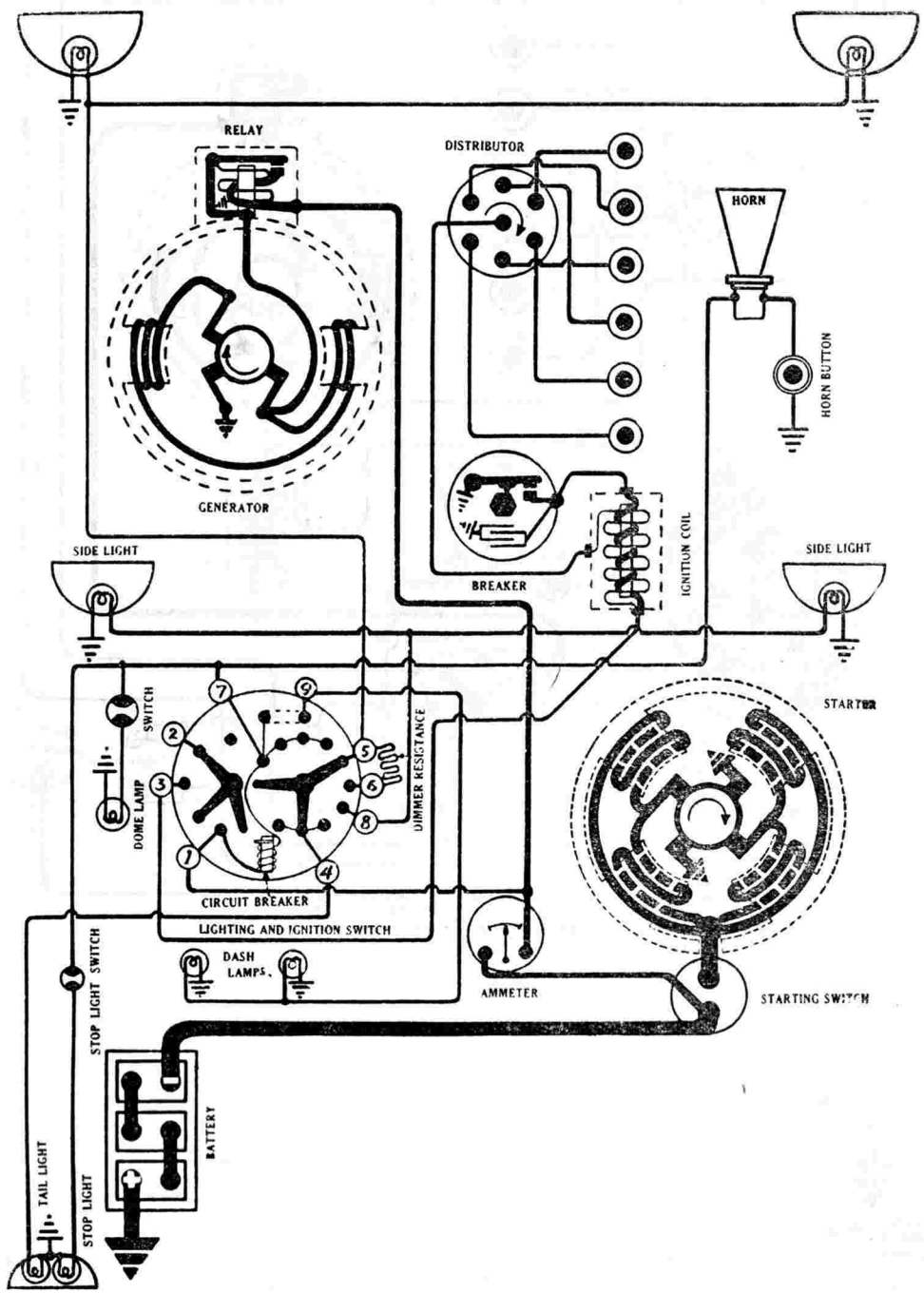
Torque.	R.P.M.	Volts.	Amperes.
0 lb. ft.	4000	6	36
27 lb. ft.	Lock.	2.75	500

Starter brush tension should be 2¼ to 2¾ pounds each.

Mounting.—Starter is mounted at right of engine by a sleeve mounting. To remove starter, remove large pilot mounting screw and slide starter to rear and out.

Oiling.—Put 8 or 10 drops of light engine oil into each starter oiler every two weeks. Saturate the wick oiler in the Bendix gear case with light engine oil once each year. Every six months remove the grease plug and repack the reduction gear case with medium heavy cup grease.

GENERATOR.—Model No. 258. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. To increase the charging rate, move the third brush in the direction of rotation (counter-clockwise) and move the same in the opposite direction (clockwise) to decrease the charging rate. The maximum charging rate is 15-17 amperes, reached at 1600-1800 R.P.M. of the armature or 22-27 miles per hour. The main brush tension should be 25-30 ounces and the third brush tension, 20-30 ounces.



CASE

MODEL J. I. C. (1926-27)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

Generator Test Data

Amperes	Volts	R.P.M.
0 (Cuts in)	7-7.5	650
4.5		800
13-17 (Max.)		1600
9-12		2300

Generator motoring freely takes a current of 4 amperes, at 6 volts, at armature speed of 450 R.P.M. The field draws a current of 3 amperes, at 5 volts.

Mounting.—Generator is mounted at right of engine. To remove, disconnect generator drive coupling and remove four hold down screws. Then lift unit from place.

Oiling.—Put 8 or 10 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Relay closes at approximately 8-9 M.P.H. or 650 R.P.M. of armature, and opens at approximately 550-600 R.P.M. of armature or 6-8 M.P.H., with a current discharge of 0-3 amperes. The contact gap separates .046-.062 inch. The air gap between relay armature and coil core is .025-035 inch, contacts fully closed.

LIGHTING:—Delco Combination Switch Model 1260. Head and stop lamps are 6-8 volt, 21 cp. S.C. Dash, tail and side lamps are 6-8 volt, 2 cp. S.C. Tonneau and dome lamps are 6-8 volt, 2 cp. D.C.

CIRCUIT BREAKER.—A circuit breaker is used in the place of fuses. Circuit breaker will operate with a current of 25-30 amperes, and will continue to operate with a current flow not exceeding 15 amperes.

CASE

MODEL Y (1925-26-27)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY.—Willard, Type SJRR-5. 6 volt, 135 ampere hour. Starting capacity is 145 amperes for 20 minutes. Lighting capacity is 5 amperes for 26 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model 2178. Distributor Model 5251. Breaker contacts separate .020-.025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file or on a medium hard oilstone. Manual advance is 38°. Automatic advance begins at 450 R.P.M. and reaches a maximum of 24-28° at 2000 R.P.M. The tension of the breaker arm spring should be 16-20 ounces.

Mounting.—Distributor is mounted at left of engine. To remove, disconnect manual advance rod and remove manual advance stop screw. Then lift unit from place.

Oiling.—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles. Wipe out the distributor head with a small quantity of grease, removing all excess, and put a small bit of grease on the face of the breaker cam every month or each 1000 miles.

Timing.—Breaker cams begin to separate when piston entering power stroke reaches top dead center with the manual spark control lever and breaker assembly in the fully retarded position. To set timing, loosen the screw in the center of the breaker cam and turn the cam until the contacts begin to separate. Then tighten the screw. Make certain that the rotor is under the segment connected to the cylinder entering power stroke.

Valve Timing:—INLET VALVES:—Head diameter, 1 15/16 inches; stem diameter, .372 inch; stem length, 6½ inches from bottom of seat; tappet clearance, .004 inch cold; spring pressure, 77 pounds; valve lift, .3125 inch; intake opens 12° after top dead center and closes 40° after lower dead center.

EXHAUST VAVLES:—Head diameter, 1 15/16 inches; stem diameter, .372 inch; stem length, 6½ inches from bottom of seat; tappet clearance, .006 inch cold; spring pressure, 77 pounds; valve lift, .3125 inch; exhaust opens 40° before lower dead center and closes 8° after top dead center. · The guide stems are removable. No oversize valve stems are made. A variance of .005 inch is allowed in stem diameter.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

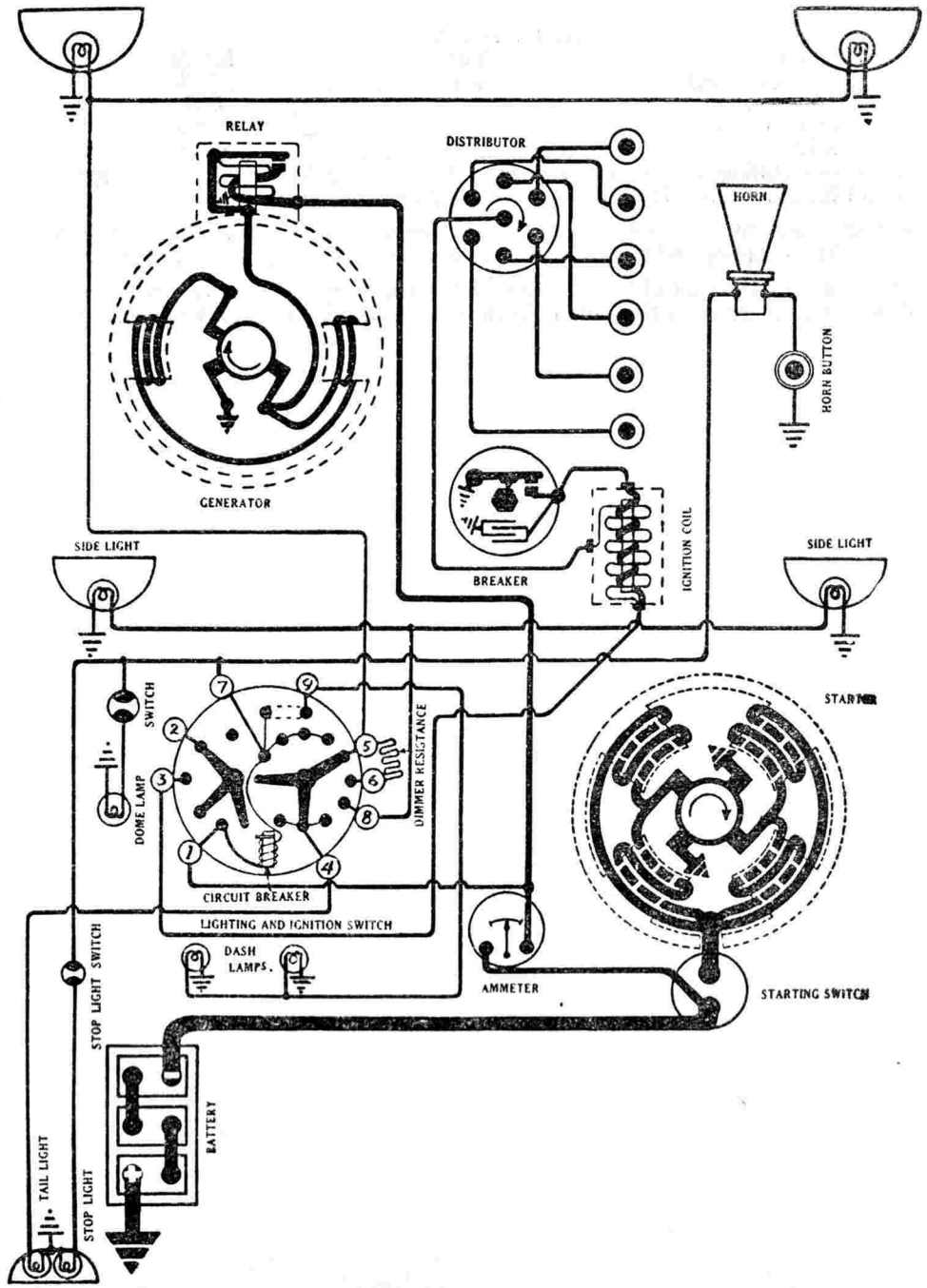
STARTER.—Model 208. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, looking at the commutator end. Starter cranks the engine at 110 R.P.M. taking a current of 300 amperes. Starter brush tension is 2¼-2¾ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	36
27 lb. ft.	Lock	2.75	—

Mounting.—Starter is sleeve mounted at right of engine. To remove starter, remove large pilot mounting screw and slide starter forward. Then lift from place.

Oiling.—Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles. Saturate the wick in the oiler at the end of the starter gear case every year. Remove the grease plug and repack the reduction gear case with medium heavy cup grease every six months.



CASE

MODEL Y (1925-26-27)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

GENERATOR.—Model 256. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the generator output, loosen the generator cover band and shift the third brush mounting plate by means of the handle attached. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. The mounting plate is held in any desired position by friction clamp washers.

Generator Data

Amperes	R.P.M.
5	700
17	1800

The generator brush spring tension should be 1¼-1¾ pounds each.

Mounting.—Generator is mounted at left of engine. To remove generator, remove four hold down screws and lift unit from place.

Oiling.—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY.—Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 6.75-7.5 volts and opens with a discharge current of 0-3 amperes. Contacts separate .025-.035 inch. Air gap between relay armature and coil core is .015-.020 inch, contacts closed.

LIGHTING.—Switch Model 1257. Head and stop lamps are each 6-8 volt, 21 cp. S.C. Dome and pillar lamps are 6-8 volt, 4 cp. D.C. Dash, tail and tonneau lamps are 6-8 volt, 2 cp. S.C.

CIRCUIT BREAKER.—A vibrating circuit breaker is mounted on the back of the switch. A current of 25-30 amperes causes this device to vibrate. While operating the current is 10-15 amperes.

Chalmers

Models 24 (1914) 26 ; 29 (1915)
Entz Starting and Lighting System
Bosch or Atwater-Kent Ignition

Battery.—Battery is 18 volt, 50 ampere-hour. The two wire system is used.

Ignition.—Ignition operates at 6 volts pressure. In connecting battery see that no greater pressure is applied to the ignition circuit. On cars using the Atwater-Kent ignition system, contacts should separate .010 inch to .012 inch.

Care.—Contacts are made of tungsten metal. Clean them with gasoline when necessary. They will operate properly even though quite rough. They should be dark gray in color. Should contacts become excessively burned or corroded, the scale may be removed by drawing the contacts across a piece of fine emery cloth laid on a flat surface as on the bed of a drill press Finish the contacts on an oil stone.

Timing.—Spark should occur when the top dead center mark on the flywheel is 1½ inches past the indicator, when Atwater-Kent ignition is used, and when the dead center mark is at the indicator, on cars using magneto ignition, spark control lever and breaker assembly being in fully retarded position in each case.

Firing Order.—The firing order is 1, 4, 2, 6, 3. 5. Use pure vaseline in the cup under the breaker head.

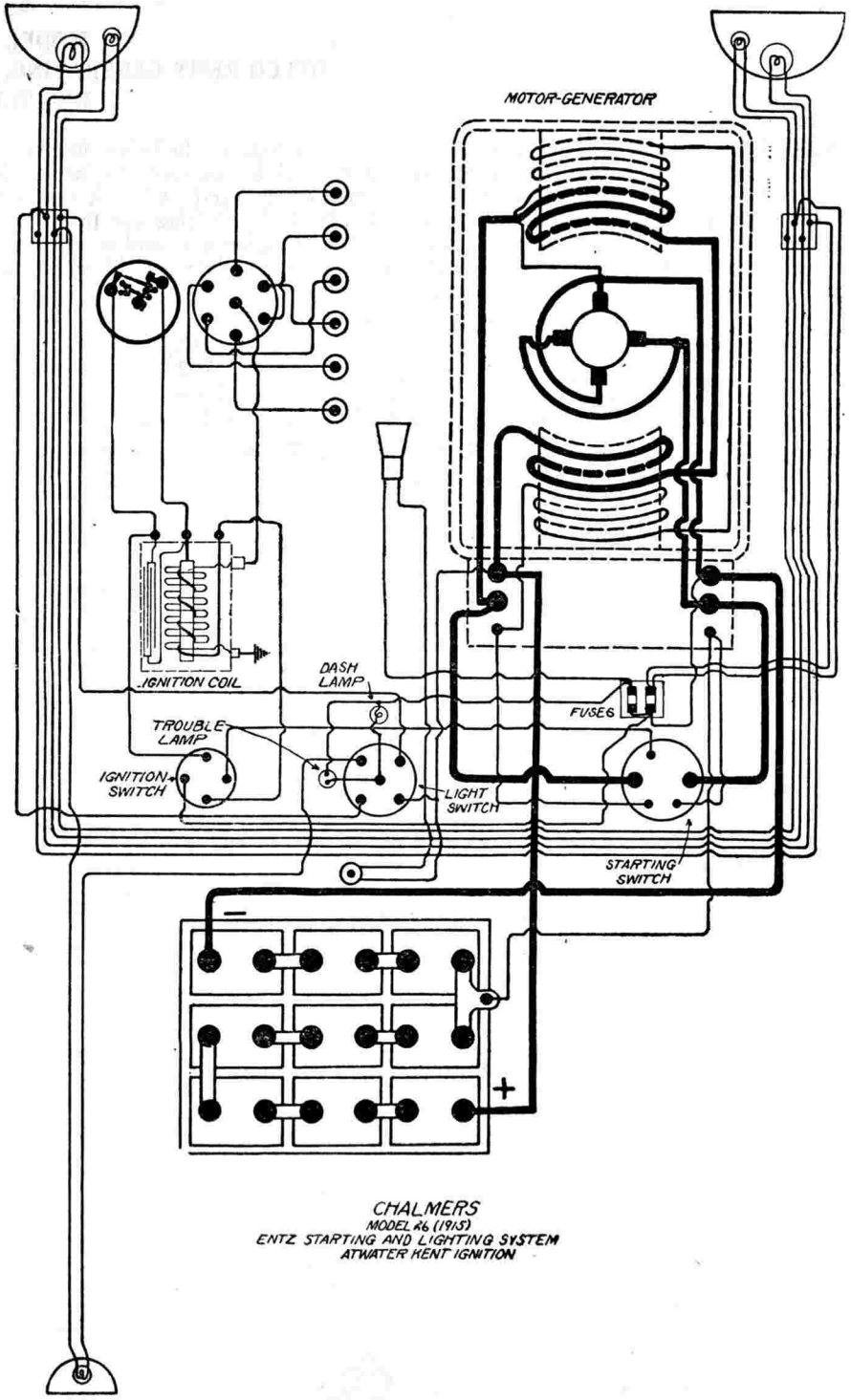
Starter.—The motor-generator is direct chain connected to the crankshaft. As there is no relay the system possesses what is known as the non-stalling feature, that is, the battery is always connected to the motor-generator when the switch is in the "On" position so will turn the armature as a motor, immediately starting the motor should it be stopped, or helping to propel the car when it is being driven at speeds below 6 miles per hour. This non-stalling feature is cut out when the switch is in the middle position, the motor-generator being entirely disconnected from the battery and the shunt field circuit broken.

Generator.—Generator voltage regulation is by reverse series field. The series and shunt fields work together when the unit is operating as a motor. This is what is known as a cumulative-compound winding. The unit should run at 100 R. P. M., as a motor.

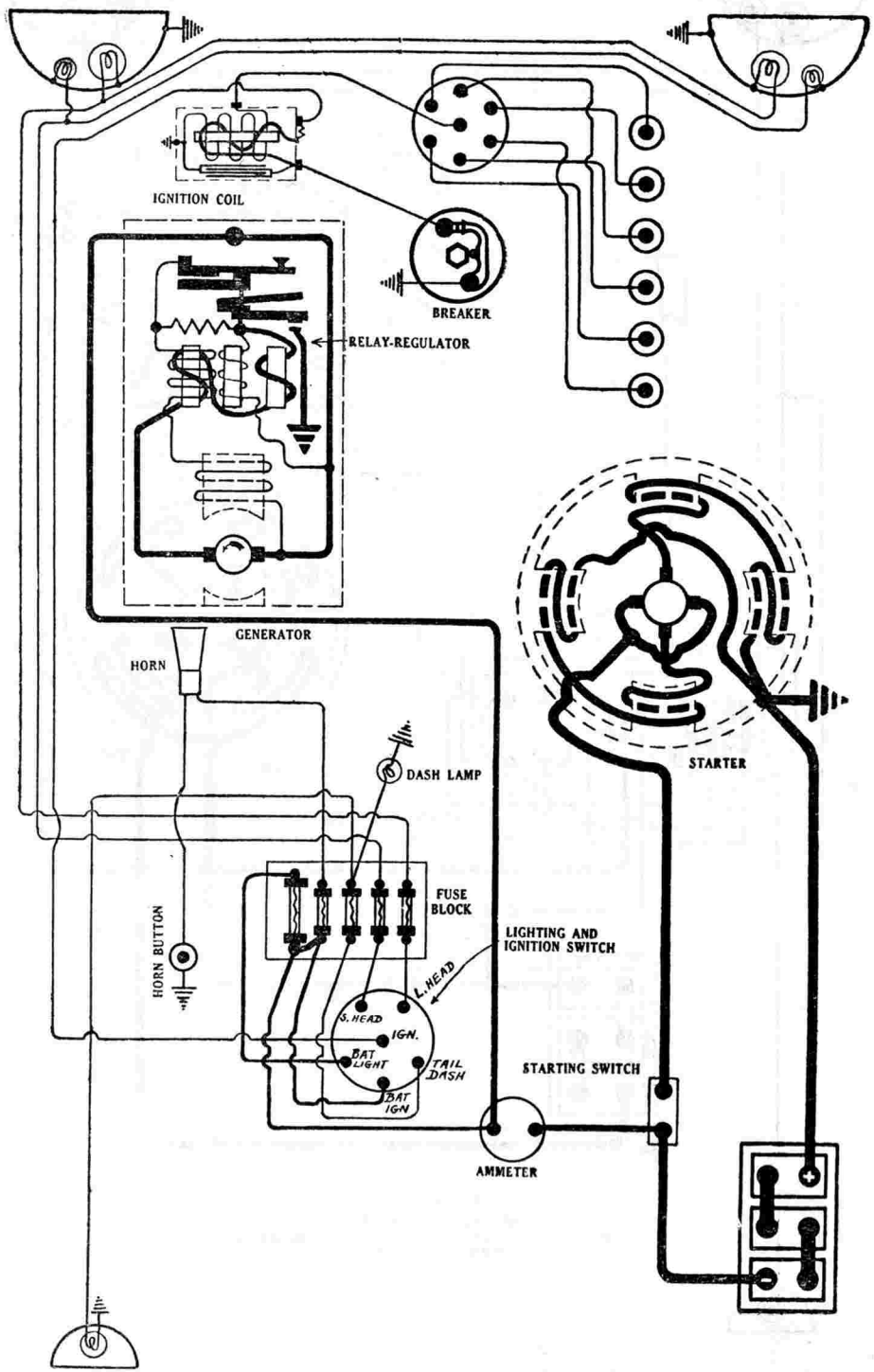
Charging Rate.—Generator should begin to charge the battery at a high gear car speed of 6-8 miles per hour or 600 R. P. M., of the generator. If it is desired to stop charging the battery or to cut out the non-stalling feature, place the switch in the middle position.

Lamps.—On the Models 29 and 26 B, head lamps are 21 volts, 18-21 cp. Tail lamp is 21 volts, 2 cp. On the Model 24 cars, head lamps are 6-8 volts, 24 cp. Dimmer lamps are 6-8 volts, 4 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp. All other lamps are 6-8 volts, 4 cp.

Fuse.—Five ampere fuses are used in the light and horn circuits on all models.



CHALMERS
MODEL 26 (1915)
ENTZ STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION



CHALMERS

MODELS 35A AND 35B (1916-17). SERIAL NOS. 55,700 TO 82,000
MODEL 35C (1916-17). SERIAL NOS. 90,000 TO 94,000
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .015 to .020 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the grease cup under the breaker head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the flywheel marking "U.C. 1 & 6" is at the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Frame No. 700. Starter is connected to the engine through a Bendix drive. Running freely, starter takes 40 amperes at 5.5 vots, armature revolving 3500-5000 R.P.M. Torque at 1250 R.P.M. is 2.5 pound-feet, current being 130 amperes at 5.5 volts. Lock torque is 12.5 pound-feet, current being 400 amperes at 4 volts. Pressure of brushes on the commutator is ¾ to 1¼ pounds.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR:—Frame 208R, 209R. Generator voltage control is by vibrating regulator. Maximum output is 15 amperes at 6.8 volts, reached at 1800 R.P.M. of the armature or 25 miles per hour. The direction of rotation is counter-clockwise, looking at the commutator end.

Amperes	Generator Data	R.P.M.
0		700
8		1000
15		1800

Shunt field winding takes 1.5 to 2 amperes at 6 to 6.3 volts. Running freely as a motor, generator takes 3 amperes at 6 to 6.3 volts.

OILING.—Put 5 or 6 drops of light engine oil in the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY-REGULATOR.—Relay-regulator is mounted in the generator frame. Relay closes at 700-750 R.P.M. of the armature or 8-9 miles per hour and opens at 650-700 R.P.M. of the armature or 6-7 miles per hour. To adjust relay, regulate the spring tension until the contacts close when the voltage of the generator reaches 6.5 to 7 volts, battery disconnected. Then regulate the air gap between the armature and coil core until the relay opens with a discharge current from the battery of 1 to 3 amperes. Adjust the regulator to limit the voltage to 7.5 at 1000 R.P.M. with an 8 ampere resistance load. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface the tungsten contact on an oil stone and the silver contact with a scraper. The surfaces must be parallel. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp. There is a switch at the tail lamp to provide means of controlling the lamp from the rear of the car, in States where this is required.

FUSES.—Large fuse is 30 ampere. Small fuse is 15 ampere.

CHALMERS

MODEL 35B (1916-17). SERIAL NOS. 82,001-90,000
MODELS 35C AND 35D (1918-19). SERIAL NOS. 94,001-111,025
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded at the starting motor.

IGNITION.—Breaker contacts separate .015 to .018 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or well worn No. 00 sandpaper.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when mark "1 and 6 DC" on flywheel is 1 5/16 inches past indicator, spark control lever and breaker assembly in the fully retarded position. There is a countersunk hole in the rim of the flywheel to aid finding the dead center mark. On early cars this mark is at dead center line, but on later cars it is 1 5/16 inches past dead center, or at the firing point.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .022 to .025 inch.

STARTER.—Frame No. 710. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 125 R.P.M., taking 275 amperes.

Starter Data

Torque	R.P.M.	Amperes
0 lb. ft.	4000	40
4 lb. ft.	1000	180
8 lb. ft.	700	280
14 lb. ft.	Lock	450

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month

GENERATOR.—Frame No. 760. Generator current regulation is by the third brush system. Maximum current output is 15-17 amperes, reached at 1250 R.P.M. of the armature or 16-20 miles per hour.

Generator Data

Amperes	Cold Test	R.P.M.	Amperes	Hot Test	R.P.M.
0		450	0		500
8		675	6		725
12		840	9		850
15-17		1250	12-14		1250
10		2000	7- 8		2000

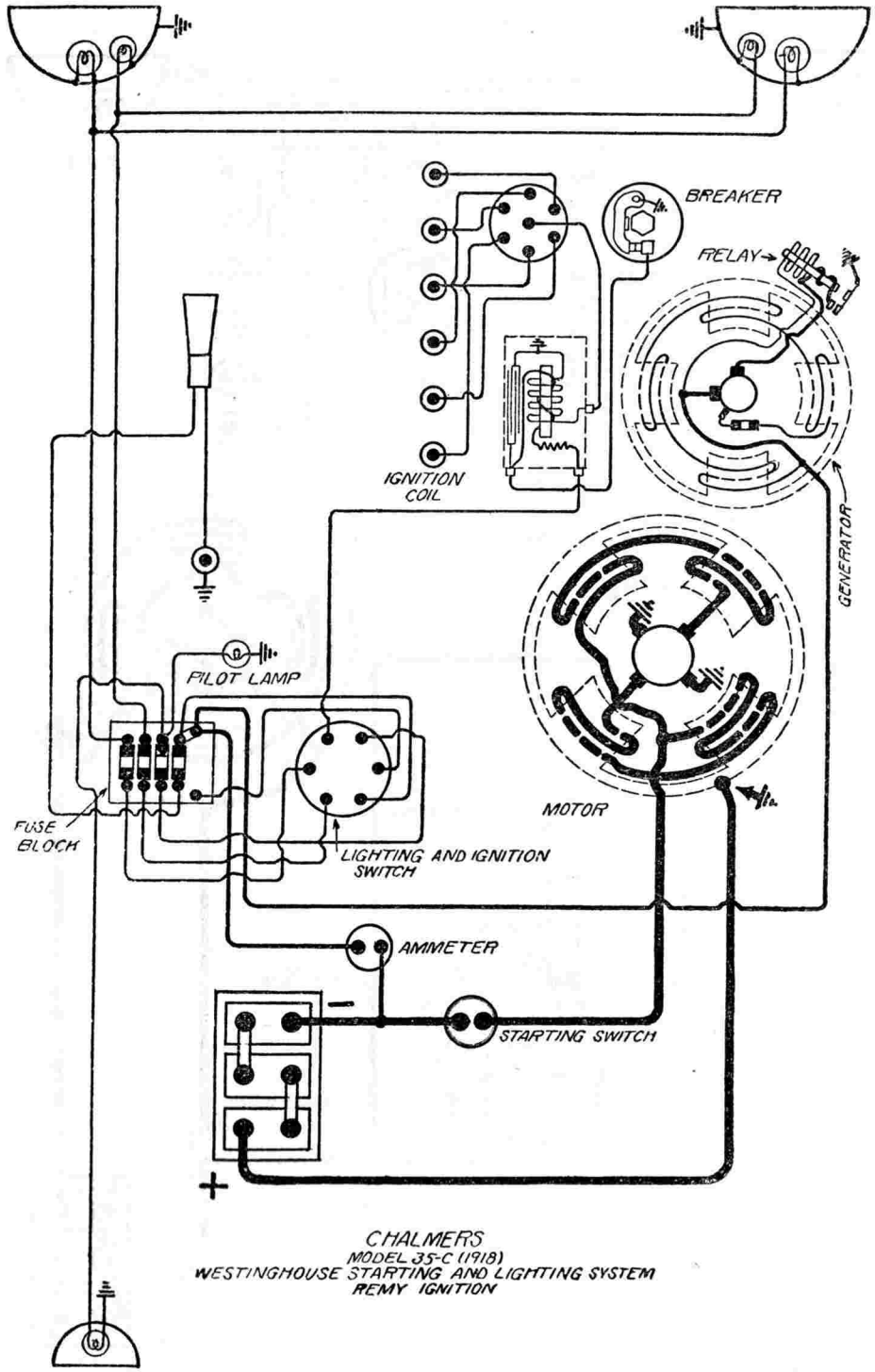
The cold test readings are obtained with a generator temperature under 95°F. The hot test readings are obtained after the generator has been operated one hour at 1800 R.P.M., charging a half-charged battery. Shunt field current is 2.8 to 3.25 amperes when 6 volts pressure is applied to its terminals. When the generator is operating freely as a motor, current is 3.5 to 5 amperes at 6 to 6.6 volts.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

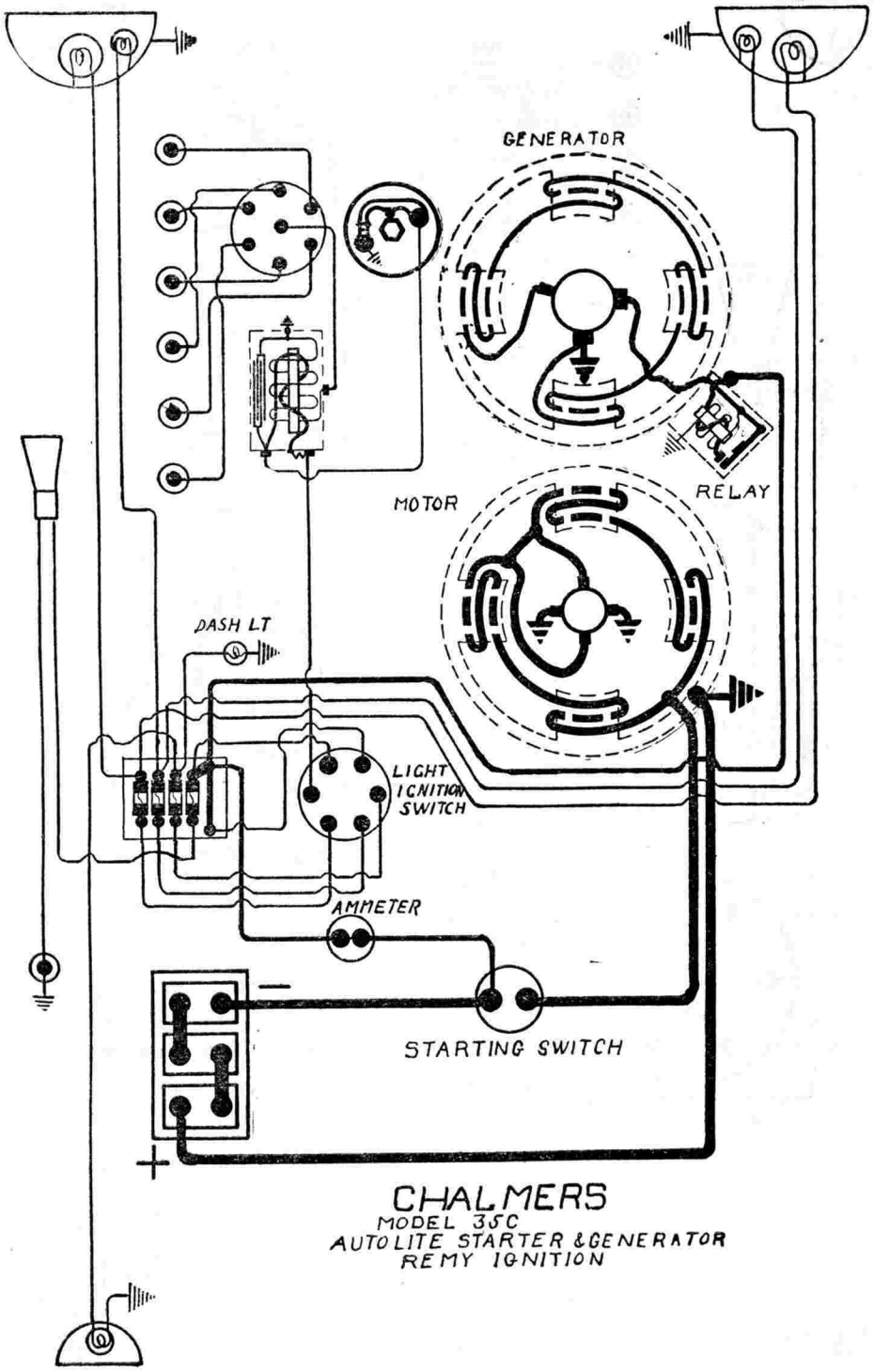
RELAY.—Relay is mounted in the generator frame. Relay closes at 500-550 R.P.M. of the armature or 8-10 miles per hour and opens at 450-500 R.P.M. of the armature or 6-8 miles perhour. Adjust the spring tension on the relay armature so that the contacts open with a discharge current of 0-3 amperes. Adjust the air gap between the relay armature and coil core so that the contacts close when the voltage of the generator reaches 6.2 to 6.5 volts. Air gap between relay armature and coil core is .005 inch, contacts closed. Contacts separate .030 to .035 inch. Resistance of the shunt coil is 68 ohms. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit.Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamp is 6-8 volt, 2 cp.

FUSES.—Large fuse is 30 ampere. Small fuses are 15 ampere.



CHALMERS
MODEL 35-C (1918)
WESTINGHOUSE STARTING AND LIGHTING SYSTEM
REMY IGNITION



CHALMERS

MODEL 35-C (1920-21)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Prest-O-Lite, Type 613-RHN, 6 volt, 80 ampere-hour. The positive (+)

IGNITNON.—Breaker contacts separate .015 to .018 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or well worn No. 00 sandpaper.

OILING.—Refill the grease cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is $1^{5}/_{16}$ inches past the indicator on the 1920 cars and $1^{21}/_{32}$ inches past the indicator on the 1921 cars, with the spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model MH-1003. Starter is connected to the engine through a Bendix drive. Lock torque is 17.5 pound-feet, current being 600 amperes at 5 volts. Starter cranks the engine at 150 R.P.M., taking 275 amperes.

OILING.—Put 4 or 5 drops of light engine oil in each of the starter oilers every month.

GENERATOR:—Models GJ-1057 & 1060. Generator current regulation is by the third brush system. Maximum current output is 12-16 amperes, reached at 1700 R.P.M. or 22 miles per hour.

Generator Data

Cold Test Amperes	R.P.M.	Hot Test Amperes	R.P.M.
0	500	0	580
8	750	6	840
12	960	9	1050
16	1400	12	1360
16.5	1700	12.7	1700
12	3400	10	3400

Above readings are obtained with a battery solution of 1.300.

OILING.—Put 4 or 5 drops of light engine oil in the rear generator bearing oiler every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 7-9 miles per hour or 460-510 R.P.M. of the armature and opens at 5-7 miles per hour or 410-460 R.P.M. of the armature. Charging current is .5 to 1.5 amperes at closing and the discharge current 0-1 ampere at the opening of relay contacts. Contacts separate .030 to .045 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and lamps are 6-8 volt, 2 cp.

CHALMERS

MODELS 35-B AND 35-C (1922-23)

35-B, SERIAL NOS. 21001 AND UP,35 -C, SERIAL NOS. 125501 AND UP

AUTO-LITE GENERATING, STARTING, AND LIGHTING SYSTEM

AUTO-LITE IGNITION.

BATTERY.—U. S. L. Type 3-CVX-6X. 6 volts, 106 ampere-hour capacity. The starting capacity is 115.5 amperes for 20 minutes. The lighting capacity is 5 amperes for 21.5 hours. The negative (—) terminal is grounded.

IGNITION.—Type IG. Coil IG. 4031. Breaker contacts separates .015-.020 inch. They are made of tungsten. If the condition of the contact points affects the ignition remove and resurface on a medium hard oilstone.

Oiling.—Fill distributor oiler with light engine oil once a week. If the car is driven more than 250 miles in a week, this care must be given every 250 miles.

Timing.—Breaker contacts begin to separate when No. 1 piston on compression stroke is 1 21/32 inch past top dead center, measured on flywheel, with marking "1:6 D. C." past the indictaor, spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plugs.—The spark plug gaps are .025-.030 inch.

STARTER.—Model MN. The direction of rotation is counter-clockwise, looking at commutator end. The starter is connected to the engine by a Bendix drive. Starter cranks the engine at 400 R.P.M. taking a current of 200 amperes at 5 volts.

Starter Test Data.

Torque	Amperes	Volts	R.P.M.
0	60	5.5	4000
18 lb.-ft.	600	4	0 (Lock)

Oiling.—Fill starter oilers with light engine oil every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

GENERATOR.—Model GJ. The direction of rotation is counter-clockwise, looking at commutator end. The third brush is used for current regulation. To increase the charging rate loosen the nut inside of the generator holding the third brush and move the brush in the direction of rotation (counter-clockwise) and to decrease the charging rate, move the third brush in a clockwise direction. The generator motoring freely takes a current of 6 amperes at 6.3 volts. The shunt field current is 2 amperes at 6.3 volts. The maximum charging rate is 16 amperes, reached at 1500 R.P.M. of armature.

Generator Test Data

Cold Test

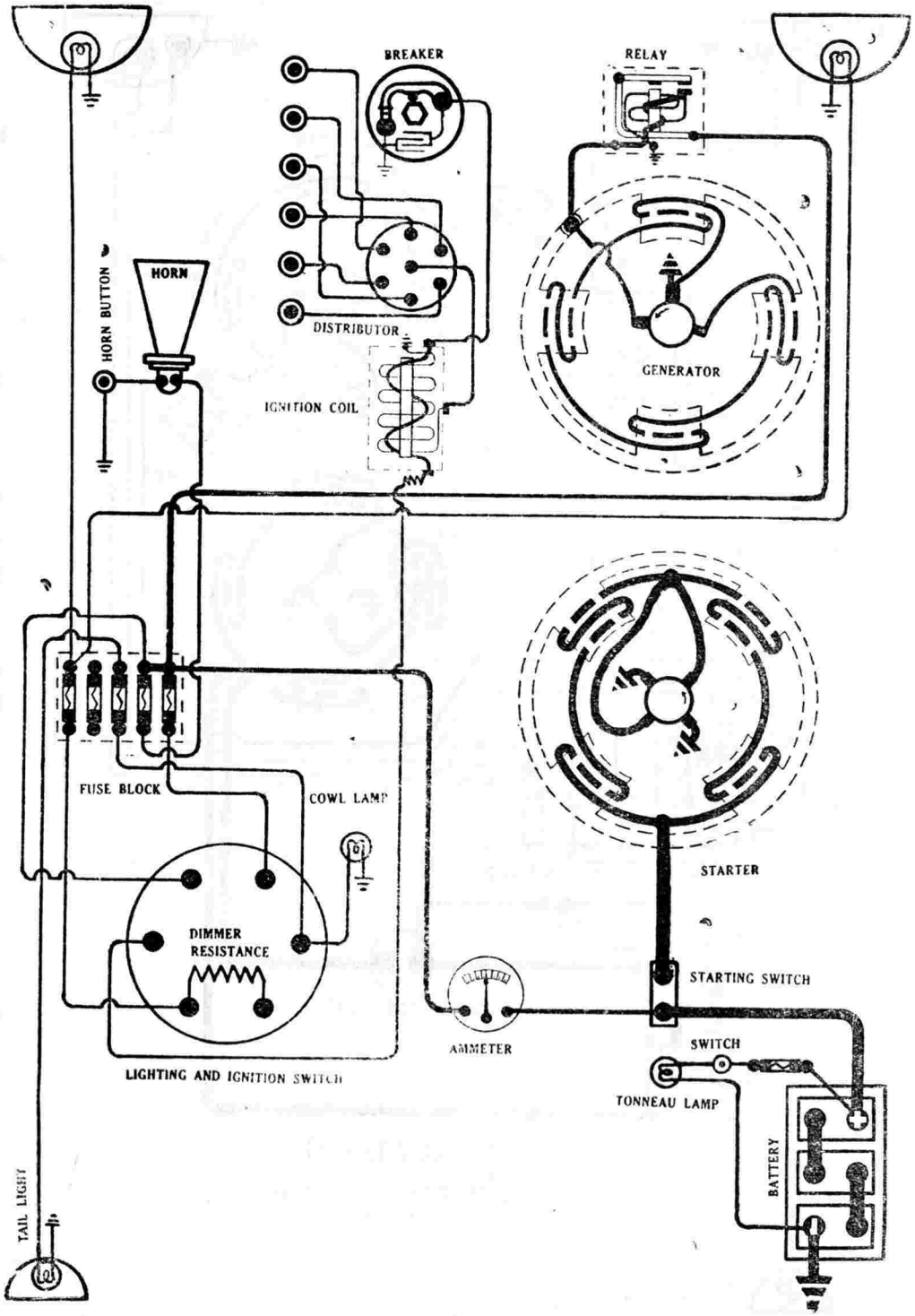
Amperes	R.P.M.	Volts
1	600	6.5
8	800	7.6
16 Max.	1500	8.3
10	4500	8.1

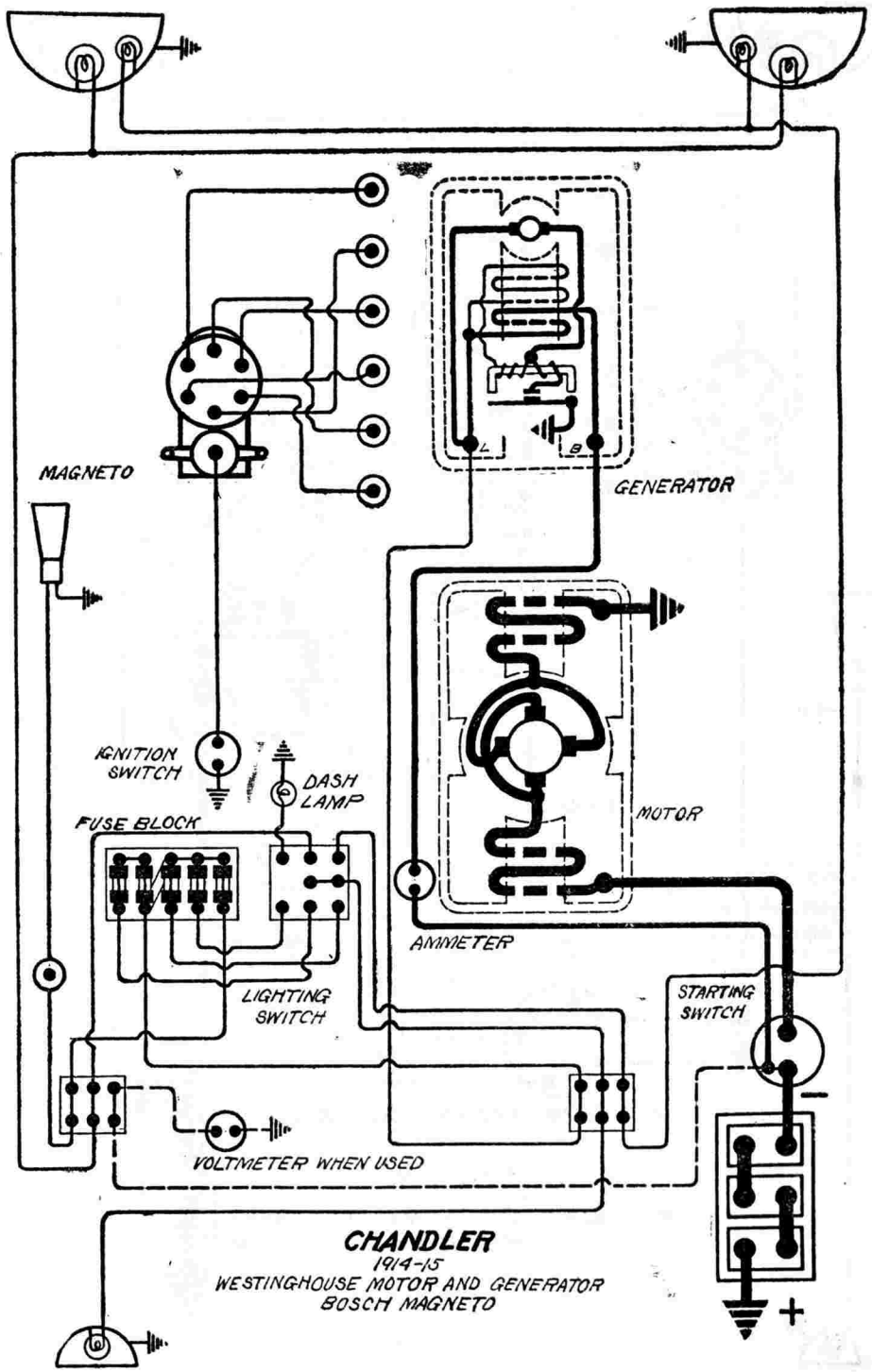
Oiling.—Fill generator oilers with light engine oil every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Relay closes at 550 R.P.M. of armature, or 7-9 M.P.H. at 6-8 volts and opens at 500 R.P.M. of armature or 5-7 M.P.H. with a current of 1 ampere discharge. The contact gap is .025-.035 inch and the air gap between relay armature and coil core is .010-.015 inch.

LIGHTING.—Briggs & Stratton combination switch is used. Head lights are 6-8 volts, 21 cp. S. C. Dimmer, dash and tail lights are each 6-8 volts, 2 cp. S. C.

FUSES.—The main fuse is 20 amperes, and the auxilliary fuses are 10 amperes.





Chandler

1914-15

Westinghouse Starting and Lighting System
Bosch Magneto Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Magneto breaker contacts should open .015 inch to .017 inch. Should contacts become badly burned or pitted, resurface them with a fine, flat jeweler's file or a strip of worn No. 00 sand paper.

Timing.—Breaker contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position. The trailing edge of the armature should be ¾ inch past the edge of the pole piece it has just passed when the contacts begin to separate, breaker fully retarded.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gap should be about .027 inch.

Oiling.—Put 3 or 4 drops of light machine oil in each of the magneto oilers every month and a very small amount of vaseline on the fiber bumper of the contact arm. If car is driven more than a thousand miles in a month, the oiling must be done every 1000 miles.

Starter.—Starter is connected to the engine through a set of reduction gears shifted by the operator. Depressing the starting pedal meshes the idler gears with the flywheel gear and motor pinion and completes the starting circuit. There is an overrunning clutch in the large idler gear, to prevent the engine driving the starting motor. The oil in the clutch case provides ample lubrication for these gears. Starter should crank the engine at about 200 R. P. M.

Oiling.—Put several drops of light engine oil in each of the motor bearing oilers every month.

Generator.—Generator current regulation is by reverse series field. The frame of the generator acts as the positive (+) terminal. The two terminals on the generator head are both negative (—). The one marked "L" is connected to the lighting switch. Current flowing past this terminal does not flow through the series field so does not have any material effect on the generator voltage. The terminal marked "B" is connected to the negative (—) terminal of the battery. Current flowing past this terminal must flow through the series winding, hence it tends to reduce the generator voltage. If the wire leading from terminal "B" is disconnected, the wire leading from terminal "L" should also be removed, as otherwise the lights may burn out if generator is run. If it is necessary to run generator with battery disconnected or other high resistance in the charging circuit, ground terminal "B." When this is done terminal "L" may be connected, as the voltage will not rise above safe limits.

Relay.—Relay should close at 5 to 7 miles per hour.

Charging Rate.—The maximum charging rate should be about 12 amperes, reached at 20-25 miles per hour.

Oiling.—Put several drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dimmer lamp is 6-8 volts, 4 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.

Fuses.—Large fuses are 30 ampere Small fuses are 3 ampere.

Chandler

1915-16

Gray and Davis Starting and Lighting System. Bosch Ignition

Bat ery—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts shonld open .015 inch to .017 inch.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position. When contacts begin to separate, the trailing edge of the armature should be ¾ inch from the edge of the pole piece which it has just passed, breaker assembly fully retarded.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gap.—The spark plug gap should be .027 inch tc .031 inch.

Care.—Every month, put 3 or 4 drops of light machine oil in each of the magneto oilers. If the car is driven more than 1000 miles in a month, the oiling should be done every 1000 miles.

Starter.—Starter is connected to the engine through a set of gears. Depressing the starting pedal moves the pinion along the keyed shaft until it reaches the flywheel gear. If the gears are in the proper position, they are meshed at once. If they are not, the spring on the shifting rod is compressed as the lever is moved further. As soon as the switch is closed, the motor armature begins to turn and the compressed spring forces the pinion into mesh with the flywheel gear. Starter should crank the engine at about 200 R. P. M. When running free starter should take about 35 amperes. It should run at 3500 R. P. M., with a terminal voltage of 3 volts and at 6600 R. P. M., with a terminal voltage of 5.5 volts; the voltage reading being taken when the motor is in operarion in each case. The motor should deliver 1½ lbs. torque on the rim of a 6 inch pulley, when running at 2400 R. P. M. It should take about 137 amperes when so running. The brush pressure on the commutator should be at least 3½ lbs.

Oiling.—Put several drops of light engine oil in each of the motor oilers every month.

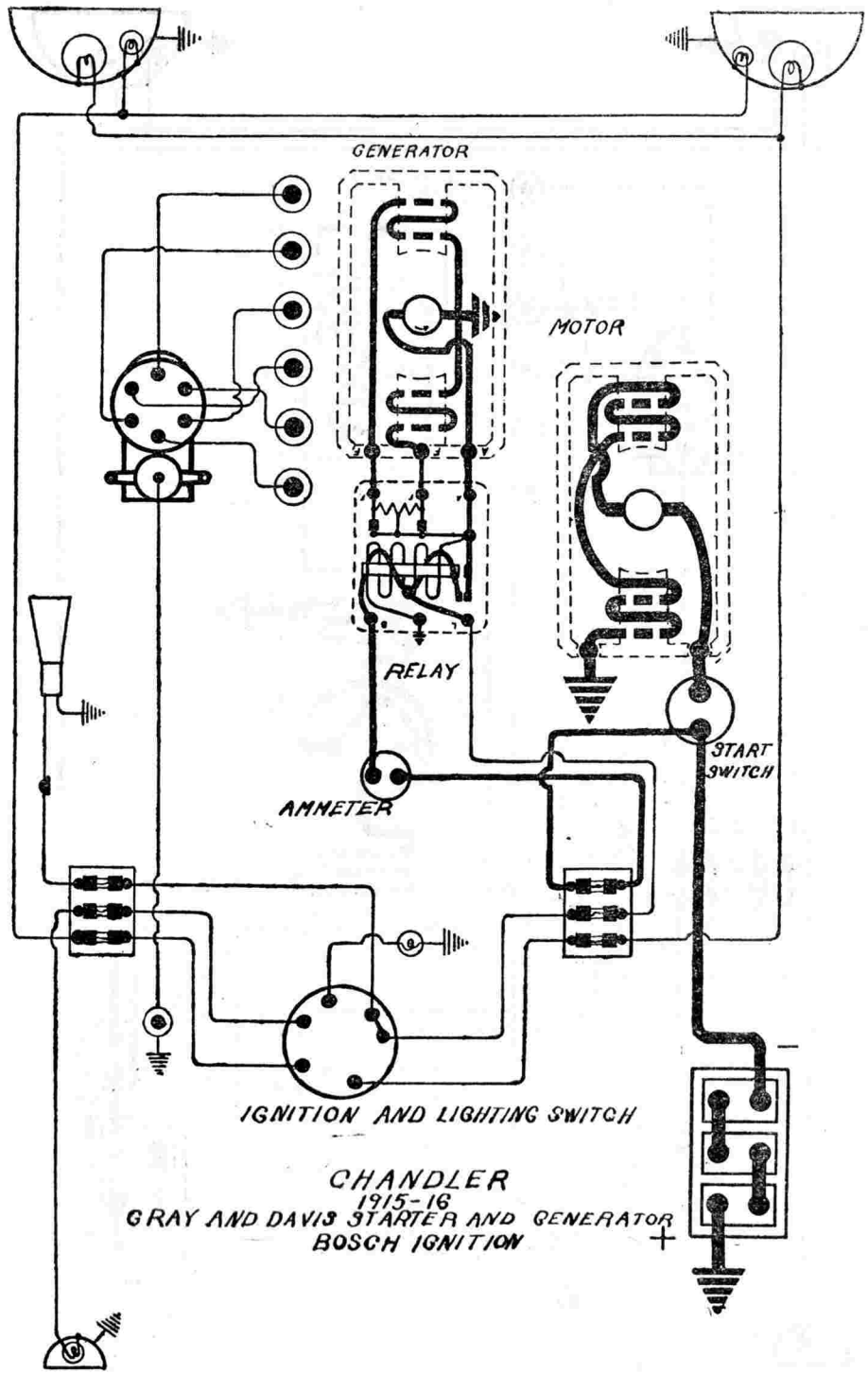
Generator.—Generator voltage regulation is by a vibrating regulator. Relay is combined with regulator. Relay should close at about 5 miles per hour.

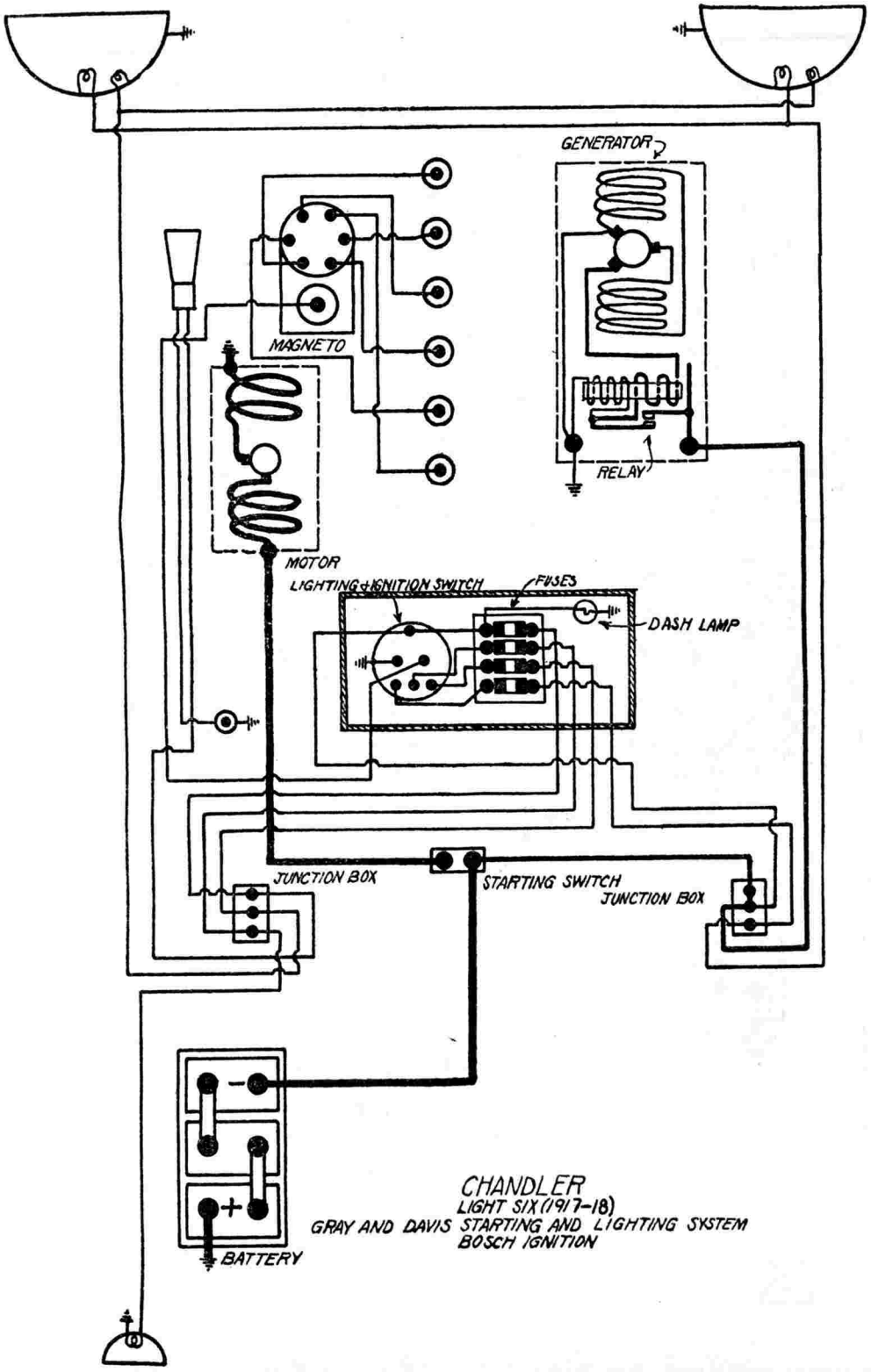
Charging Rate.—The normal charging rate should be about 9 amperes at 15 miles per hour. This rate increases to a maximum of about 12 amperes at 25 miles per hour.

Trouble Shooting.—To test generator, connect together the two terminals of the generator which lead to the field coils and connect them to one terminal of a 6 volt battery. Then connect the other terminal of the generator to the other battery terminal. The generator should then run as a motor, at 320 R. P. M., and take 3 amperes. A variation of 10% above or below these readings is allowable but never more. If the readings do not fall within these limits, remove the regulator and repeat the test. Low speed, excessive current, or a vibrating of the ammeter needle indicates a grounded or short circuited armature. If speed is high and current is high but steady, the field coils are partially shorted or grounded, or connections are poor. To test the generator, connect together the two field terminals which lead to the regulator, and drive the generator at 750 R. P. M. It should deliver 10 amperes. Less current at this speed indicates short circuited field coils, defective brushes or brush connections, dirty commutator, partly grounded or short circuited armature, defective connections between the commutator bars and the armature windings, or the pole pieces are loose in the frame. To test the field windings connect one terminal of a 6 volt battery to the generator frame and the other battery terminal to first one and then the other field leads on top of the generator. The ammeter should indicate not less than 1.09 amperes or more than 1.32 amperes. More current indicates short circuited or grounded windings. Less current indicates defective connections or brush contact. With a 7½ ampere lamp load, the generator should charge the battery at 1 to 4.5 amperes, generator being driven at low speed, and at 8.5 to 11 amperes, generator running at 1750 R. P. M. or over.

Care.—If it does not, the regulator contacts should be cleaned by drawing a piece of soft paper between them. If necessary, resurface them with a piece of well worn No. 00 sand paper. If cleaning will not produce the desired result, adjust the regulator.

Adjustment.—Increasing the spring tension increases the output. Decreasing the spring t nsion decreases the output. When adjusting contacts, hold the upper contacts open while the lower ones are adjusted, until the desired output is attained. Then hold the lower contacts open while the upper set is adjusted. Then allow both pair of contacts to operate together. The generator should be running at about 1750 R.P.M., when adjusting regulator. Every month put several drops of light engine oil in each of the generator oilers. If car is driven more than 1000 miles a month, oil every 1000 miles.





Chandler

Light Six (1917-18) (Serial Nos. 35,001 and up)
Gray and Davis Generating, Starting and Lighting System
Bosch Magneto Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts separate .014 inch to .016 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper.

Oiling.—Put 2 or 3 drops of light machine oil in magneto oilers every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

Timing.—Breaker contacts separate when piston entering power stroke is on top dead center spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .026 inch.

Starter.—Starting motor is No. 126. It is connected to the engine through a Bendix drive. Operating freely, starter takes 35 amperes at 3 volts, and runs at 2200 R. P. M. With the same current starter runs at 4500 R. P. M., with 5.5 volts, and at 5000 R. P. M., with 6 volts. The torque is 1.5 pound-feet at 1660 R. P. M., taking 100 amperes at 5.75 volts. Pressure of motor brushes on commutator is 2¼ pounds.

Oiling.—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month.

Generator.—Generator current regulation is by third brush system.

GENERATOR DATA, TYPE NO. 400

Amperes	R. P. M.	Miles per Hour
0.0	400	6
6.0	600	9
12.0	800	12
13.5	1000	15
14.4	1200	18
14.8	1400	21
14.4	1600	24
14.0	1800	27
12.0	2400	36
10.0	3000	45
8.0	3600	54

Generator is driven at 1½ times engine speed. Rotation is counter-clockwise, looking at commutator end. Position of third brush is adjustable by means of a rack and pinion movement operated by turning a screw, accessible through an opening in the end plate. Turn the screw to the right to increase the charging rate and to the left to decrease the charging rate.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—Relay closes at 7 miles per hour and opens at 5 miles per hour. Charging current is 1 to 3 amperes at closing, and discharge current 0 to 2 amperes at opening of relay contacts. Contacts separate .015 inch. Minimum air gap between armature (moving member) and coil core is .020 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 4 cp. Tail lamp is 6-8 volt, 2 cp.

Fuses.—Fuses are 30 amperes.

CHANDLER

NEW SERIES (1919) (SERIAL NOS. 65001 UP)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH MAGNETO IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type DU6. Breaker contacts separate .014 to .016 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 2 or 3 drops of light engine oil in each of the magneto oilers every month. Apply a small amount of vaseline to the fiber bumper of the contact arm, with a toothpick. If the car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .028 inch.

STARTER.—Frame 710. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes
0 lb. ft.	4000	40
4 lb. ft.	1400	120
8 lb. ft.	700	280
14 lb. ft.	Lock	450

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Frame 760. Generator current regulation is by the third brush system. Maximum current output is 13-15 amperes, reached at 1100-1500 R.P.M. of the armature, or 15 to 20 miles per hour.

Generator Data

Amperes	Cold Test	R.P.M.	Amperes	Hot Test	R.P.M.
0		500	10.5-12.5		1250
8		825	10		2500
12		840			
13-15		1100-1500			
7-10		2500			

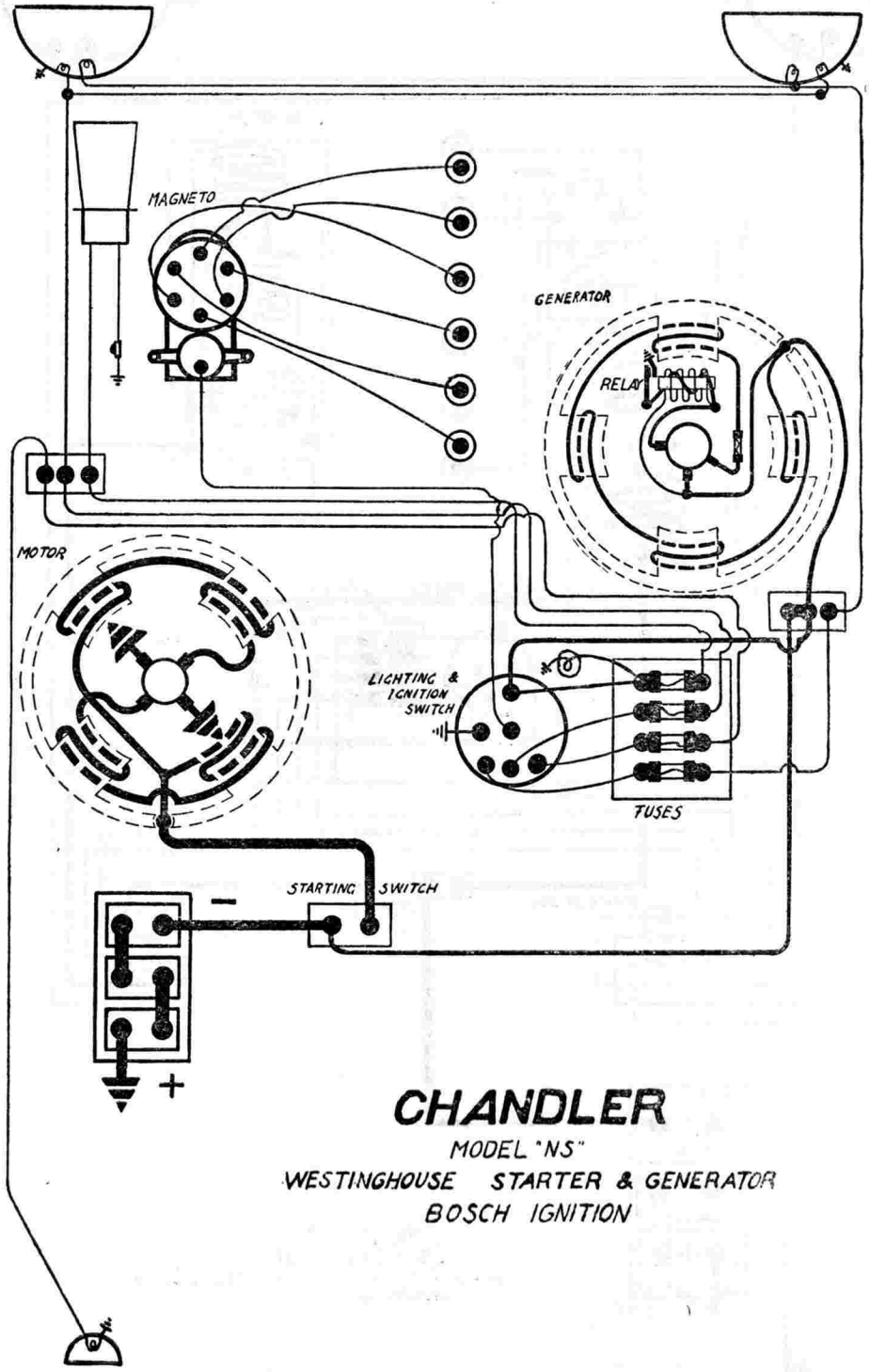
The cold test readings are obtained with a generator temperature under 95°F. The hot test readings are obtained after the generator has been operated one hour at 1800 R.P.M., charging a half-charged battery. The shunt field current is 2.8 to 3.25 amperes when 6-6.3 volts pressure is applied. When the generator is operating freely as a motor, the current is 3.5 to 5 amperes at 6 -6.3 volts. Move the third brush in the direction of armature rotation to increase the charging rate, or in the opposite direction to decrease the charging rate.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in the generator frame. Relay closes at 500-550 R.P.M. of the armature or 6.2 to 6.5 volts or 8-9 miles per hour, and opens at 450-500 R.P.M. of the armature or 7-8 miles per hour. Charging current is 1-2 amperes at closing, and the discharge current 0 to 3 amperes at the opening of relay contacts. Air gap between relay armature (moving member) and coil core is .030 to .035 inch, contacts separated. Contacts separate .013 to .018 inch. Clean contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Lighting circuit fuses are 20 ampere. Generator field fuse is 5 ampere.

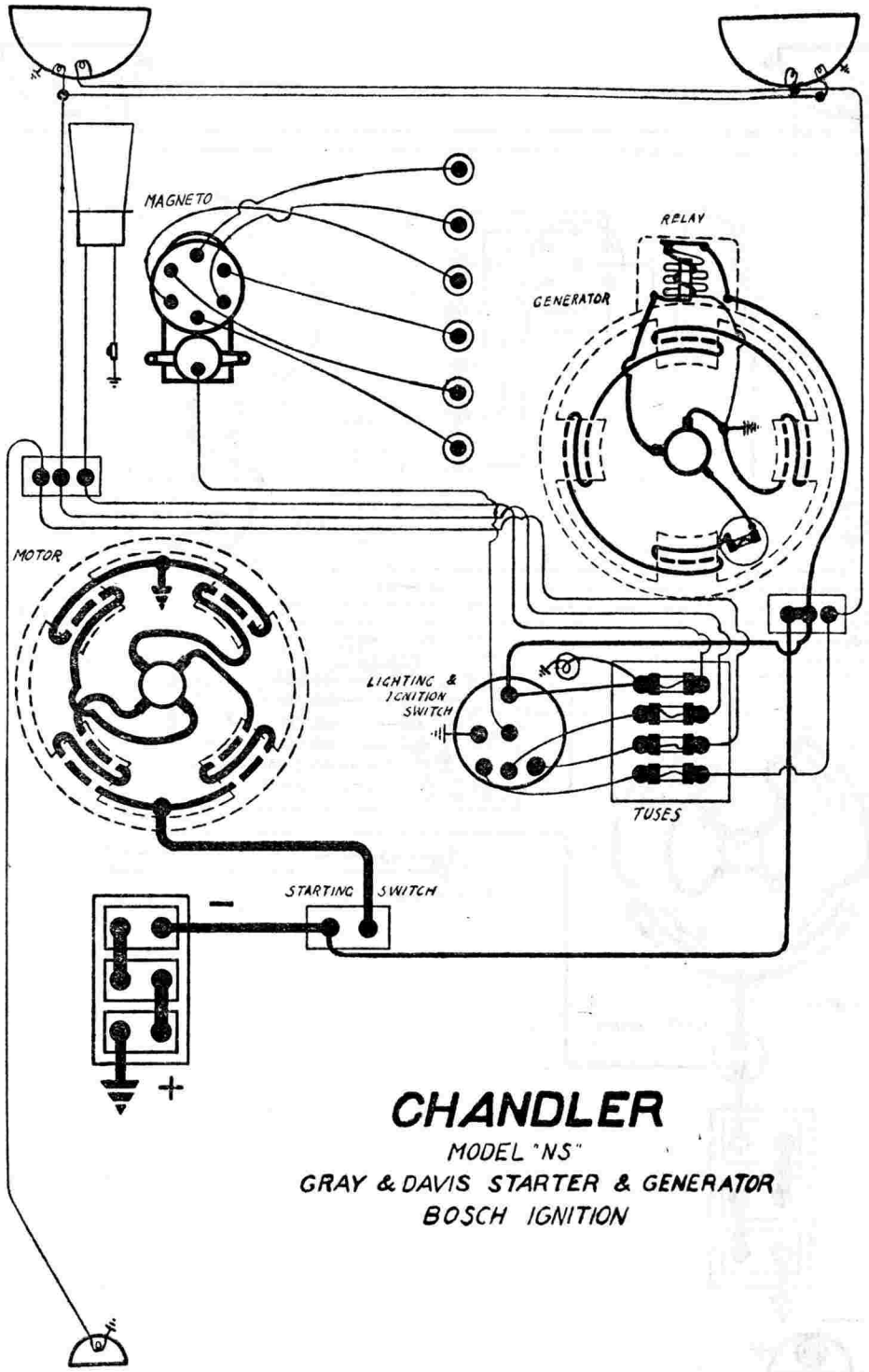


CHANDLER

MODEL "NS"

WESTINGHOUSE STARTER & GENERATOR

BOSCH IGNITION



CHANDLER

MODEL "NS"

GRAY & DAVIS STARTER & GENERATOR

BOSCH IGNITION

CHANDLER

NEW SERIES (1920-21)

GRAY AND DAVIS GENERATING, STARTING AND LIGHTING SYSTEM

BOSCH MAGNETO IGNITION

BATTERY.—Prest-O-Lite, 6 volt, 105 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type B-6. Breaker contacts separate .015 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 2 or 3 drops of light engine oil in each of the magneto oilers every month. Apply a small amount of vaseline to the fiber bumper of the contact arm, with a toothpick. If the car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model No. 504. Starter is connected to the engine through a Bendix drive. Lock torque is 12 pound-feet, current being 450 amperes. Starter cranks the engine at 120 R.P.M., taking 125 amperes.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter bearing oilers every month.

GENERATOR.—Model No. 607. Generator current regulation is by third brush system. Maximum charging rate is 12-15 amperes at 18-20 miles per hour. Charging rate is varied by turning a screw, located on the lower right side of the commutator end plate. Turning this screw shifts the third brush assembly through a rack and pinion movement. Turn the screw in a clockwise direction (looking at commutator end) to increase the charging rate and in a counter-clockwise direction to decrease the charging rate.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on generator frame. Relay closes at 8-10 miles per hour, or 500-550 R.P.M. of the armature and opens at 6-8 miles per hour or 450-500 R.P.M. of the armature. Charging current is 1-2 amperes at closing, and the discharge current 0-2 amperes at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

FUSES.—Fuses are 20 ampere.

CHANDLER

1922 MODEL
BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH MAGNETO IGNITION

BATTERY.—Prest-O-Lite, Type 613-RHN, 6 volt, 105 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type B-6. Breaker contacts separate .014 to .016 inch. They are made of platinum. When the condition of the contacts affects the ignition, resurface them with a fine, flat jeweler's file.

Oiling.—Put 3 or 4 drops only of light machine oil in the oil cup at the side of the distributor housing every 500 miles. Care must be taken not to over oil the magneto.

Timing.—Breaker contacts begin to separate when the piston entering the power stroke is on top dead center and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—The spark plug gaps are .027 to .030.

STARTER.—Type 901. The direction of rotation is counter-clockwise, looking at the commutator end. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 105 R.P.M., taking 150 amperes.

Starter Data.—No. 901

Torque	R.P.M.	Amperes
2 lb. ft.	1600	130
6 lb. ft.	600	280
10 lb. ft.	250	410
12 lb. ft.	125	465
15 lb. ft.	Lock	540

The pressure of all of the brushes on the commutator is 1¾ pounds.

Oiling.—Oilless bearings are used. No oil is required.

GENERATOR.—Model No. 1001. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. The maximum charging rate is 15 amperes, reached at 1600 R.P.M. of the armature. or 36 miles per hour.

Generator Data.—No. 1001

Amperes Hot Test	R.P.M.	Amperes Cold Test	R.P.M.
0	550	0	500
4	760	4	640
8	1100	12	1100
10	1600	15	1600
8	2280	12	2240

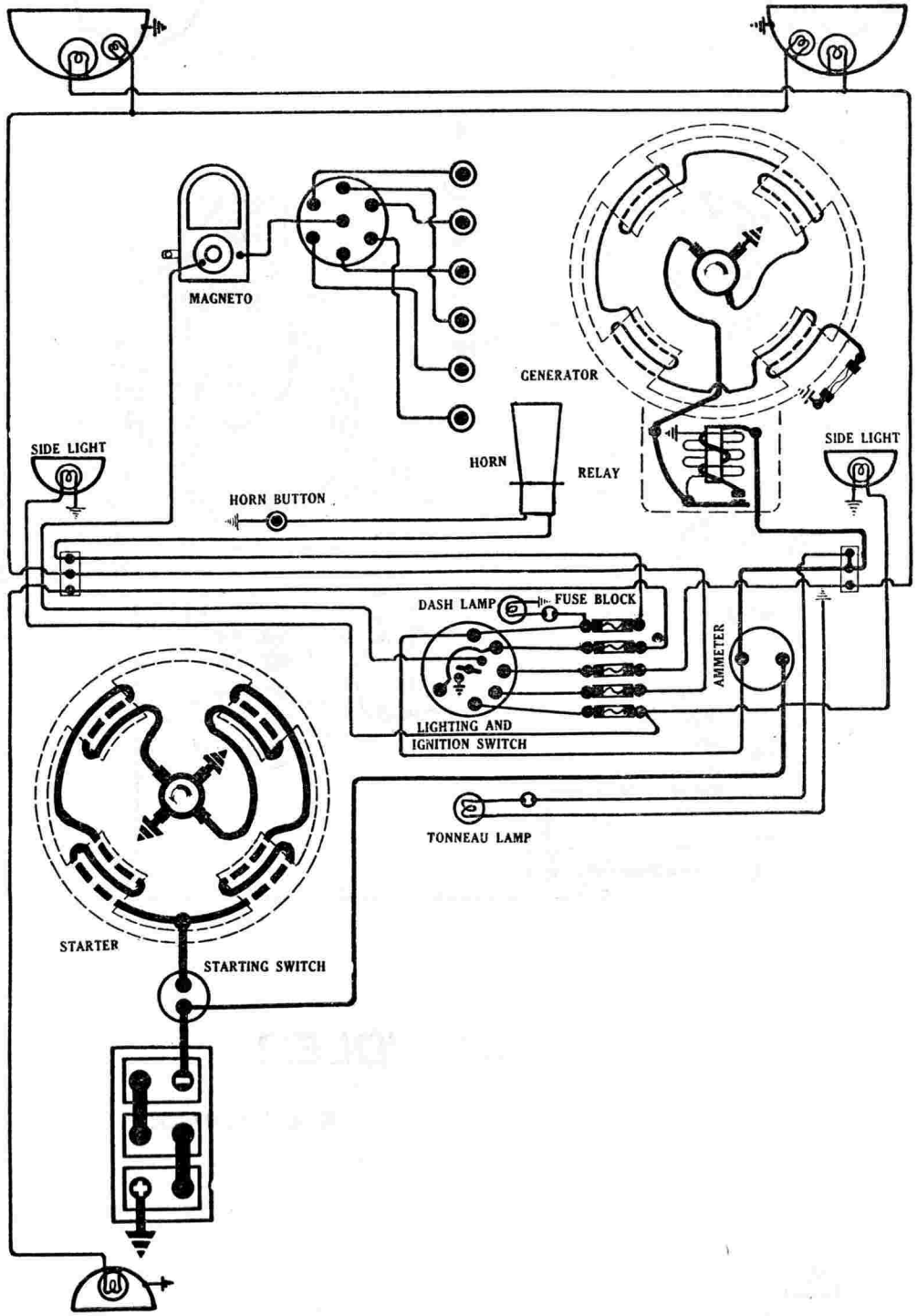
The pressure of all of the brushes on the commutator is 1¾ pounds.

Oiling.—Put 4 or 5 drops of light engine oil in the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes when the voltage reaches 6.5 to 7.5 volts and opens when there is a discharge current of 0 to 2 amperes. Contacts separate .012 to .015 inch. The air gap between the coil core and the relay armature is .018 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

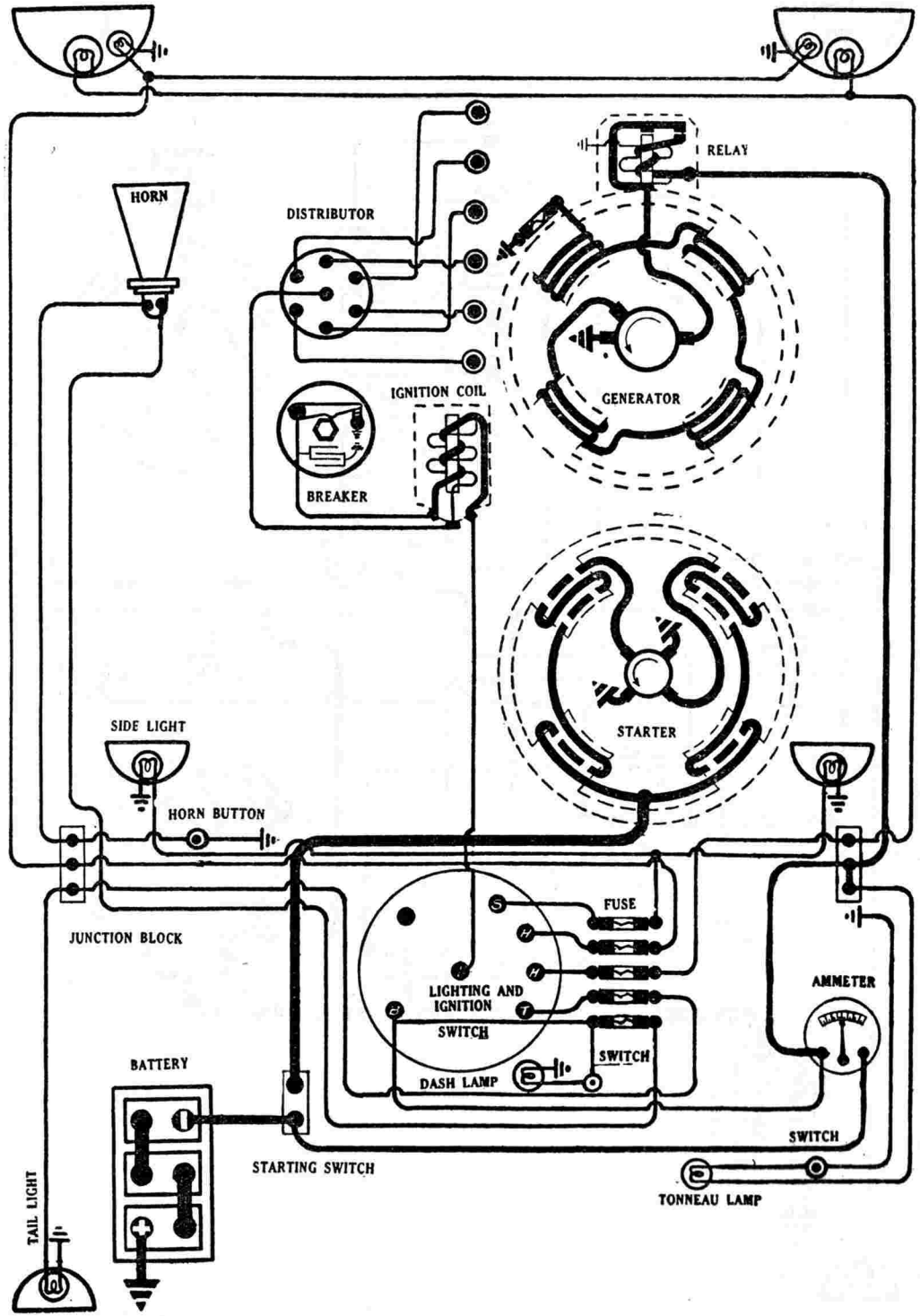
LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Side lamps 6-8 volt, 8 cp. Dash, tail and tonneau lamps are 6-8 volt, 2 cp.

FUSES.—Lighting fuses are 20 ampere. Generator field fuse is 5 ampere.



CHANDLER

MODEL 32 (1923) 32A (1924)
AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION



BATTERY:—Prest-O-Lite, Type 613-RHN, 6 volts, 100 ampere hour capacity. The starting capacity is 105 amperes for 20 minutes, and the lighting capacity is 5 amperes for 20 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model TC-30. Distributor Model FI-635. Breaker contacts separate .020 inch. They are made of tungsten. If the condition of the contacts affect the ignition, remove and resurface on a medium hard oilstone. If excessively worn, replace the points.

Oiling:—Fill oiler on the side of the distributor housing with light engine oil. Put one drop of light engine oil (less rather than more) on the interrupter lever pilot. Place a bit of hard grease about the size of a match head on the side of the interrupter fibre block nearest to the pivot post. The above lubricating instructions must be followed every month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles.

Timing:—Breaker points just begin to separate when piston No. 1 is on compression stroke, two teeth past top dead center measured on flywheel or two teeth past indicator mark (1:6), spark control lever and breaker assembly fully retarded.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—The spark plug diameters are 7/8 inch. Gaps are .020 inch.

STARTER:—Model 935. The direction of rotation is counter-colckwise ,looking at the commutator end. The starter is connected to the engine through a Bendix drive. Cranks the engine at 100-150 R.P.M. taking a current of 150 amperes at 5-5½ volts.

Starter Test Data

Torque	R.P.M.	Amperes	Volts
0	4000	35-40	6
12 lb. ft.	Lock	450	3-4

Oiling.—Put 4 or 5 drops of light engine oil into each oiler of the starter every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

GENERATOR:—Model No. 1001. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is employed for current regulation. To increase the charging rate, turn screw located on the commutator end of the generator. Move the third brush in a counter-clockwise direction to increase the charging rate, and decrease the output by moving the third brush in a clockwise direction. The maximum charging rate is 13-14 amperes at 7.5 volts, reached at 1500-1600 R.P.M. of armature. To make this adjustment, the generator should be at 50°-80°F. at frame (generator cold), and battery must be fully charged. The brush tension is 1¾-2¼ pounds.

Generator Test Data

Hot Test			Cold Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.0	800	0	6.3	520
4	6.0	800	7	6.9	800
8.6	7.0	1200	12	7.4	1200
9.8	7.3	1600	13.7	7.6	1600
9.6	7.3	2000	12.8	7.6	2000
8.8	7.0	2400	11.5	7.4	2400
6.0	5.6	3200	8.4	6.0	3200

Oiling:—Fill generator oilers with light engine oil every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY:—Relay closes at 500 R.P.M. of armature or 6-8 M.P.H. or at 6.5-7 volts, and opens at 450 R.P.M. of armature or 5-6 M.P.H. with a current discharge of 0-2 amperes. The contact gap separates .015 inch and the air gap between relay armature and coil core is .010 inch.

LIGHTING.—Head lamps are each 6-8 volts, 21 cp. Dimmer lamps are each 6-8 volts, 4 cp. Dash, side, tail and tonneau lamps are each 6-8 volts, 2 cp. All lights are equipped with a single contact base.

FUSES:—Generator field fuse is 5 amperes. All other fuses are 20 amperes.

CHANDLER

MODEL 33 (1924) 33-A (1925)

AMERICAN BOSCH GENERATING, STARTING, AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

BATTERY.—Prest-O-Lite, Type 613-RHN, 6 volts, 100 ampere-hour capacity. The starting capacity is 105 amperes for 20 minutes, and the lighting capacity is 5 amperes for 20 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model TC-30. Distributor Model FI-635. Breaker contacts separate .020 inch. They are made of tungsten. If the condition of the contacts affect the ignition, remove and resurface on a medium hard oilstone. If excessively worn, replace the points.

Oiling.—Fill oiler on the side of the distributor housing with light engine oil. Put one drop of light engine oil (less rather than more) on the interrupter lever pivot. Place a bit of hard grease about the size of a match head on the side of the interrupter fibre block nearest to the pivot post. The above lubricating instructions must be followed every month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles.

Timing.—Breaker points just begin to separate when piston No. 1 is on compression stroke, two teeth past top dead center measured on flywheel or two teeth past indicator mark (1:6), spark control lever and breaker assembly fully retarded. On 1925 cars, contacts separate wth piston ½ tooth on flywheel past top dead center.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plugs.—The spark plug diameters are 7/8 inches, and the gaps are .020 inch.

STARTER.—Model 935. The direction of rotation is counter-clockwise, looking at commutator end. The starter is connected to the engine through a Bendix drive. Cranks the engine at 100-150 R.P.M. taking a current of 150 amperes, at 5-5½ volts.

Starter Test Data

Torque	R.P.M.	Amperes	Volts
0	4000	35-40	6
12 lb. ft.	Lock	450	3-4

Oiling:—Oilless bearings are used. They require no attention.

GENERATOR:—Model No. 1001,1059. The generator is a 4 pole, 6 volt, shunt wound machine, equipped with ball bearings. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is employed for current regulation.To increase the charging rate turn screw located on the commutator end of the generator. Move the third brush in a counter-clockwise direction to increase the charging rate, and decrease the out-put by moving the third brush in a clockwise direction. The maximum charging rate is 13-14 amperes, at 7.5 volts, reached at 1500-1600 R.P.M. of armature. To make this adjustment, the generator should be at 50°-80° F. at frame, (generator cold) and battery must be fully charged. See that the commutator is not oily or dirty; clean by wiping off with a clean cloth slightly moistened with gasoline. Be sure to wipe dry before operating the generator. The brush tension is 1¾-2¼ pounds.

Generator Test Data

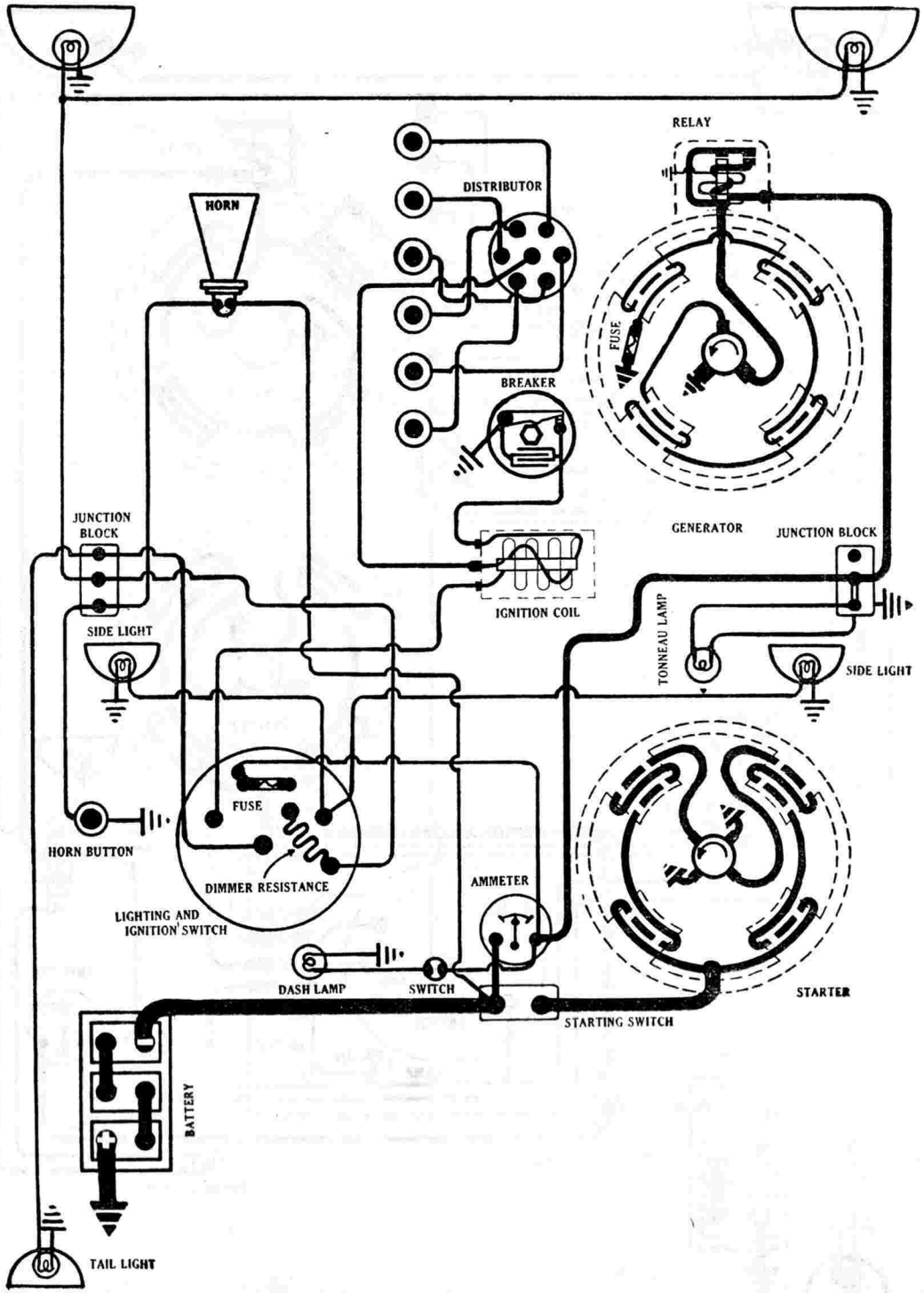
Hot Test			Cold Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.0	600	0	6.3	520
4	6.0	800	7	6.9	800
8.6	7.0	1200	12	7.4	1200
9.8	7.3	1600	13.7	7.6	1600
9.6	7.3	2000	12.8	7.6	2000
8.8	7.0	2400	11.5	7.4	2400
6.0	5.6	3200	8.4	6.0	3200

Oiling.—Fill generator oilers with light engine oil every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Relay closes at 500 R.P.M. of armature or 6-8 M.P.H. or at 6.5-7 volts, and opens at 450 R.P.M. of armature or 5-6 M.P.H. with a current discharge of 0-2 amperes. The contact gap separates .015 inch, and the air gap between relay armature and coil core is .010 inch, contacts fully closed.

LIGHTING:—Head lamps are 6-8 volt, 21 cp. A resistance on the switch is used for dimming. Dash, tail, side and tonneau lamps are each 6-8 volt, 2 cp.

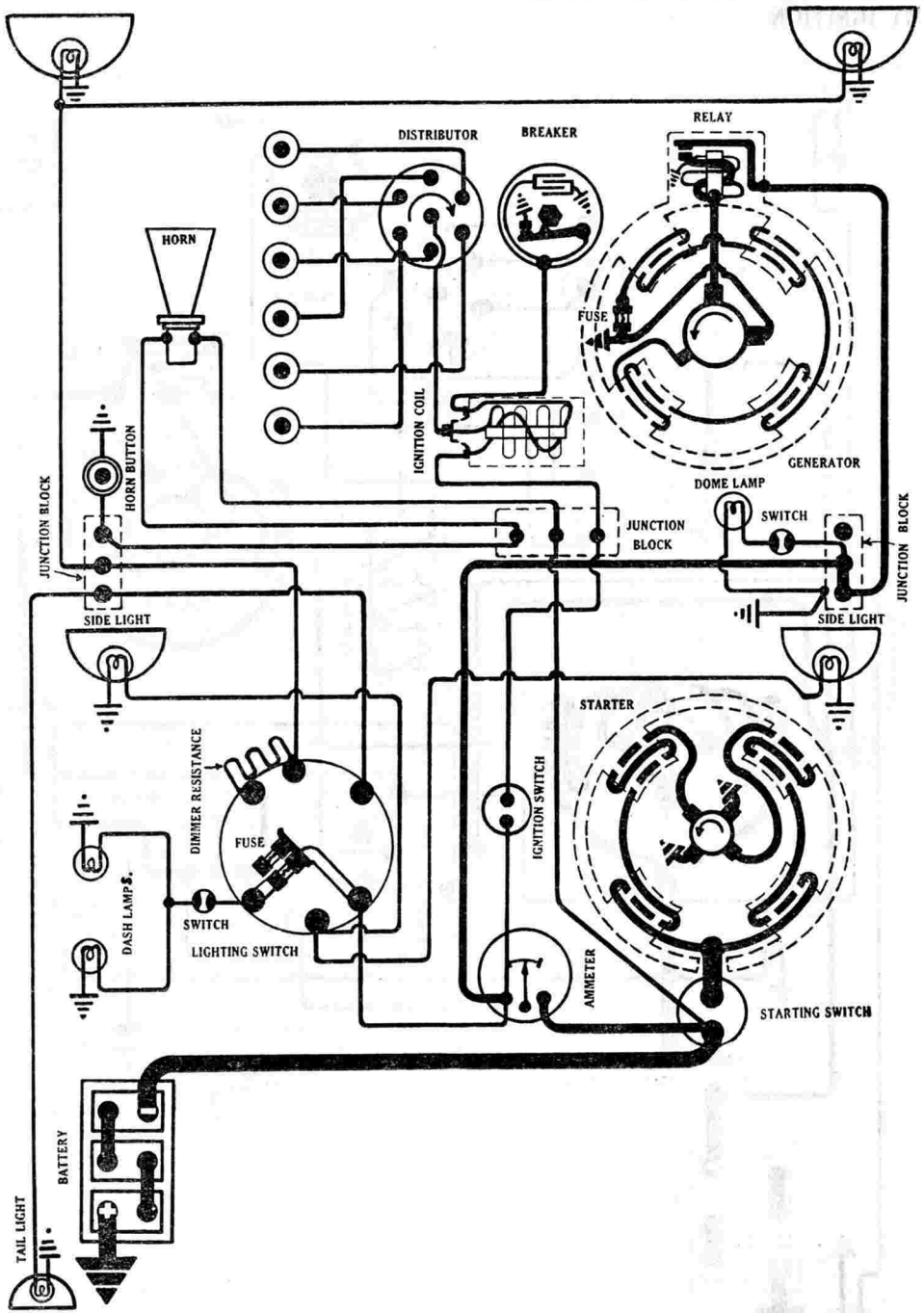
FUSES.—Generator field fuse is 5 amperes. All other fuses are 20 amperes.



CHANDLER

MODEL 35 (1926)

AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION



BATTERY:—Prest-O-Lite, Type 613-RHN, 6 volts, 100 ampere-hour capacity. The starting capacity is 105 amperes for 20 minutes, and the lighting capacity is 5 amperes for 20 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model TC-30. Distributor Model FI-635. Breaker contacts separate .020 inch. They are made of tungsten. If the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone. If excessively worn, replace the points.

Oiling:—Fill oiler on the side of the distributor housing with light engine oil. Put one drop of light engine oil (less rather than more) on the interrupter lever pilot. Place a bit of hard grease about the size of a match head on the side of the interrupter fibre block nearest to the pivot post. The above lubricating instructions must be followed every month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles.

Timing.—Breaker contacts begin to separate when piston No. 1 entering power stroke reaches a position one-half tooth past top dead measured on the flywheel with the spark control lever in the fully advanced position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are ⅞ inch, and the gaps are .020 inch.

STARTER.—Model No. 959. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 100-150 R.P.M. taking 150 amperes at 5-5.5 volts. The brush tension should be 1¾-2 pounds each. Starter switch is Model S-203.

Starter Test Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	35-40	6
12 "	Lock	450	3-4

GENERATOR.—Model No. 1070. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for generator current regulation. To adjust the charging rate, insert special wrench in the hole on the generator end plate or remove cover band and shift third brush mounting plate by hand. Shifting the third brush in the direction of generator rotation increases the charging rate and in the opposite direction decreases the rate. The maximum generator output is 13-14 amperes at 7.5 volts, which is reached at 1600-1800 R.P.M. of the armature. When making the adjustment, generator frame temperature should be 50-80° F. and the battery fully charged. Brush tension should be 1-1¼ pounds each. Motoring freely generator draws 6 amperes at 6 volts. The shunt field current is 3.2 amperes at 6 volts.

Generator Test Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.0	600	0	6.3	520
4	6.0	800	7	6.9	800
8.6	7.0	1200	12	7.4	1200
9.8	7.3	1600	13.7	7.6	1600
9.6	7.3	2000	12.8	7.6	2000
8.8	7.0	2400	11.5	7.4	2400
6.0	5.6	3200	8.4	6.0	3200

Oiling:—Fill generator oilers with light engine oil every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY:—Relay closes at 500 R.P.M. of armature or 6-8 M.P.H. or at 6.5-7 volts, and opens at 450 R.P.M. of armature or 5-6 M.P.H. with a current discharge of 0-2 amperes The contact gap separates .015 inch, and the air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING:—Head lamps are 6-8 volt, 21 cp. A dimmer resistance on the switch cuts a resistance into the head lamp circuit for dimming. Dash, tail, side and tonneau lamps are each 6-8volt, 2 cp.

FUSES:—Generator field fuse is 5 amperes. All other fuses are 20 amperes.

CHANDLER

STANDARD SIX MODEL 31 (1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 613-JFKA, 6 volt. Starting capacity is 102 amperes for 20 minutes. Lighting capacity is 5 amperes for 17 hours. The positive (+) terminal is grounded. Battery is mounted under the floor boards of the front compartment on the left side.

IGNITION:—Coil Model 525-C. Distributor Model 637-V. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Stationary contact is mounted on special crescent shaped arm which moves in same arc as breaker arm allowing contact opening to be set without disturbing parallel surface of contacts. To set contacts, loosen the lockscrew on the crescent mounting arm and turn eccentric adjusting screw until proper contact opening is secured. Then tighten the lockscrew. Breaker arm spring tension is 15-20 ounces. Ignition current is 1-3 amperes with engine running and 3.4-5 amperes with engine stopped. Distributor is semi-automatic. Manual advance is 19°. Automatic advance begins at 400 R.P.M. (engine). Maximum automatic advance is 24° (engine) at 2400 R.P.M.

Mounting:—Ignition coil is mounted on top of cylinder head at forward end of engine. Distributor is mounted on top of the accessory bracket at right of engine. To remove distributor, disconnect primary lead and remove distributor head with high tension cables intact. Then loosen locknut and remove distributor set screw on side of housing. Lift distributor from place.

Oiling:—Refill the grease cup on the side of the distributor shaft with medium cup grease and turn down two turns every month or each 1000 miles. Every month put a small amount of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position two teeth on the flywheel before top dead center with the manual spark control lever in the fully advanced position. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Then fully advance spark control lever and continue to crank engine until the dead center mark on the flywheel 'D1-C6' is two teeth before the indicator in the sight hole on the right front of flywheel housing. The breaker contacts should begin to separate at this point. If they do not, loosen advance arm clamp screw and rotate distributor housing until contacts begin to separate. Tighten the clamp screw.

Valve Timing:—INLET VALVES:—Head diameter, 1 13/32 inches; stem diameter, .309 inch; stem length, 5⅛ inches; valve lift, 5/16 inch; spring pressure, 60 pounds. Tappet clearance, .007 inch recommended. Inlet valves open 16° before top dead center and close 51° after lower dead center.

EXHAUST VALVES:—Head diameter, 1 13/32 inches; stem diameter, .309 inch; stem length, 5⅛ inches; valve lift, .007 inch recommended; spring pressure, 60 pounds. Exhaust valves open 64° 30′ before lower dead center and close 21° after top dead center. Valve stem guides are removable. Oversize valves are not made.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are .025 inch.

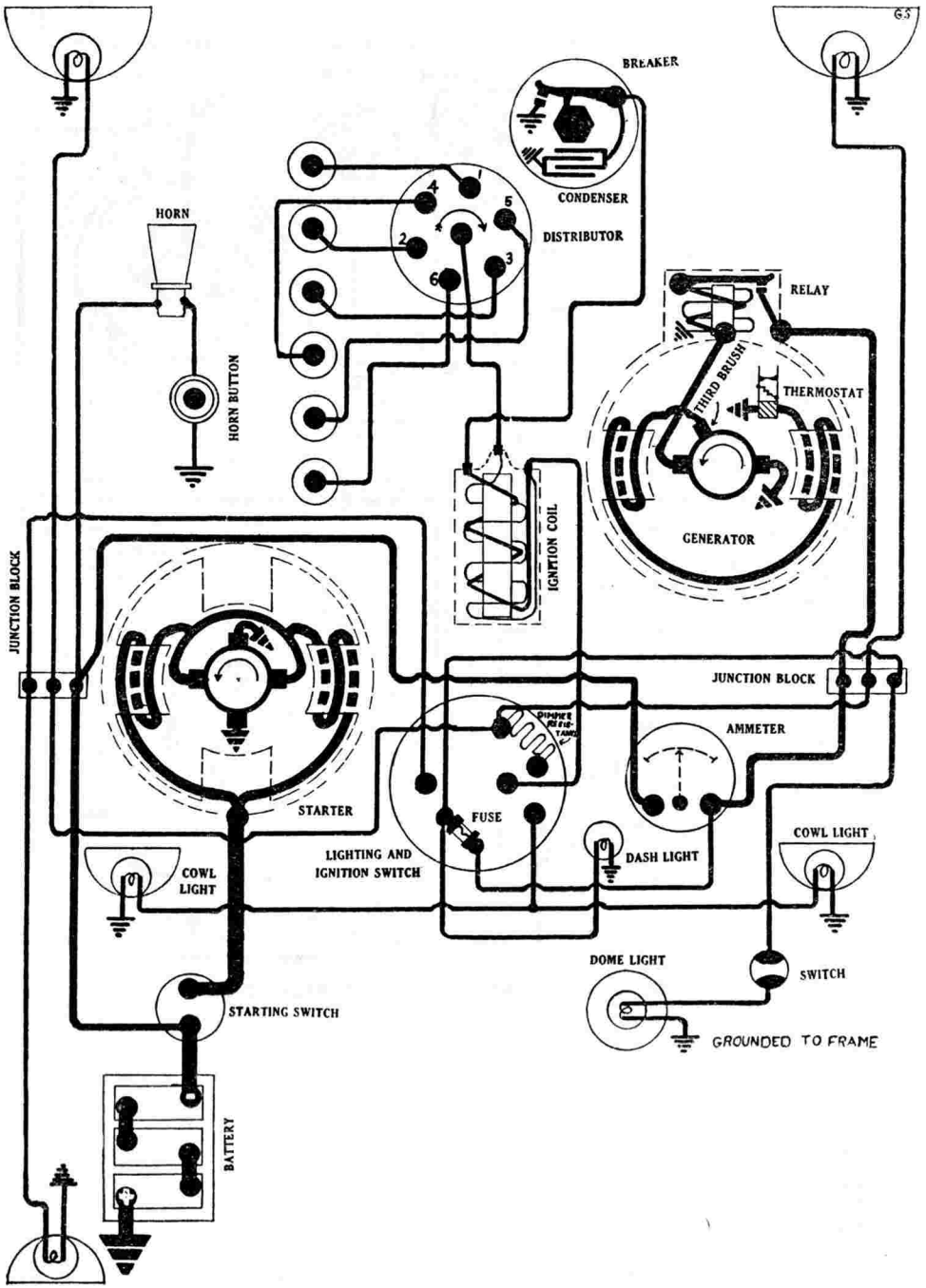
STARTER:—Model 717-A. Starter is connected to the engine through an inboard Bendix drive Type L-11X-11T. The direction of rotation is counter-clockwise, looking at the commutator end. Starter switch is Model 405-C. Brush spring tension is 24-28 ounces each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	70
11 "	Lock	3.6	450

Mounting:—Starter is flange mounted on forward side of flywheel housing at left of engine. To remove starter, disconnect starter cable and remove flange mounting cap screws. Then slide starter forward and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles.



CHANDLER

STANDARD SIX MODEL 31 (1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

GENERATOR:—Model 949-E. The direction of generator rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field combined with a thermostat. Thermostat contacts open at 165°F. cutting a resistance in the shunt field circuit and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Maximum charging rate is 21 amperes (cold) reached at 1450 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.5	1450	9-12	7.6	2000

Motoring freely generator draws 5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is mounted at rear of accessory bracket on right side of engine by special flange mounting using dowel pins to center generator. The pump is driven by an extension of the generator shaft. To remove generator, disconnect pump coupling, drain radiator, remove pump. Then remove four flange mounting bolts and slide generator to the rear. It may then be lifted from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay closes at 500 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is 3 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch, contacts closed.

LIGHTING:—Clum Switch Types 10562-10486. Head lamps are each 6-8 volt, 21 cp. S.C. Dimming is by resistance on switch. Dash, tail, side and dome lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Lighting fuse on switch is 20 amperes.

CHANDLER

SPECIAL SIX MODEL 43 (1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 611-RHK, 6 volt. Starting capacity is 95 amperes for 20 minutes. Lighting capacity is 5 amperes for 16 hours. The positive (+) terminal is grounded. Battery is mounted under the floor boards of the front compartment on the left frame member.

IGNITION:—Coil Model 525-C. Distributor Model 637-U. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Ignition current is 1-3 amperes with engine running and 3.4-5 amperes with engine stopped. Distributor is semi-automatic. Manual advance is 25° (engine). Automatic advance starts at 400 R.P.M. (engine) and reaches a maximum of 24° (engine) at 2400 R.P.M. Breaker arm spring tension is 15-20 ounces.

Mounting:—Ignition coil is mounted on engine side of dash. Distributor is mounted on cylinder head and is accessible from the right side. To remove distributor, disconnect primary lead and remove distributor head with high tension cables intact. Then loosen distributor clamp screw and lift distributor from place.

Oiling:—Refill the grease cup on the side of the distributor shaft with medium cup grease and turn down two turns every month or each 1000 miles. Every month put a small amount of vaseline on the face of the breaker cam under the fiber bumper of the breaker arm.

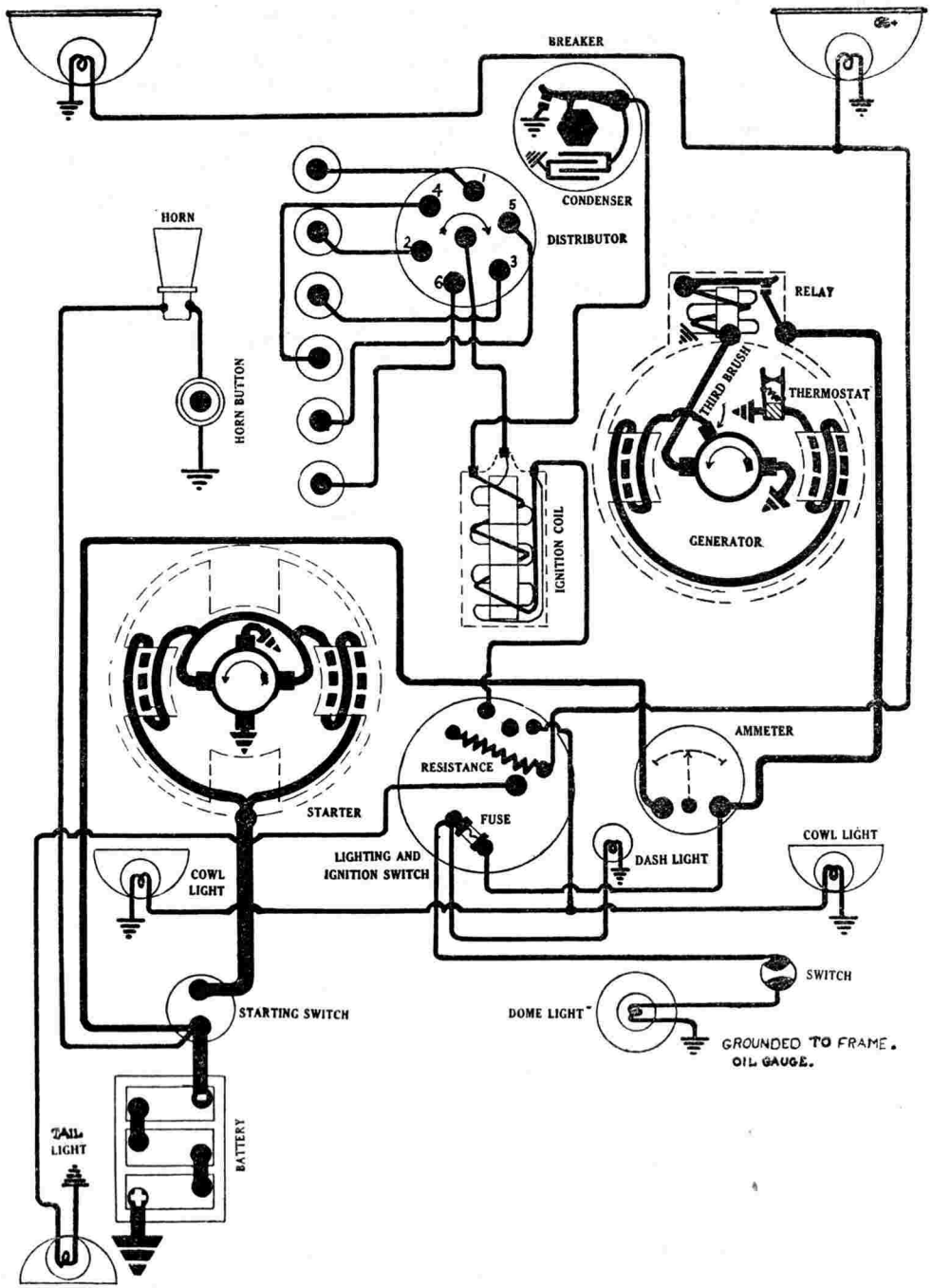
Timing:—Breaker contacts begin to separate when the piston entering power stroke raches a position one-half tooth on the flywheel past top dead center with the spark control lever in the fully advanced position. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance spark control lever and continue to crank engine until the top dead center mark 'D1-C6' is one-half tooth past the notch in the inspection hole on the right side of the flywheel housing. The inspection hole is covered by a plate which must be removed to check timing. The breaker contacts should begin to separate at this point. If they do not, loosen advance arm clamp screw and rotate distributor until contacts begin to separate. Tighten the clamp screw. Make certain that the rotor is under the segment connected to the spark plug in cylinder No. 1.
On cars with magneto ignition breaker contacts should be fully separated on the center of the cam when the piston entering power stroke is on top dead center with the flywheel mark 'D1-C6' directly opposite the indicator notch in the flywheel housing and with the manual spark control lever in the fully retarded position.

Valve Timing:—INLET VALVES:—Head diameter, 1 17/32 inches; stem diameter, .340 inch; stem length, 6⅜ inches; valve lift, 5/16 inch; spring pressure, 65 pounds; tappet clearance, .006-.008 inch. Inlet valves open 2° before top dead center and close 52° after lower dead center.
EXHAUST VALVES:—Head diameter, 1 17/32 inches; stem diameter, .340 inch; stem length, 6⅜ inches; valve lift, 5/16 inch; spring pressure, 65 pounds; tappet clearance, .006-.008 inch. Exhaust valves open 53° before lower dead center and close 16° after top dead center. Valve stem guides are not removable. Oversize stem guides are not made.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are .027 inch.

STARTER:—Model 713-J. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-colckwise, looking at the commutator end. Starter switch is Model 405-C. Brush spring tension is 24-28 ounces.



CHANDLER

SPECIAL SIX MODEL 43 (1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
12 "	Lock	3.6	475

Oiling:—Put 4 or 5 drops of light engine oil in the starter bearing oilers every month or each 1000 miles.

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect starter cable and remove flange mounting cap screws. Then slide starter forward and lift from place.

GENERATOR:—Model 949-D. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting a resistance in the shunt field circuit and reducing the output approximately 40%. Maximum charging rate is 21 amperes (cold) reached at 1450 R.P.M. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
21	8.5	1450	9-12	7.6	2000

Running as a motor, generator draws 5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 24-28 ounces.

Mounting:—Generator is mounted by special flange to rear of fan pulley bracket at right of engine. To remove generator, disconnect generator lead and water pump coupling. Then remove flange mounting cap screws and slide generator to the rear. Then tension of the timing chain is adjusted by moving the entire generator and fan pulley bracket mounting away from the engine block around the lower flange mounting cap screw as a pivot. To adjust chain, loosen three flange mounting cap screws on the fan pulley bracket and shift bracket until proper tension is secured. The chain should be loose enough to operate noiselessly. With proper adjustment, movement of pump shaft should be 1/8-3/16 inch.

Oiling:—Put 4 or 5 drops of light engine oil in the generator bearing oilers every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay closes at approximately 600 R.P.M. when the voltage of the generator reaches 7-7.5 amperes and opens with a discharge current of 0.2-.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch, contacts closed.

LIGHTING:—Clum Switch Model 10463. Head lamps are 6-8 volt, 21 cp. S.C. Side, dash, tail and dome lamps are each 6-8 volt, 3 cp. S.C. Stop lamp is 6-8 volt, 15 cp. S.C.

FUSES:—Lighting fuse on switch is 20 amperes.

CHANDLER

BIG SIX MODEL 35 (1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 613-RHK, 6 volt. Starting capacity is 115 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The positive (+) terminal is grounded. Battery is mounted under the floor boards of the front compartment on the right hand frame member.

IGNITION:—Coil Model 525-C. Distributor Model 637-X. Breaker contacts separate .015-.020 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Stationary contact is mounted on crescent shaped mounting plate which moves in same arc as breaker arm. This allows setting of contacts without disturbing parallel surface of breaker contacts. To adjust contact opening, loosen lockscrew on crescent mounting plate just back of stationary contact. Then turn eccentric adjusting screw until correct opening is secured. Tighten the lockscrew. Ignition current is 1-3 amperes with engine running and 3.4-5 amperes with engine stopped. Distributor is semi-automatic. Manual advance is 22°. Automatic advance begins at 400 R.P.M. (engine). Maximum automatic advance of 22° is reached at 2600 R.P.M. Breaker arm spring tension is 15-20 ounces.

Mounting:—Distributor is mounted on rear of generator at right of engine. To remove distributor, disconnect primary lead and remove distributor head with high tension cables intact. Then loosen lockscrew on side of distributor mounting and lift distributor from place.

Oiling:—Refill the grease cup with medium cup grease and turn down two turns every month or each 1000 miles. Every month put a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position one-half tooth on the flywheel past top dead center with the manual spark control lever in the fully advanced position. To set timing, crank engine until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Fully advance spark control lever and continue to crank engine until piston No. 1 reaches top dead center. At this point the dead center mark on the flywheel '1/6' will be directly on top of the flywheel and under the center of the flywheel housing. Then crank engine over one half tooth from this point. The breaker contacts should begin to separate. If they do not, loosen advance arm clamp screw and rotate distributor housing until contacts begin to separate. Tighten the clamp screw. Make certain that the rotor button is under the segment connected to the spark plug in cylinder No. 1.

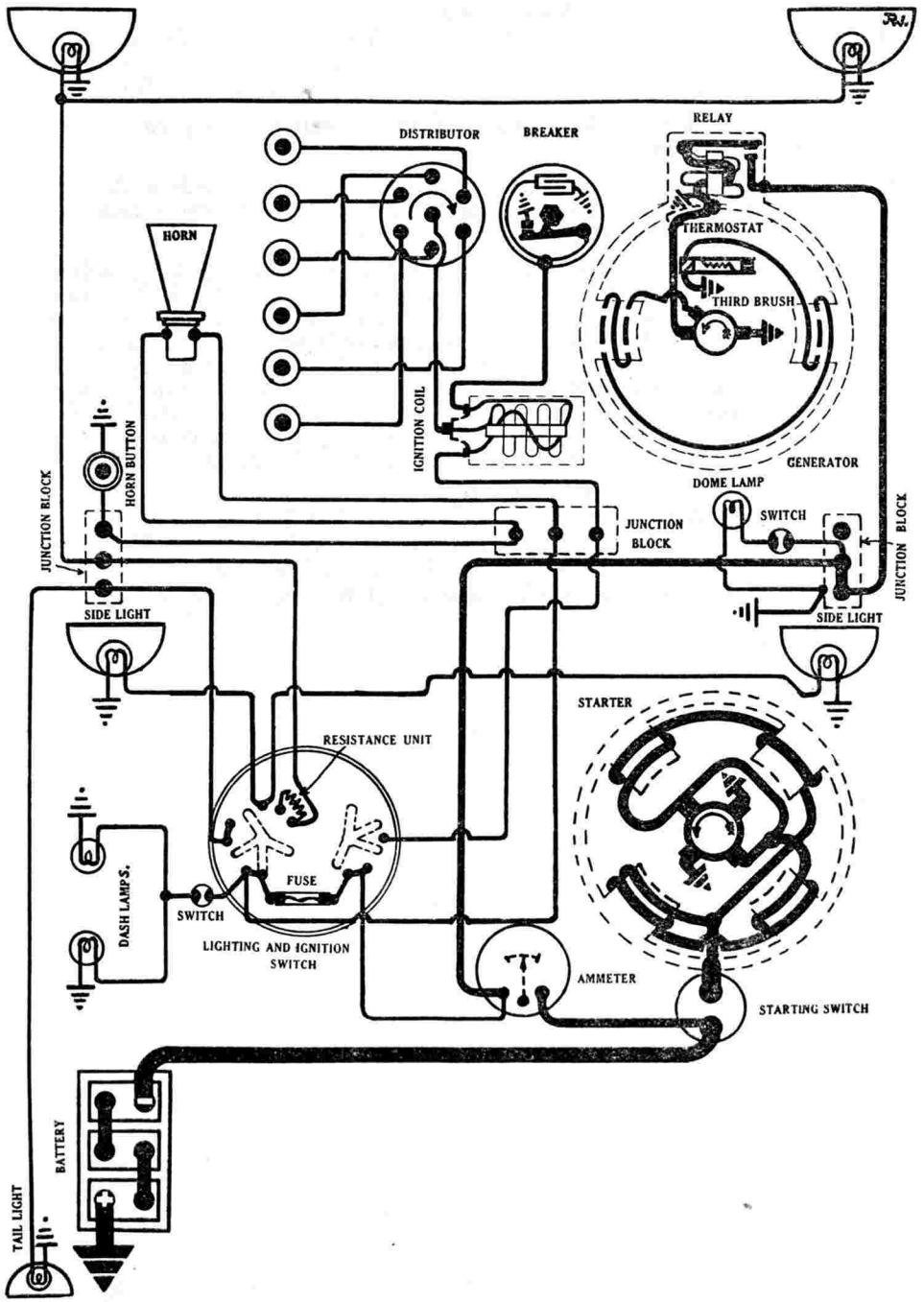
On cars with magneto ignition, breaker contacts should be fully open when the piston entering power stroke reaches a position two and one half teeth on the flywheel past top dead center with the spark control lever and breaker assembly in the fully retarded position. To set magneto timing, crank engine until piston No. 1 reaches firing position. Then loosen coupling at front of magneto and remove breaker box cover and distributor head. Rotate magneto armature until distributor brush is directly under No. 1 segment. Then turn armature slightly until breaker contacts just begin to separate. Tighten magneto coupling and replace breaker box cover and distributor head.

Valve Timing:—INLET VALVES:—Head diameter, 1 23/32 inches; stem diameter, .372 inch; stem length, 6 9/16 inches; valve lift, 5/16 inch; spring pressure, 60 pounds; tappet clearance, .007 inch recommended. Inlet valves open 2° before top dead center and close 52° after lower dead center.

EXHAUST VALVES:—Head diameter, 1 23/32 inches; stem diameter, .372 inch; stem length, 6 9/16 inches; valve lift, 5/16 inch; spring pressure, 60 pounds; tappet clearance, .007 inch recommended. Exhaust valves open 53° before lower dead center and close 16° after top dead center. Valve stem guides are not removable. Oversize valve stems are not made.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Gaps are .025 inch.



CHANDLER

BIG SIX MODEL 35 (1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

STARTER:—Model 720-W. Starter is connected to engine through an outboard Bendix drive Type R-11X-11T. The direction of rotation is counter-clockwise, looking at the commutator end. Starter switch is Model 405-C. Brush spring tension is 24-28 ounces each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Mounting:—Starter is mounted by special flange mounting at right of engine on forward side of flywheel housing under the flange of the crankcase. To remove starter, disconnect starter cable and remove stud extending through crankcase flange and flange mounting capscrews. Then slide starter forward from place.

Oiling:—Put 5 or 6 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless.

GENERATOR:—Model 944-C. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field combined with a thermostat. Thermostat contacts open at 165°F. cutting a resistance in the shunt field circuit and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The maximum charging rate of 20 amperes (cold) is reached at 1300 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
18-20	8.5	1300	9-12	7.6	1400

Running freely as a motor, generator draws 5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 22-28 ounces.

Mounting:—Generator is base mounted on special bracket at right of engine and is driven from the pump shaft. To remove generator, disconnect generator lead and all ignition wires or remove distributor from mounting. Then disconnect generator coupling. Remove nuts from two base mounting studs and lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay closes at 500 R.P.M. when the voltage of the generator reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is 3 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch, contacts closed.

LIGHTING:—Remy Switch Model 470-S. Head lamps are each 6-8 volt, 21 cp. S.C. Side lamps are 6-8 volt, 2 cp. S.C. Dome lamp is 6-8 volt, 4 cp. S.C. Instrument board lamps and tail lamp are each 6-8 volt, 2 cp. S.C. Dimming is by resistance on switch.

FUSES:—Lighting fuse on switch is 20 amperes.

CHANDLER

ROYAL EIGHT MODEL 37 (1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite. Type 615-JFK, 6 volt. Starting capacity is 120 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The positive (+) terminal is grounded. Battery is mounted under the floor boards of the front compartment on the right hand frame member.

IGNITION:—Coil Model 525-C. Distributor Model 658-G. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Ignition current is 1-3 amperes with engine running and 3.4-5 amperes with engine stopped. Distributor is semi-automatic. Manual advance is 33° (engine). Automatic advance begins at 400 R.P.M. and reaches a maximum of 35° at 2400 R.P.M. Breaker arm spring tension is 17-21 ounces. Two sets of breaker contacts are used. They operate on a four sided cam and open alternately at intervals of 45° corresponding to 90° of crankshaft rotation. The firing interval must be correctly set for proper ignition.

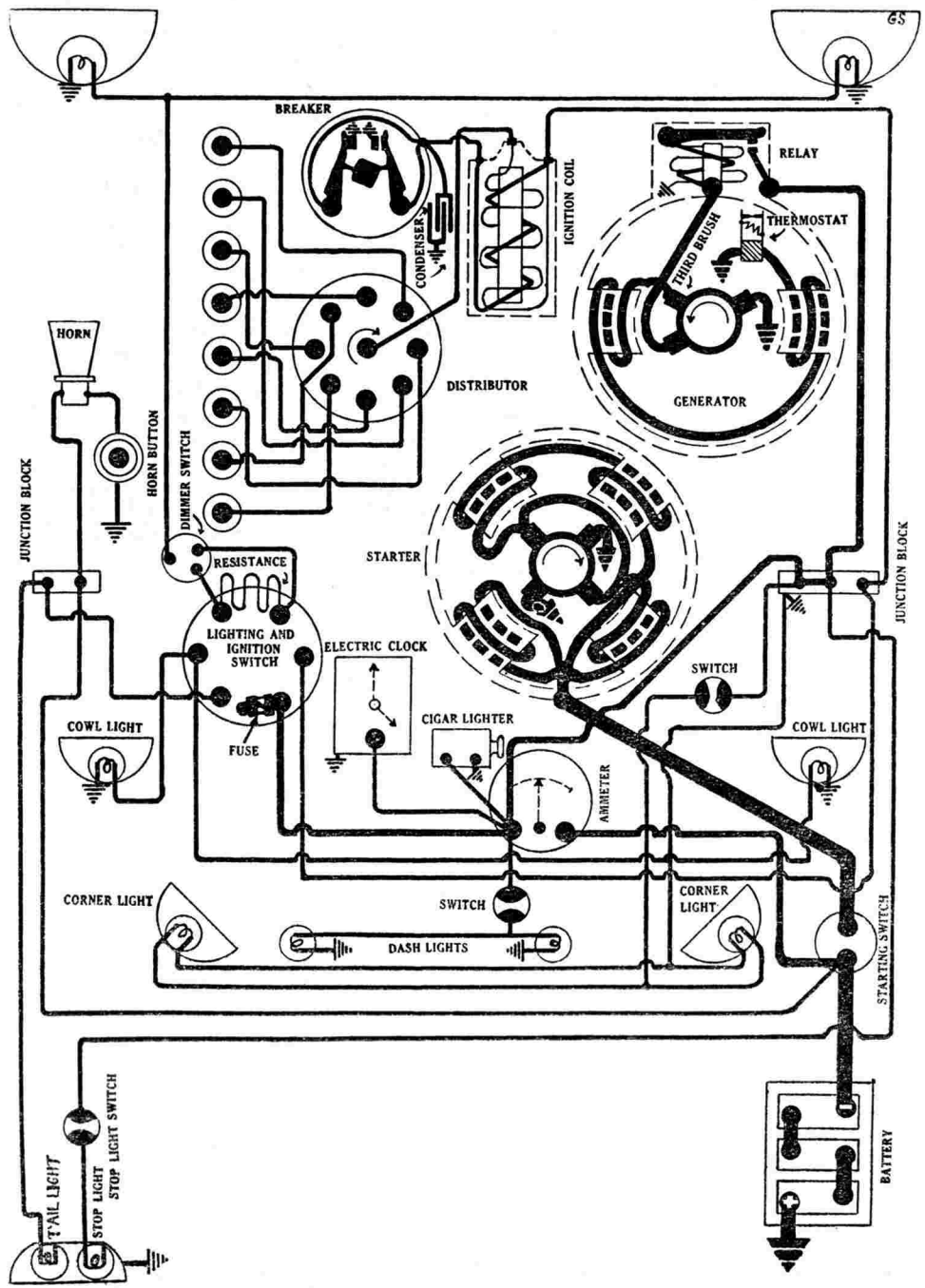
Mounting:—Ignition coil is mounted in the right frame member channel. Distributor is mounted on the front of the generator at right of engine. To remove distributor, disconnect primary lead and remove distributor head with high tension cables intact. Then disconnect manual advance control rod and loosen distributor clamp screw. Then lift distributor from place.

Oiling:—Every two weeks remove the rotor button and put 3 or 4 drops of light engine oil in the wick oiler of the distributor shaft. Every month put a small bit of heavy grease or vaseline on the face of the breaker cam. Refill the grease cup on the side of the distributor shaft with medium heavy cup grease and turn down one turn every month or each 1000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position one tooth on the flywheel past top dead center with the manual spark control lever in the fully advanced position. To set timing, adjust breaker contacts to separate .018 inch. Then crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance spark control lever and crank engine until piston No. 1 reaches top dead center when the flywheel mark '#1 TDC' will be opposite the indicator in the inspection hole in the flywheel housing at the right of engine. Continue to crank engine over one tooth past the top dead center mark. The breaker contacts on stationary plate should separate at this point. If they do not, loosen distributor clamp screw and rotate distributor housing until contacts begin to separate. Tighten the clamp screw. To check the second set of contacts, crank the engine over 90° until piston No. 6 reaches firing position. The top dead center mark for piston No. 6 (a short straight line on the face of the flywheel) will be one tooth past the indicator on the flywheel housing. This point is 28 teeth past the firing position of piston No. 1. The breaker contacts should begin to separate at this point. If they do not, loosen the two lockscrews on the breaker assembly mounting plate and turn the eccentric adjusting screw until they begin to separate. Tighten the two lockscrews.

Valve Timing:—INLET VALVES:—Head diameter, 1 21/32 inches; stem diameter, .372 inch; stem length, 6 13/32 inches; valve lift, 5/16 inch; spring pressure, 60 pounds; tappet clearance, .007 inch. Inlet valves open 2° before top dead center and close 52° after lower dead center. These figures are correct with a tappet clearance of .007 inch.

EXHAUST VALVES:—Head diameter, 1 17/32 inches; stem diameter, .372 inch; stem length, 6 13/32 inches; valve lift, 5/16 inch; spring pressure, 60 pounds; tappet clearance, .007 inch. Exhaust valves open 64° 3' before lower dead center and close 21° after top dead center. Valve stem guides are not removable. Oversize valve stems are not made.



CHANDLER

ROYAL EIGHT MODEL 37 (1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 7/8 inch. Gaps are .027 inch.

STARTER:—Model 727-A. Starter is connected to the engine through a set of reduction gears and an outboard Bendix drive. The direction of rotation is clockwise (armature shaft), looking at the commutator end. Starter switch is Model 405-C. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2500	5	70
28 "	Lock	3	600

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect starter cable and remove three flange mounting cap screws. Then slide starter forward and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oilers at each end of the starter armature shaft every two weeks or each 500 miles. Every six months or each 5000 miles remove the pipe plug from the gear compartment and repack the reduction gears with medium cup grease.

GENERATOR:—Model 944-D. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is third brush shunt field combined with a thermostat. Thermostat contacts open at 165°F. cutting a resistance in the shunt field circuit and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. The maximum charging rate of 20 amperes (cold) is reached at 1300 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19	8.5	1300	12	7.65	1500

Motoring freely, generator draws 5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 16-18 ounces each.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect generator lead and all ignition wires or remove distributor from mounting. Then remove three flange mounting cap screws and slide generator to the rear. Make certain that timing chain does not slip off generator drive sprocket as this will disturb valve timing of engine. The timing chain is adjusted by loosening the two upper mounting screws of the generator and moving generator and distributor assembly outward. There should be just enough play in the chain to allow it to run silently.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay closes at 500 R.P.M. when the voltage of the generator reaches 7-7.5 volts and opens with a discharge current of 0-3 amperes. Charging current at closing of contacts is 2 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch, contacts closed.

LIGHTING:—Delco-Remy Switch Model 470-S. Head and stop lamps are each 6-8 volt, 21 cp. S.C. Side lamps on cowl are 6-8 volt, 3 cp. S.C. Instrument panel lamps, corner lamps and tail lamp are each 6-8 volt, 3 cp. S.C. Emergency lamp is 6-8 volt, 21 cp. S.C. This is mounted on a bracket under the dash and fits in the cigar lighter socket after the heating element is removed.

Dimmer System:—A foot operated dimmer switch is used in conjunction with the head lamp circuit.

FUSES:—Lighting fuse on switch is 20 amperes.

CHANDLER

MODEL 31-A (1928) SERIAL NOS. C-30001-C-40000 (AUG. 1, 1927-JAN. 1, 1928)
MODEL 131-A (1928) SERIAL NOS. C-40001 UP (AFTER JAN. 3, 1928)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 613-JFK, 6 volt, 13 plates. The positive (+) terminal is grounded. Starting capacity (20 minutes rate) is 102 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted under the front floor boards on the left side member.

IGNITION: Coil Model 525-C. Ignition coil is mounted on bracket at front of engine block. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

Distributor Model 633-B. Breaker contacts separate .018-.024 inch with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 22 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 22 degrees (engine) reached at 2600 R.P.M.

Mounting:—Distributor is mounted on accessory bracket at right front of engine. To remove distributor, disconnect primary lead and manual advance rod and remove distributor head with cables intact. Then remove set screw on side of distributor shaft and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down two turns every month or each 1000 miles. Every month put a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual advance lever fully advanced. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance spark lever. Continue to crank engine until piston No. 1 reaches top dead center when flywheel mark 'DC 1&6' will be opposite indicator mark on flywheel housing. Loosen advance arm clamp screw and rotate distributor until contacts begin to separate. Tighten the clamp screw and make certain that the segment opposite the rotor is connected to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

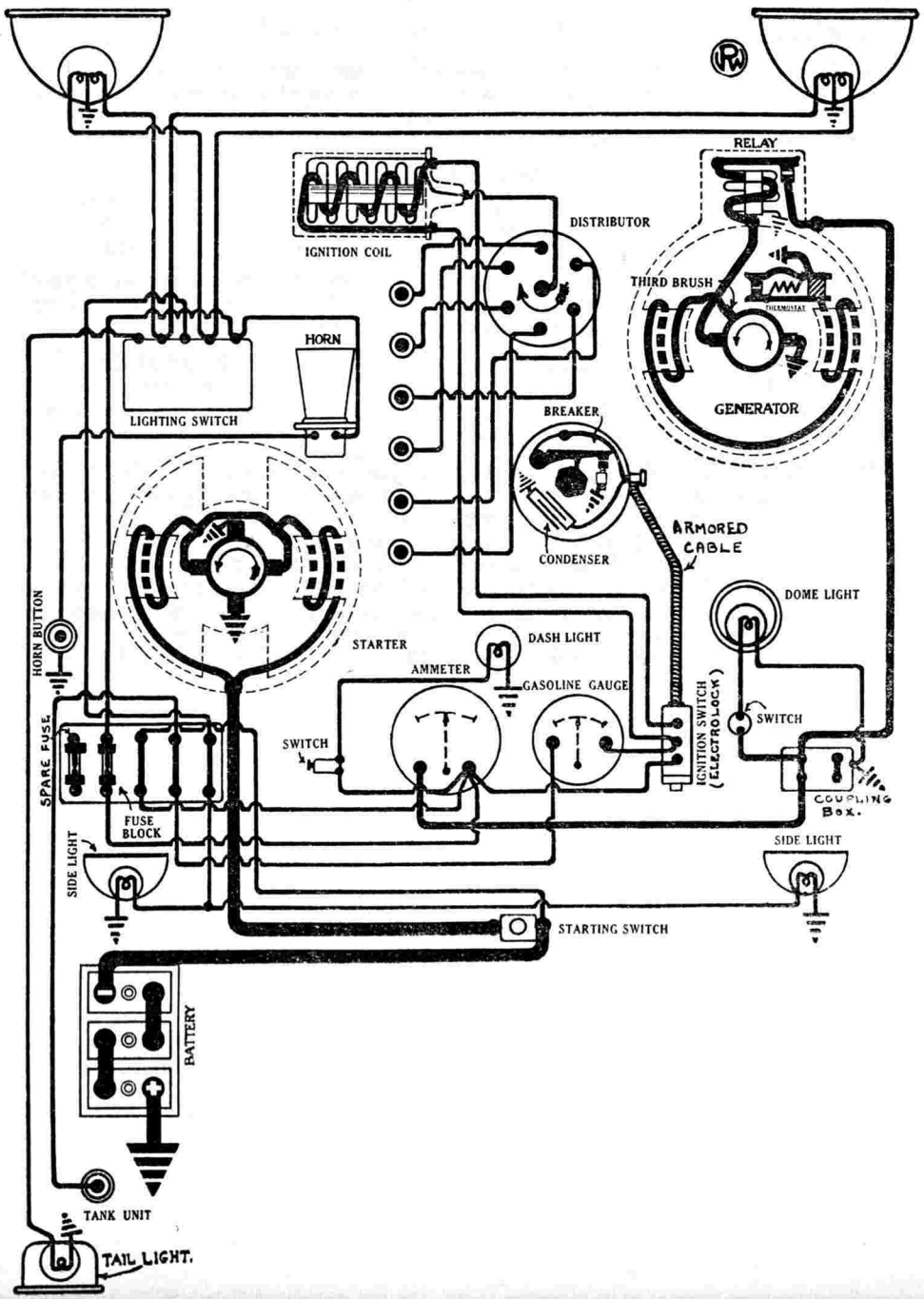
VALVE TIMING:—Specifications:—Head diameter, 1 15/32 inches; stem diameter, 5/16 inch; stem length, 5 1/8 inches. Valve lift, 5/16 inch. Tappet clearance, .009 inch. Spring pressure, 70 pounds. Valve stem guides are removable. Oversize valve stems are not made.

Timing:—Inlet valves open 16 degrees before top dead center and close 51 degrees after lower dead center. Exhaust valves open 64 degrees 30 minutes before lower dead center and close 21 degrees after top dead center.

STARTER:—Model 717-A. Starter is connected to the engine through an inboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter switch is Model 405-C. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	70
11 "	Lock	3.63	450



CHANDLER

MODEL 31-A (1928) SERIAL NOS. C-30001-C-40000 (AUG. 1, 1927-JAN. 1, 1928)
MODEL 131-A (1928) SERIAL NOS. C-40001 UP (AFTER JAN. 3, 1928)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove 3 flange mounting cap screws. Pull starter forward and lift from place.

Oiling:—Put 8 or 10 drops of light oil in the starter bearing oilers every 1000 miles or each month.

GENERATOR:—Model 949-E. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the field circuit and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the charging rate is 20 amperes (cold) reached at 1450 R.P.M. or 22 miles per hour.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.35	1450	9-12	7.5	2000

Motoring generator draws 6 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is flange mounted at right of engine on rear of accessory bracket. The water pump is driven by extension of the generator shaft. To remove generator, disconnect lead and water pump coupling and remove 4 mounting bolts. Then pull generator to the rear and lift from place.

Oiling:—Put 8 or 10 drops of light oil in each of the generator bearing oilers every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay closes at 500 R.P.M. when the generator voltage reaches 6.75-7.5 volts and opens with a current discharge of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Clum Switch Model 10677. Switch is mounted on the lower end of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Stop light is 6-8 volt, 3 cp. S.C. Mazda No. 63. Dome light is 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash, tail and side lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Lighting fuses are 20 amperes capacity.

CHANDLER

MODEL 35-A (1928—AUGUST 1, 1927 TO JANUARY 1, 1928)
MODEL 135 (1928) SERIAL NOS. 182501 UP AFTER JANUARY 3, 1928
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 615-JFK, 6 volt, 15 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 120 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted under front floor boards on right frame member.

IGNITION:—Coil Model 525-C. Coil is mounted on horn bracket at right front of engine. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

Distributor Model 633-C (Model 35-A). Breaker contacts separate .018-.024 inch with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-20 ounces. Distributor is semi-automatic. Maximum manual advance is 22 degrees of engine. Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 22 degrees reached at 2600 R.P.M.

Distributor Model 641-C (Model 135). Breaker contacts separate .018-.024 inch. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 22 degrees. Automatic advance begins at 500 R.P.M. of engine. Maximum automatic advance is 30 degrees of engine reached at 3000 R.P.M.

Mounting:—Distributor is mounted on the rear of the generator at the right of the engine. To remove distributor, disconnect primary lead and manual advance lever and remove distributor head with cables intact. Then remove set screw in side of shaft and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft and turn down one turn every month. Each month put a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark advance lever fully advanced. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance spark lever. Continue to crank engine until piston No. 1 reaches top dead center when the flywheel mark 'DC 1&6' will be directly opposite the pointer on the flywheel case. Then loosen advance arm clamp screw and rotate distributor until contacts begin to open. Tighten the clamp screw. Make certain that the segment opposite the rotor is connected to the spark plug in cylinder No. 1 and connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head.

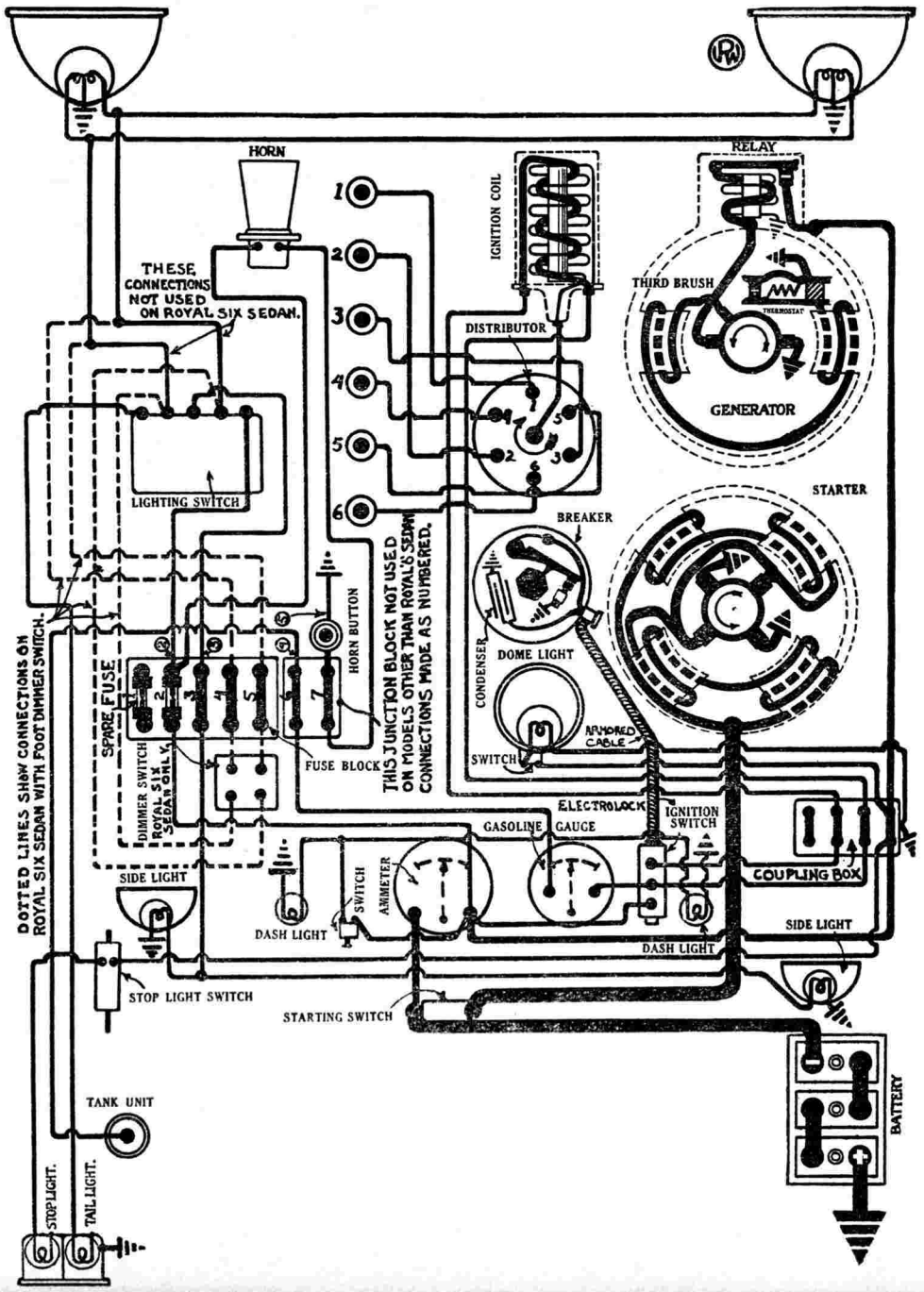
Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

VALVE TIMING:—Specifications:—Head diameter, 1 23/32 inches; stem diameter, 3/8 inch; stem length, 6 9/16 inches. Valve lift, 5/16 inch. Tappet clearance, .009 inch (hot). Spring pressure, 70 pounds. Valve stem guides are removable. Oversize valves are not made.

Timing:—Inlet valves open 16 degrees before top dead center and close 51 degrees after lower dead center. Exhaust valves open 64 degrees 30 minutes before lower dead center and close 21 degrees after top dead center.

STARTER:—Model 720-W. Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter switch is Model 405-C. Brush spring tension is 24-28 ounces.



CHANDLER

MODEL 35-A (1928—AUGUST 1, 1927 TO JANUARY 1, 1928)
MODEL 135 (1928) SERIAL NOS. 182501 UP AFTER JANUARY 3, 1928
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing under the crankcase flange. To remove starter, disconnect cable and remove flange mounting cap screws and stud extending through crank case flange. Then pull starter forward and lift from place.

Oiling:—Put 5 or 6 drops of light oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless.

GENERATOR:—Model 944-C. The direction of rotation is counter-clockwise, looking at the commutator end of the generator. Current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the field and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 19 amperes (cold) reached at 1300 R.P.M. or 22 miles per hour.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
18-20	8.5	1300	9-12	7.6	1400

Motoring generator draws 6 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 22-28 ounces.

Mounting:—Generator is base mounted on special bracket at right of engine and is driven by extension of water pump shaft. To remove generator, disconnect lead and water pump coupling. Remove distributor. Then remove nuts from two base mounting studs and lift generator from place.

Oiling:—Put 4 or 5 drops of light oil in each of the generator bearing oilers every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 500 R.P.M. when the generator voltage reaches 6.75-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Clum Switch Model 10677. Switch is located at lower end of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Dome light is 6-8 volt, 6 cp. S.C. Mazda No. 81. Side, stop, dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Fuses are 20 amperes capacity.

CHANDLER

MODEL 37-A (1928)—AUGUST 1, 1927 TO JANUARY 1, 1928)
MODEL 137 (1928—AFTER JAN. 3, 1928) SERIAL NOS. 106001 UP
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 613-JFK, 6 volt, 13 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 102 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted under front floor boards on the right frame member.

IGNITION:—Coil Model 525-C. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped. Coil is mounted in the right front frame channel.

Distributor Model 658-G (Model 37-A). Breaker contacts separate .022 inch with breaker arm on lobe of cam. Set contact gap by loosening lock screw on stationary contact plate and turning eccentric adjusting screw until proper setting is secured. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Breaker uses two sets of contacts on a single four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval for the Chandler engine and breaker must be accurately set. See Timing. Distributor is semi-automatic. Maximum manual advance is 33 degrees (engine). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 35 degrees reached at 2400 R.P.M.

Distributor Model 657-A (Model 137). Data identical with Model 658-G.

Mounting:—Distributor is mounted on the front of the generator at the right of the engine. To remove distributor, disconnect primary lead and manual advance rod and remove distributor head with cables intact. Then loosen distributor clamp screw and lift distributor from place.

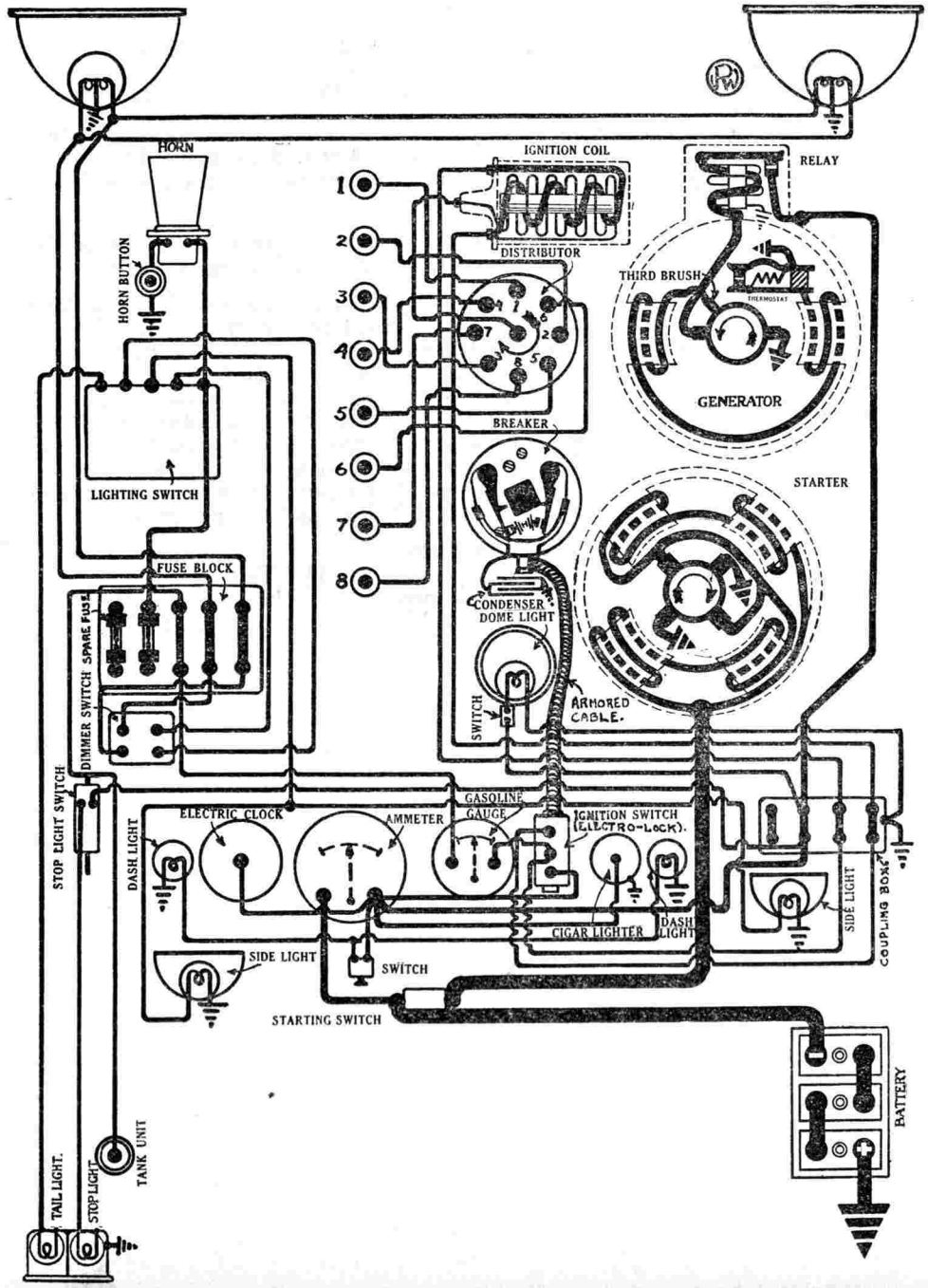
Oiling:—Fill the grease cup on the side of the distributor shaft and turn down one turn every month or each 1000 miles. Every month remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light oil. Put a small bit of vaseline on the breaker cam.

Timing:—Synchronization of Contacts:—Use Delco-Remy Tool, Part No. 820738, and follow directions on Page S-30 of National Manual. Contacts can be synchronized without tool after distributor has been timed to engine by cranking engine over 90 degrees from firing position of piston No. 1 when piston No. 6 will reach top dead center entering power stroke. The second set of contacts should separate at this point. If they do not, loosen lock screws and turn eccentric adjusting screw on breaker plate until contacts begin to open. Tighten the lock screw and check the contact gap with the breaker arm on the lobe of the cam. If it is not within limits of .018-.024 inch reset at .022 inch and repeat synchronizing operation.

Timing Distributor to Engine:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual advance lever fully advanced. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance spark control lever. Continue to crank engine until piston No. 1 reaches top dead center when the flywheel mark 'DC 1&8' will be directly opposite the indicator on the flywheel case. Loosen advance arm clamp screw and turn distributor housing until contacts begin to separate. Tighten the clamp screw. Make certain that the rotor is opposite the segment connected to the spark plug in cylinder No. 1 and connect the remaining spark plugs in order 6-2-5-8-3-7-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .020 inch.



CHANDLER

MODEL 37-A (1928)—AUGUST 1, 1927 TO JANUARY 1, 1928)
MODEL 137 (1928—AFTER JAN. 3, 1928) SERIAL NOS. 106001 UP
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

VALVE TIMING:—INLET VALVES:—Head diameter, 1 23/32 inches; stem diameter, 3/8 inch; stem length, 6 13/32 inches. Valve lift, 5/16 inch. Tappet clearance, .009 inch. Spring pressure, 95 pounds. Inlet valves open 16 degrees before top dead center and close 51 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 19/32 inches; stem diameter, 3/8 inch; stem length, 6 13/32 inches. Valve lift, 5/16 inch. Tappet clearance, .009 inch.

Spring pressure, 95 pounds. Exhaust valves open 64 degrees 30 minutes before lower dead center and close 21 degrees after top dead center. Valve stem guides are rmovable. Oversize valve stems are not made.

STARTER:—Model 727-A. Starter is connected to the engine through reduction gears and an outboard Bendix drive. The direction of rotation of the armature shaft is clockwise, looking at the commutator end. Starter switch is Model 405-C. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2500	5	70
28 "	Lock	3	600

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove flange mounting studs. Then pull starter forward and lift from place.

Oiling:—Put 8 or 10 drops of light oil in each of the starter bearing oilers every two weeks or each 500 miles. Every six months remove the grease plug in the reduction gear compartment and repack gears with medium cup grease.

GENERATOR:—Model 944-D. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screws after making the adjustment. With standard car setting, maximum charging rate is 19 amperes reached at 1300 R.P.M. or 20 miles per hour.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19	8.5	1300	12	7.65	1500

Motoring generator draws 6 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect generator lead and remove distributor. Then remove 3 flange mounting cap screws and slide generator to the rear. Make certain that timing chain does not slip off generator drive sprocket as this will throw off valve timing of engine.

Adjustment of Timing Chain:—Timing chain is adjusted by loosening two upper flange mounting screws and moving generator outward. Make adjustment with engine running and move generator until chain hums. Then slack up on chain tension until the noise disappears. Tighten the cap screws. It is very important not to get too much tension on the chain. With correct setting the chain will operate noiselessly.

Oiling:—Put 8 or 10 drops of light oil in each of the generator bearing oilers every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 500 R.P.M. when the voltage of the generator reaches 6.75-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Clum Switch Model 10677. Switch is mounted at lower end of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Stop light is 6-8 volt, 3 cp. S.C. Mazda No. 63. Dash, tail, side and corner lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Lighting fuses are 20 amperes capacity.

CHEVROLET
MODEL 4-90 (1916-17)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .023 inch. They are made of tungsten. When the condition of the points affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

OILING.—Refill the cup under breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

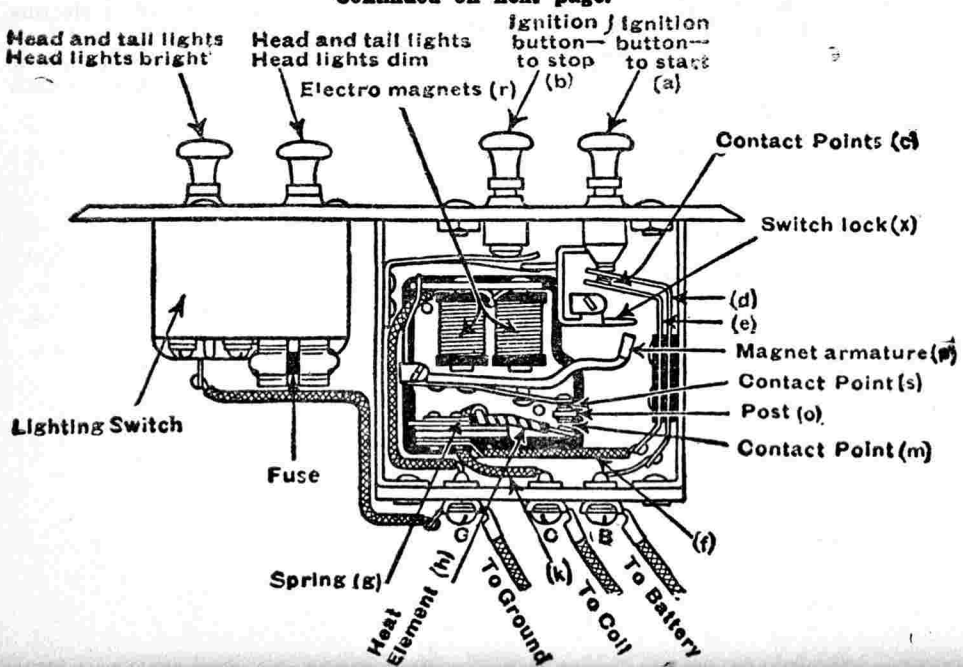
TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

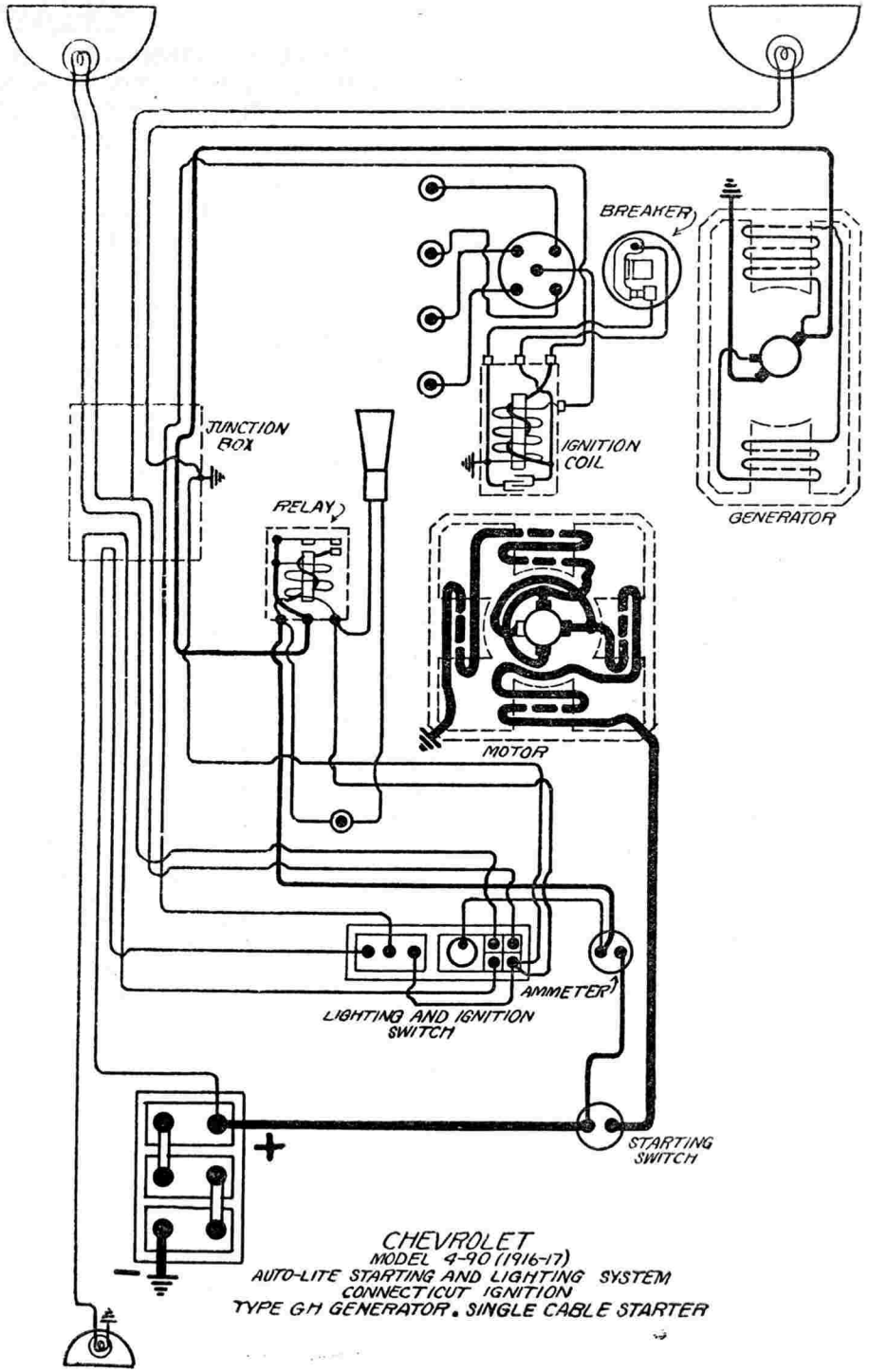
FIRING ORDER.—The firing order is 1, 2, 4, 3.

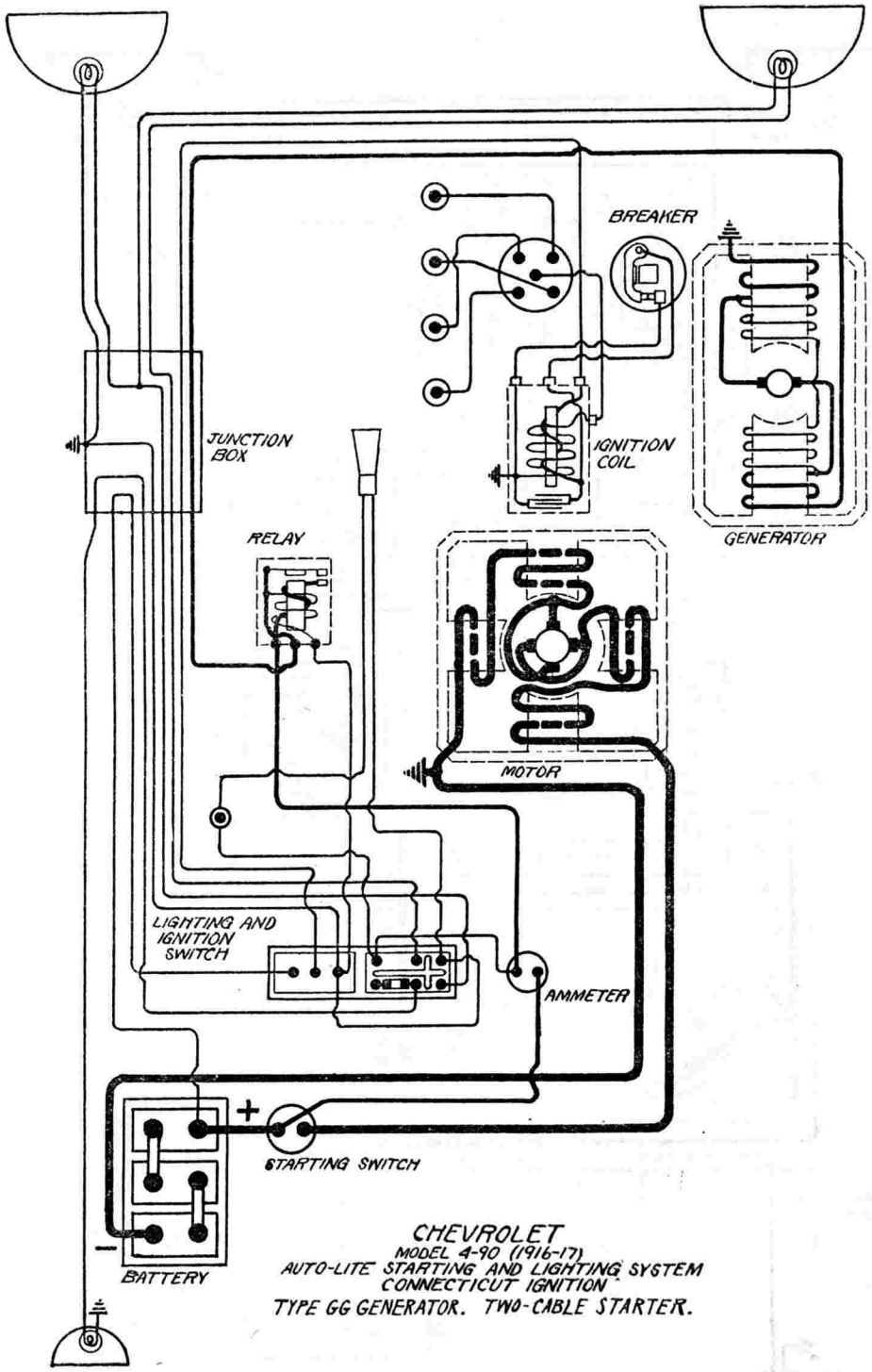
SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

THERMOSTAT.—There is a thermostatically controlled device in the ignition switch to automatically open ignition circuit, should switch be left in the "On" position, engine idle, and contacts closed. This device is shown below. The ignition current flowing through the heat element (h) causes it to bend, making contact at (m). This completes circuit through the electro-magnet (r), causing armature (p) to vibrate, applying a series of blows to switch lock (x), releasing the ignition button (a), opening the ignition circuit. Should the device fail to operate, loosen the screws holding it to the instrument board and pull out. Disconnect wire from middle connection (c). Run a wire from negative terminal of battery or from ground, and connect to the spring (e), switch closed. Make and break the connection. If a spark is given off, the contacts (c) are in good condition. If not, make necessary repairs. If they are in good condition, test the heat element (h) by bringing the free end of the test wire to terminal C. Make and break the circuit. If no spark results, either the heat element (h) is burned out, the wire K has become unsoldered from the heat element or the heat element is detached from spring (j). If heat unit is burned out, a temporary repair may be made by soldering a piece of wire from the spring (e) to terminal C. With this connection, the thermostat is inactive. Should vibrator fail to operate when the heat element makes contact at post (o), contacts are defective or there is a broken wire or ground or short circuit in magnet circuit, or magnets are burned out.

Continued on next page.







CHEVROLET
MODEL 4-90 (1916-17)
AUTO-LITE STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION
TYPE GG GENERATOR. TWO-CABLE STARTER.

CHEVROLET

MODEL 490 (1916-17)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM CONNECTICUT IGNITION

Continued from preceding page.

STARTER.—Starter is connected to engine through a Bendix drive.

OILING.—Thoroughly clean out and repack starter bearings with soft cup or ball bearing grease every six months.

GENERATOR.—Two types of generators are used, the type GG machine using reverse series field system of current regulation, and a type GH machine, using third brush system of current regulation.

Amperes	Generator Data. Model GG	R.P.M.
5.0		750- 860
10.0		1225-1400
12.5		1600-1825
15.0		2175-2450
17-19		3200-3700

A variation of 1.5 amperes from these amounts is allowable. Current may be varied slightly by changing pressure of brushes on commutator. The correct pressure is 1 to 1¼ lbs. Operating freely as a motor, generator takes 2.8 amperes, armature revolving at 350 R.P.M. Shunt field takes 1.1 amperes.

Amperes	Generator Data. Model GH	R.P.M.
5.0		760- 820
10.0		1020-1100
12.5		1200-1300
15.0		1460-1675
15-17		1950-2250

Operating freely as a motor, generator takes 2.7 amperes, armature revolving at 450 R.P.M. Shunt field takes 1.7 amperes.

OILING.—Put 5 or 6 drops of light engine oil in each of generator bearing oilers every 2 weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Model GG generator closes the relay at 7-9 miles per hour or 500-575 R.P.M. of armature. Model GH generator closes the relay at 7-9 miles per hour or 525-600 R.P.M. of armature. Charging current is .5 to 1.5 amperes at closing and the discharge current 0 to 1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 17 cp. on 1916 cars and 6-8 volt, 14 cp. on later cars. Tail lamp is 6-8 volt, 4 cp.

CHEVROLET

MODEL D, 8 CYLINDER (1917-18)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

This Page Applies to First 1000 Cars

BATTERY.—Battery is 6 volt, 115 ampere-hour. The negative (—) terminal is grounded at the starting motor.

IGNITION.—Breaker contacts separate .020 to .025 inch. When condition of contacts affects the ignition, resurface with a fine flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions should be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1R, 4L, 2R, 3L, 4R, 1L, 3R, 2L.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch to .030 inch.

STARTER.—Model ME. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes
1 lb. ft.	1960	80
3 lb. ft.	1100	160
5 lb. ft.	800	220
7 lb. ft.	500	280
9 lb. ft.	230	340
13 lb. ft.	Lock	470

OILING.—Starter bearings are packed with soft cup or ball bearing grease. Thoroughly clean out and repack every 6 months.

GENERATOR.—Model GH. Generator current regulation is by third brush system.

Generator Data

Ampere	R.P.M.
5.00	760- 820
10.00	1020-1100
12.50	1200-1300
15.00	1460-1675
15-16	1950-2250

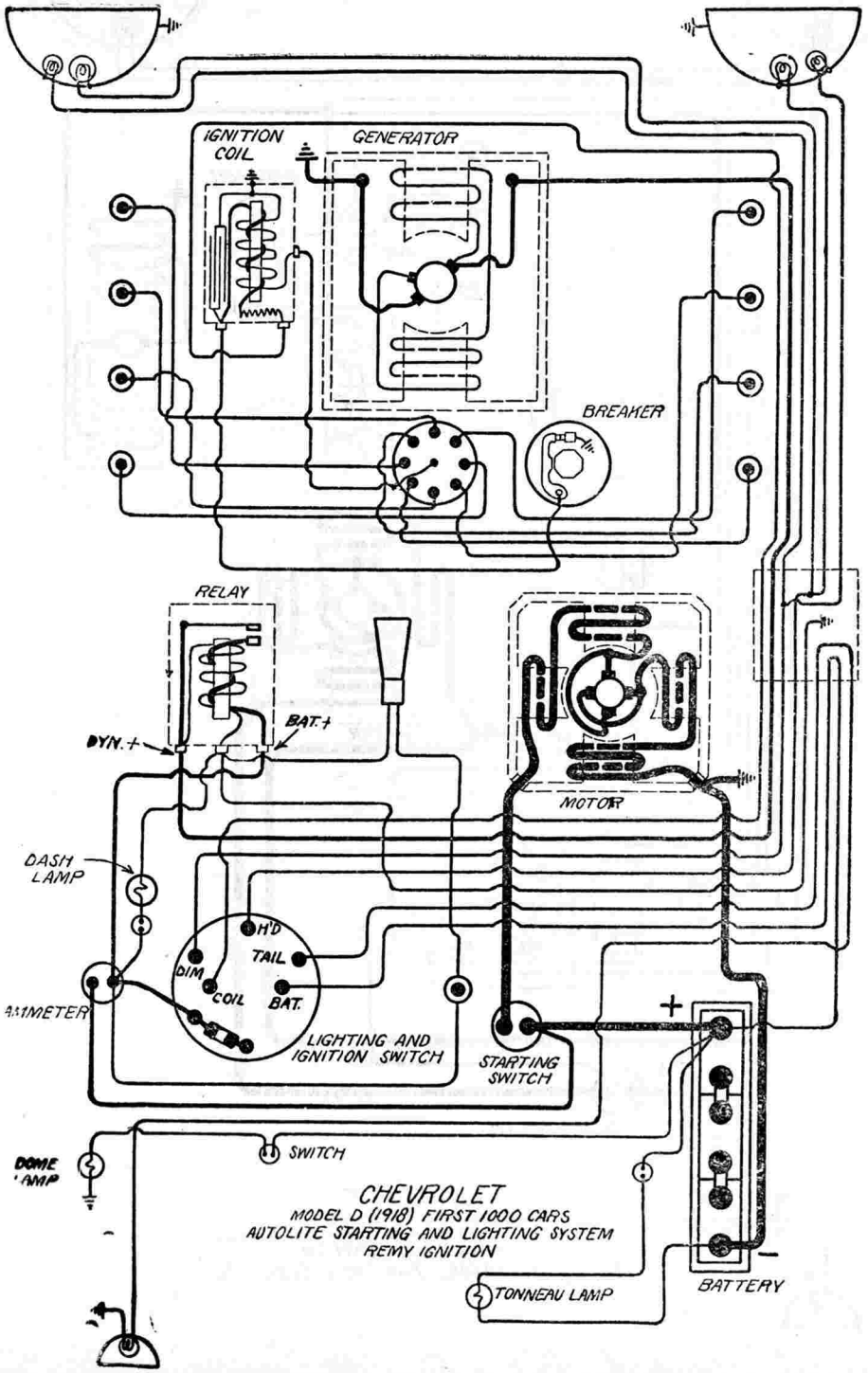
When generator is operating freely as a motor, current is 2.7 amperes, armature revolving at 450 R.P.M. Shunt field current is 1.7 amperes.

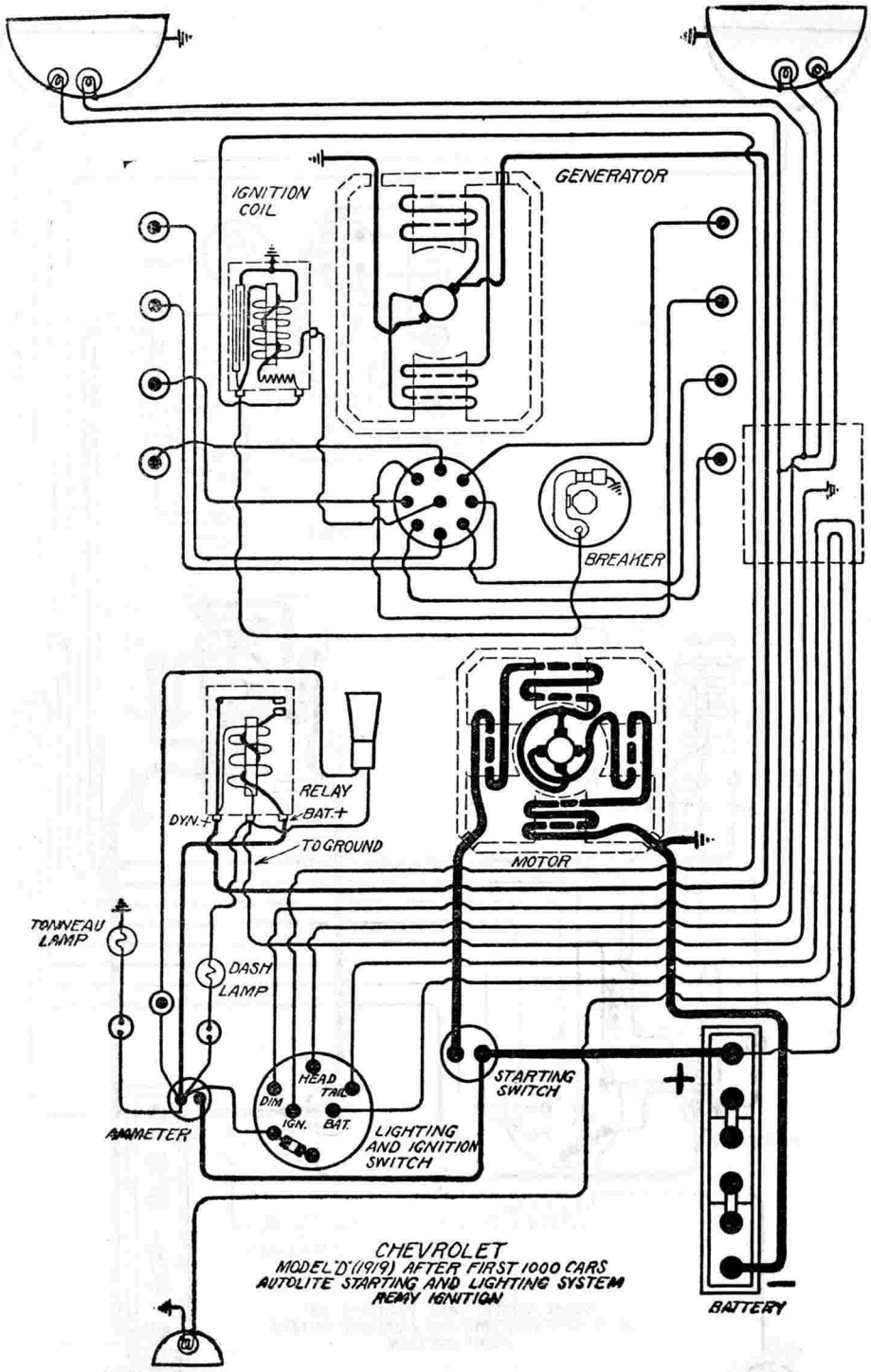
OILING.—Put several drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 550-600 R.P.M. of armature and opens at 5-8 miles per hour or 450-500 R.P.M. of armature. Charging current is .5 to 1.5 amperes at closing and the discharge current, 0-1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

FUSES.—Fuses are 20 ampere.





Chevrolet

MODEL D, 8 CYLINDER (1919)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

This Page Applies After First 1000 Cars

BATTERY.—Battery is 6 volt, 115 ampere-hour. The negative (—) terminal is grounded at the starting motor.

IGNITION.—Breaker contacts separate .020 to .025 inch. When condition of contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly fully retarded.

FIRING ORDER.—The firing order is 1R, 4L, 2R, 3L, 4R, 1L, 3R, 2L.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER.—Model ME. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes
1 lb. ft.	1960	80
3 lb. ft.	1100	160
5 lb. ft.	800	220
7 lb. ft.	500	280
9 lb. ft.	230	340
13 lb. ft.	Lock	470

OILING.—Starter bearings are packed with soft cup or ball bearing grease. Thoroughly clean out and repack every six months.

GENERATOR.—Model GH. Generator current regulation is by third brush system.

Generator Data

Amperes	R.P.M.
5.00	760- 820
10.00	1020-1100
12.50	1200-1300
15.00	1460-1675
15-16	1950-2250

When generator is operating freely as a motor, current is 2.7 amperes, armature revolving at 450 R.P.M. Shunt field current is 1.7 amperes.

OILING.—Put several drops of light engine oil in each of generator oilers every two weeks If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles

RELAY.—Relay closes at 8-10 miles per hour or 550-600 R.P.M. of armature and opens at 5-8 miles per hour or 450-500 R.P.M. of armature. Charging current is .5 to 1.5 amperes at closing and the discharge current, 0-1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

CHEVROLET
MODEL F A (1919)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Battery is 6 volt, 85 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .020 to .025 inch. When condition of contacts affects the ignition, resurface with a very fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 2, 4, 3.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER.—Model ME. Starter is connected to engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes
1 lb. ft.	1960	80
3 lb. ft.	1100	160
5 lb. ft.	800	220
7 lb. ft.	500	280
9 lb. ft.	230	340
13 lb. ft.	Lock	470

OILING.—Starter bearings are packed with grease. Thoroughly clean out and repack starter bearings with soft cup or ball bearing grease every six months.

GENERATOR.—Model GH. Generator current regulation is by third brush system.

Generator Data

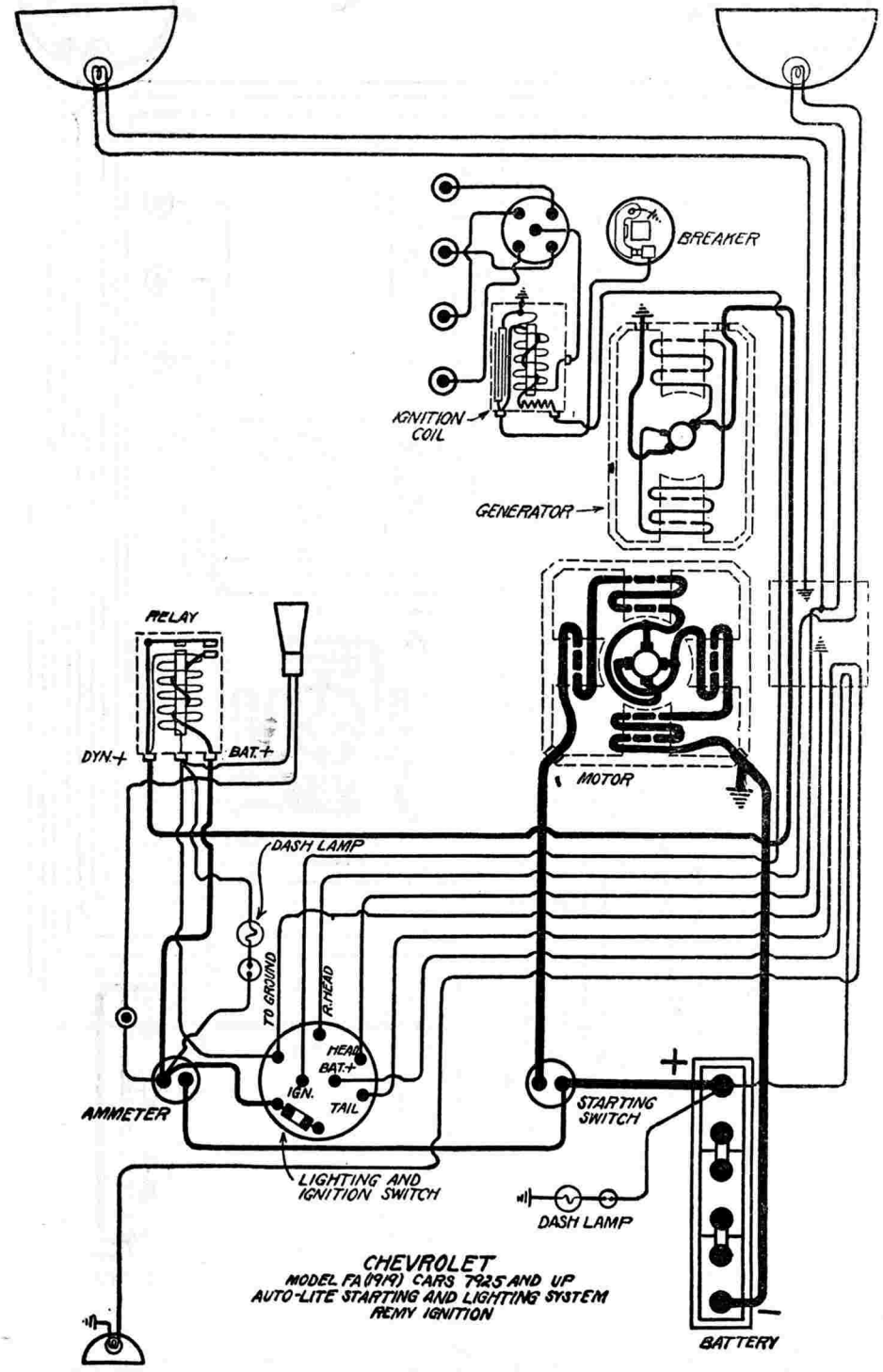
Amperes	R.P.M.
5.00	760- 820
10.00	1020-1100
12.50	1200-1300
15.00	1460-1675
15-16	1950-2250

When generator is operating freely as a motor, current is 2.7 amperes, armature revolving at 450 R.P.M. Shunt field current is 1-7 amperes.

OILING.—Put 5 or 6 drops of light engine oil in each of generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 550-600 R.P.M. of armature and opens at 5-8 miles per hour or 450-500 R. P. M. of armature. Charging current is .5 to 1.5 amperes at closing and the discharge current 0-1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

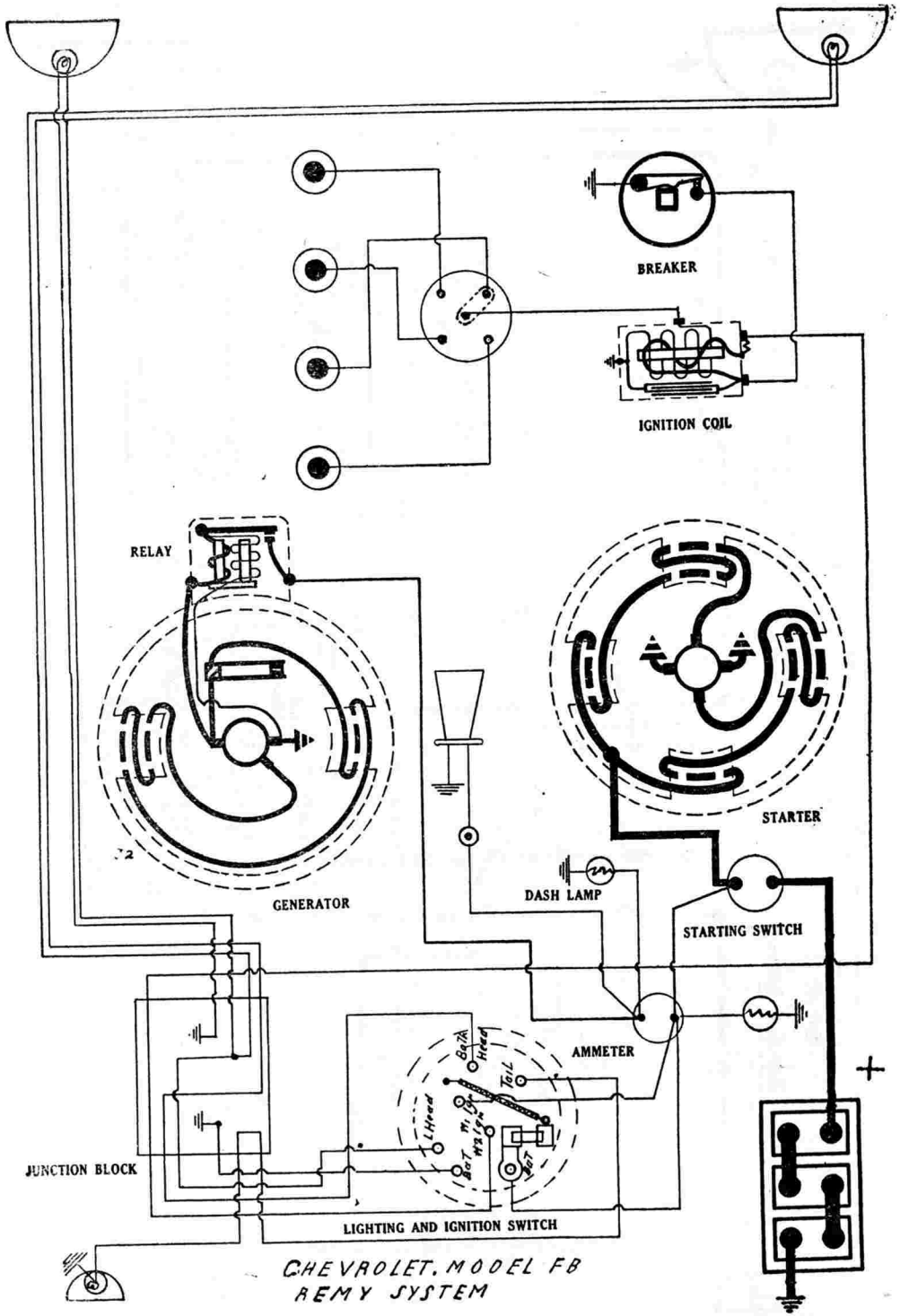
LAMPS.—Head lamps are 6-8 volt, 14 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.



CHEVROLET

MODEL F. B. (1920-21-22)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION



BATTERY.—Willard, Type SJR-4, 6 volt, 115 ampere-hours. The negative (—) terminal is grounded.

IGNITION:—Breaker contacts separate .020 to .025 inch. When condition of contacts affects the ignition, resurface with a very fine, flat jeweler's file or worn No. 00 sandpaper.

Oiling:—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing:—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-2-4-3.

Spark Plug Gaps:—Spark plug gaps are .025 to .030 inch.

STARTER:—Model ME. Starter is connected to engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes
1 lb. ft.	1960	80
3 lb. ft.	1100	160
5 lb. ft.	800	220
7 lb. ft.	500	280
9 lb. ft.	230	340
13 lb. ft.	Lock	470

Oiling:—Starter bearings are packed with grease. Thoroughly clean out and repack starter bearings with soft cup or ball bearing grease every six months.

GENERATOR:—Model GH. Generator current regulation is by the third brush system.

Generator Data

Amperes	R. P. M.
5.00	760- 820
10.00	1020-1100
12.50	1200-1300
15.00	1460-1675
15-16	1950-2250

When generator is operating freely as a motor, current is 1.7 amperes, armature revolving at 450 R.P.M. Shunt field current is 1-7 amperes.

Oiling:—Put 5 or 6 drops of light engine oil in each of generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY:—Relay closes at 8-10 miles per hour or 550-600 R.P.M. of armature and opens at 5-8 miles per hour or 450-500 R.P.M. of armature. Charging current is .5 to 1.5 amperes at closing and the discharge current 0-1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dash and tail lamps are 6-8 volt, 4 cp

FUSES.—Fuse is 20 ampere.

CHEVROLET
MODEL 4-90 (1919-20-21)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Willard, Type SJW-3, 6 volt, 80 ampere-hour. The negative (—) terminal is grounded at the starting motor.

IGNITION.—Breaker contacts separate .030 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the grease cup under the breaker head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering the power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 2, 4, 3.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model MF. Rotation is counter-clockwise, looking at the commutator end. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 75 R.P.M., taking 150 amperes.

OILING.—Thoroughly clean out and repack the starter bearings with soft cup or ball-bear- rate is 16 amperes, reached at 1800-2250 R.P.M. or 25 miles per hour.

GENERATOR.—Model GH. Rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Maximum charging ing grease every six months.

Generator Data

Amperes	R.P.M.	Volts
0	550	6.25
4	720	6.6
8	900	7.0
12	1150	7.4
16	1700	7.9
16.4	2000	8.0
15	2500	7.8

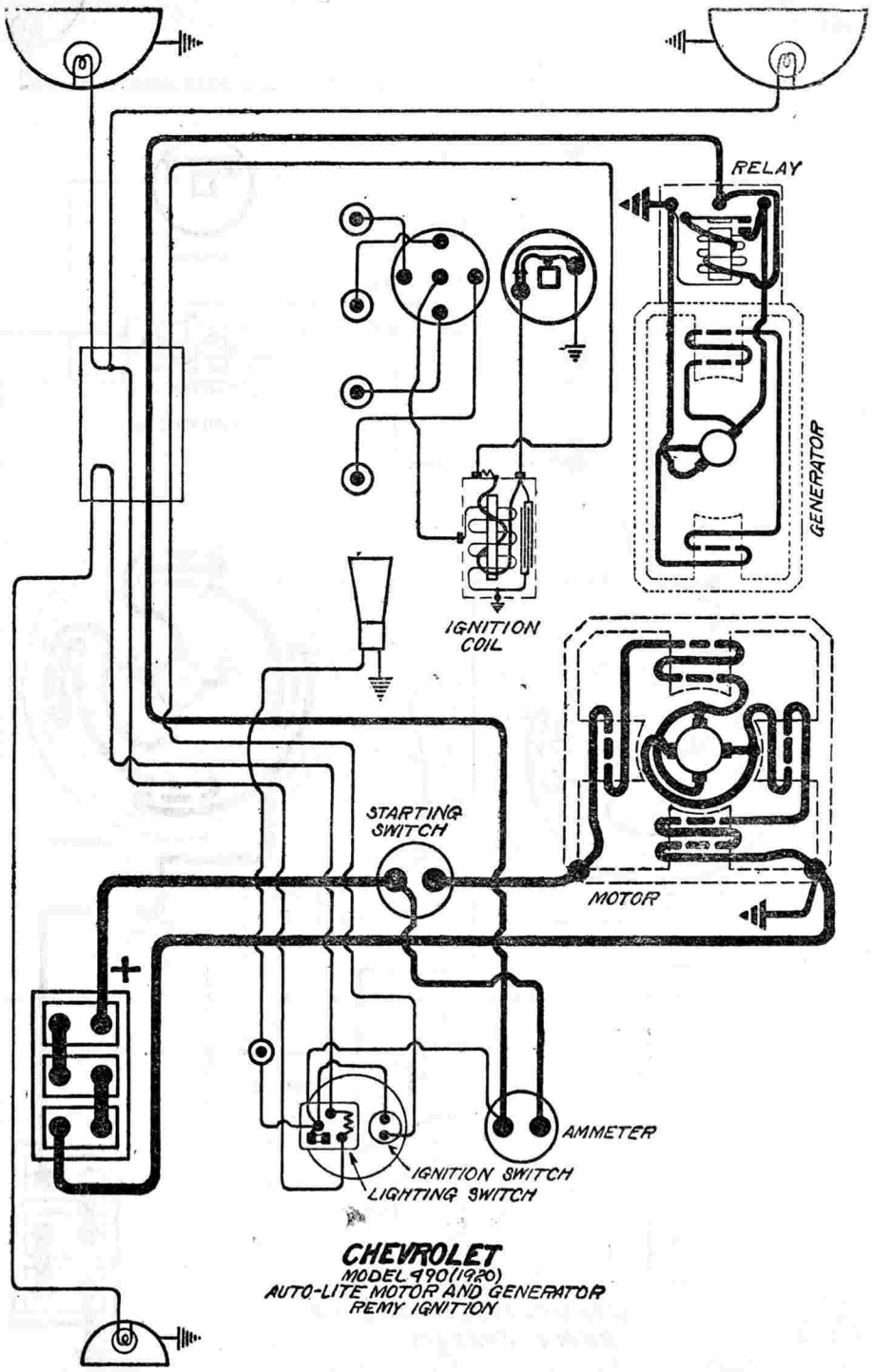
Charging rate is varied by adjustment of the third brush setting. Move the third brush in a counter-clockwise direction, looking at the commutator end, to increase the charging rate and in the opposite direction to decrease the charging rate. Reseat the brush after adjusting the position. Operating freely as a motor, generator takes 2.7 amperes, armature revolving at 450 R.P.M. Shunt field winding takes 1.7 amperes.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

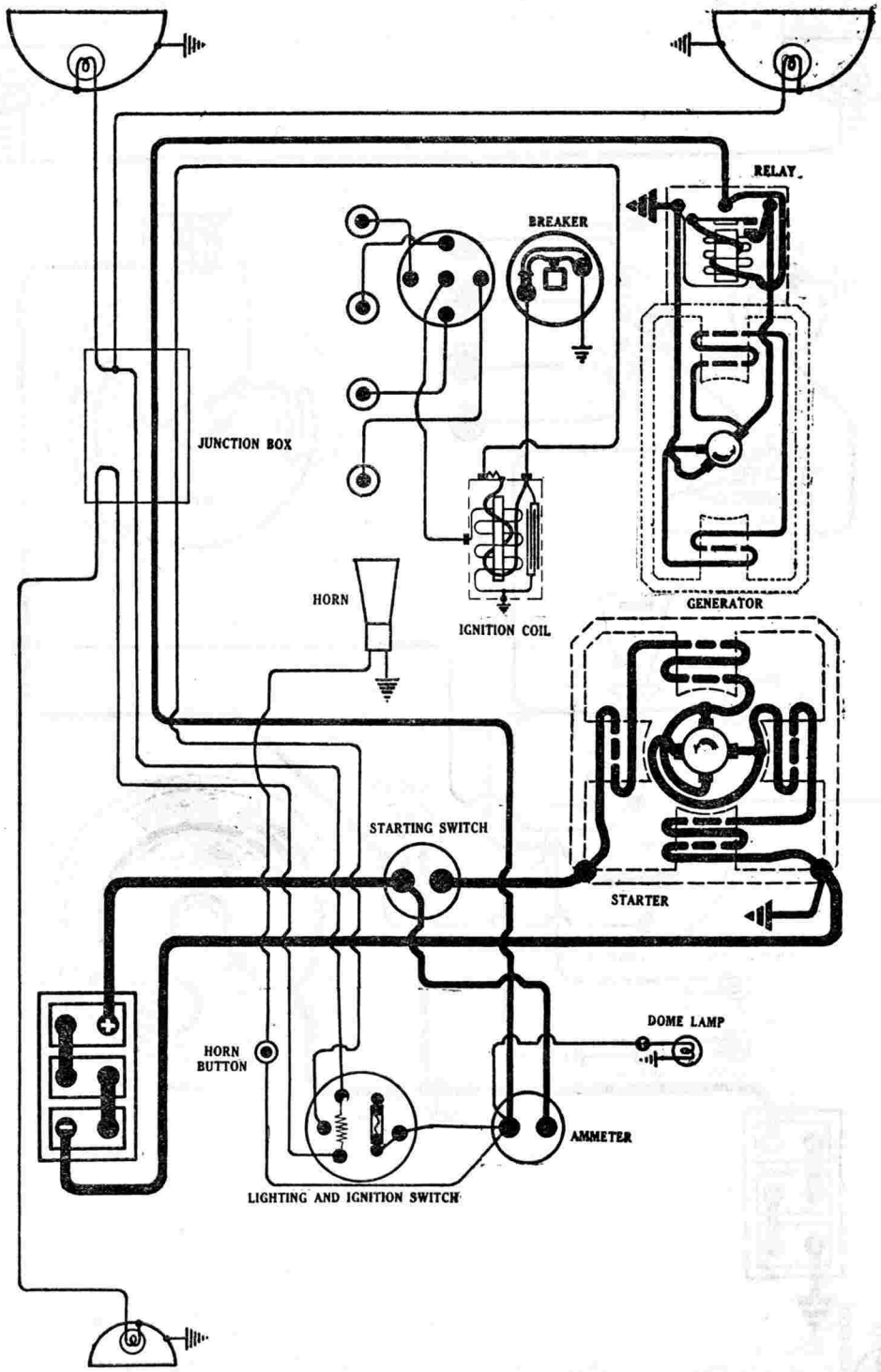
RELAY.—Relay closes at 550-600 R.P.M. of the armature or 8-10 miles per hour and open at 500-550 R.P.M. of the armature or 6-8 miles per hour. Charging current is .5 to 1.5 amperes at closing and the discharge current 0-1 ampere at the opening of the relay contacts. Clean the relay contacts by drawing unglazed peper between them. If badly burned or pitted, resurface them with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Tail lamp is 6-8 volt, 2 cp.

FUSES.—One fuse is used; 20 amperes.



CHEVROLET
MODEL 490 (1920)
AUTO-LITE MOTOR AND GENERATOR
REMY IGNITION



CHEVROLET

MODEL 490 (1922)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY:—Willard, Type SJXR-3. 6 volt, 80 ampere-hour. The negative (—) terminal is grounded at the starting motor.

IGNITION:—Breaker contacts seperate .030 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

Oiling:—Refill the grease cup under the breaker head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing:—Breaker contacts begin to separate when the piston entering the power stroke is on top dead center, spark control lever and breaker assembly in thet fully retarded position.

Firing Order:—The firing order is 1-2-4-3.

Spark Plug Gaps.—Spark plug gaps are .030 inch.

STARTER:—Model MF. Rotation is counter-clockwise, looking at the commutator end. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 150 to 160 R.P.M., normally, taking 160 amperes.

Starter Data—Model MF

Torque	R.P.M.	Volts	Amperes
2.0 lb ft.	1550	190	5.1
4 lb. ft.	960	295	4.5
5 lb. ft.	500	390	4.0
7.5 lb. ft.	100	460	3.7

Stalled Torque Data

Volts	Lock Torque
2.0	5.6 lb. ft.
3.5	10.4 lb. ft.
5.0	15.0 lb. ft.

The brush tension is 2 pounds.

Oiling:—Thoroughly clean out and repack the starter bearings with soft cup or ball-bearing grease every six months.

GENERATOR:—G.H. 1012. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system.

Generator Test Data

Amperes	Hot Test R.P.M.	Amperes	Cold Test R.P.M.
0	700	0	660
6	1200	6	1000
10	1700	10	1300
12	2000	12	1500
13	2400	16	2400

The brush tension is 2 pounds. Charging rate is varied by adjustment of the third brush setting. Move the third brush in a counter-clockwise direction, looking at the commutator end, to increase the charging rate and in the opposite direction to decrease the charging rate. Reseat the brush after adjusting the position. Operating freely as a motor, generator takes 2.7 amperes, armature revolving at 450 R.P.M. Shunt field winding takes 1.7 amperes

Oiling:—Put 5 or 6 drops of light engine oil in each of the gererator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks the oiling must be done every 500 miles.

RELAY:—Relay closes at 10 miles per hour or 700 R.P.M. of the armature, and opens at 9 miles per hour or 600 R.P.M. of the armature. The discharge current is 0 to 2 amperes at opening of relay contacts. Clean the relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface them with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS:—Head lamps are 6-8 volt, 17 cp. Tail lamp is 6-8 volt, 2 cp. Dome lamp is 4 cp. (used only in closed bodies).

FUSES.—Lighting fuse is 20 ampere.

CHEVROLET

SUPERIOR MODEL (1923-24)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Exide, Type 3-XC-13-1, or **Willard, Type SJXR-3,** 6 volt, 90 ampere-hour. The starting capacity is 100 amperes for 20 minutes. The lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model 284-L. Distributor Model 374-A. Breaker contacts separate .030 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone or with a fine, flat jeweler's file. The distributor has no automatic advance. Manual advance is 30°.

Oiling:—Refill the grease cup on the side of the distributor shaft and turn down one quarter turn every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing:—Breaker contacts separate when No. 1 piston entering power stroke is at top dead center, spark control lever and breaker assembly fully retarded.

Firing Order:—The firing order is 1-2-4-3.

Spark Plugs:—Spark plug gaps are .025 inch.

STARTER:—Model 711-B (2 Brush) 711-BX (4 Brush). The direction of rotation, looking at commutator end, is counter-clockwise. Starter is connected to motor by a Bendix drive. Cranks the engine at 160 R.P.M. taking 140 amperes. Starter brush tension should be 20-24 ounces each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
10 "	Lock	3.5	425

Oiling:—Put 4 or 5 drops of light engine oil into starter oiler every two weeks. If car is driven over 500 miles in two weeks, this care must be given every 500 miles.

GENERATOR:—Model 950-A,B. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for voltage regulation. The maximum charging rate is 18 amperes reached at 1800 R.P.M. of the generator armature. Brush tension is 14-18 ounces each. Shunt field current is 5 amperes at 6 volts.

Generator Test Data

Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	7.25	640			
7	7-7.3	880	12-15	8-8.5	1750
15-17	8.2-8.8	1750			
8.5-15.5		2500			

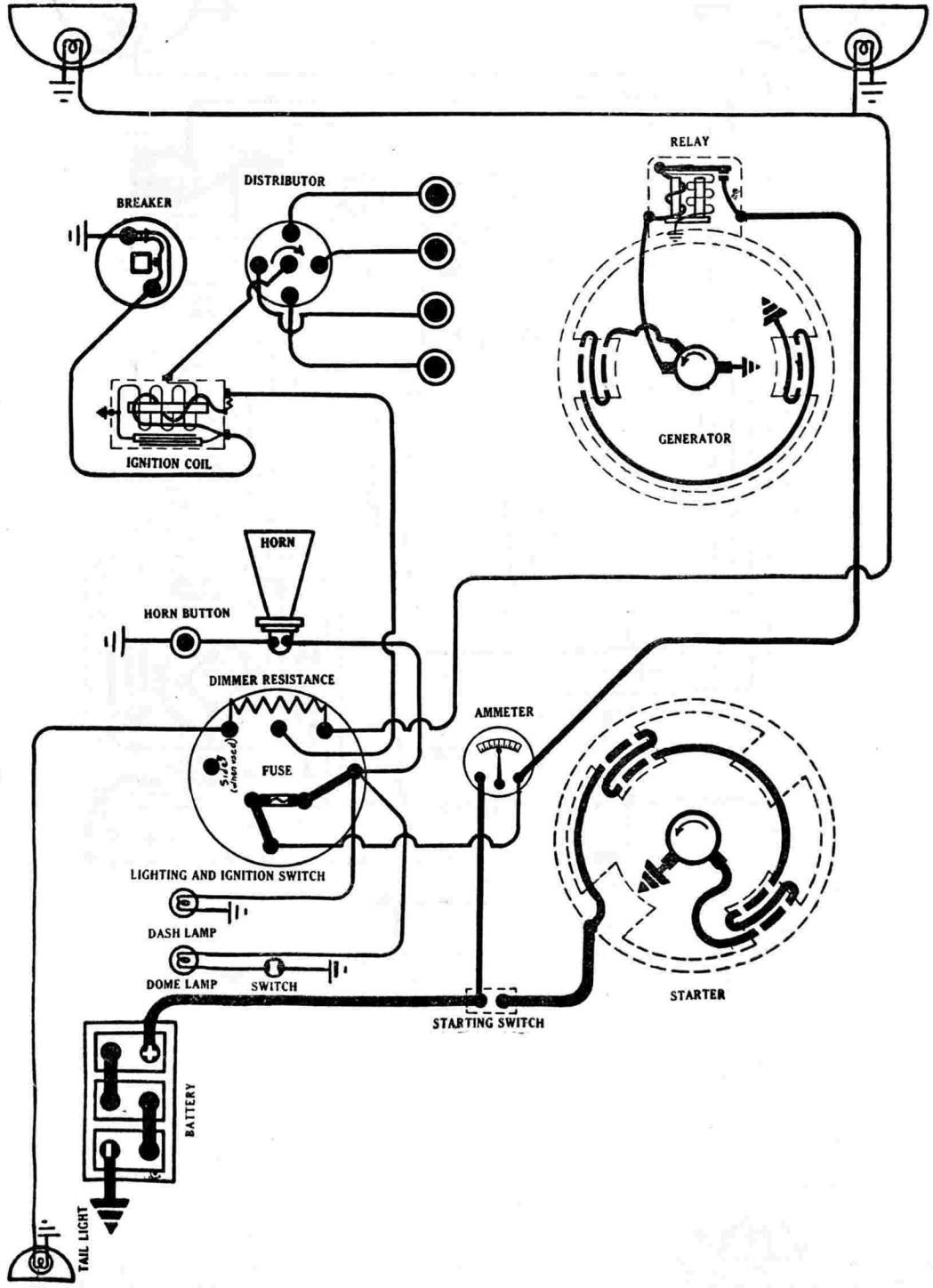
To adjust the generator charging rate, loosen the generator cover band and the screw on the generator end plate. Then shift the third brush in the direction of armature rotation to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment.

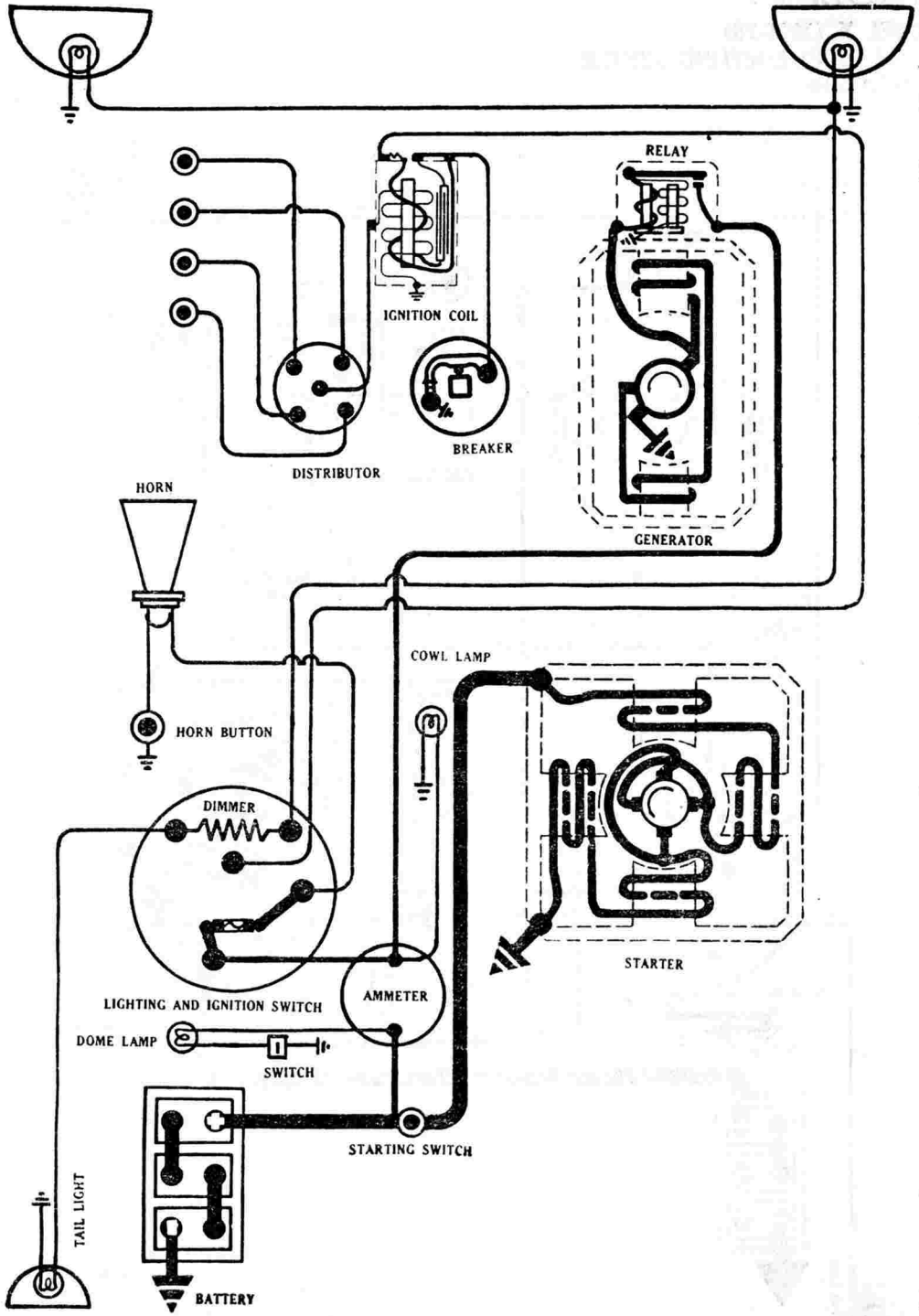
Oiling:—Put 4 or 5 drops of light engine oil into generator oiler every two weeks. If car is driven over 500 miles in twowe eks, this attention must be given every 500 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay contacts close at 6-10 M.P.H. or 650 R.P.M. of the generator when the voltage reaches 7.25 volts and open with a discharge current of 0-2.5 amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LAMPS.—Head lights are 6-8 volts, 21 cp. Tail and cowl lights, 6-8 volts, 2 cp. Dome light, 6-8 volt, 2 cp.

FUSES.—20 amperes.





CHEVROLET

SUPERIOR MODEL (1923)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY.—Exide, Type 3-XC-13-1, or **Willard, Type SJXR-3,** 6 volt, 90 ampere-hour. The starting capacity is 100 amperes for 20 minutes. The lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION.—Distributor Model No. 66-P. Breaker contacts separate .030 inch. When the condition of contacts affects the ignition, resurface on a medium hard oilstone.

Oiling.—Refill the grease cup under the breaker head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when the piston entering the power stroke is on top dead center, spark control lever and breaker asssembly in the fully retarded position.

Firing Order.—The firing order is 1, 2, 4, 3.

Spark Plugs.—The spark plug diameters are 7/8 inch, gaps are .022 inch.

STARTER.—Model MF. Rotation is counter-clockwise, looking at the commutator end. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 150 to 160 R.P.M., normally, taking 160 amperes

Starter Data.—Model MF

Torque	R.P.M.	Amperes	Volts
2.0 lb. ft.	1550	190	5.1
4 lb. ft.	960	295	4.5
6 lb. ft.	500	390	4.0
7.5 lb. ft.	100	460	3.7

Stalled Torque Data

Volts	Lock Torque
2.0	5.6 lb. ft.
3.5	10.4 lb. ft.
5.0	15.0 lb. ft.

The brush tension is 2 pounds.

Oiling.—Thoroughly clean out and repack the starter bearings with soft cup or ball-bearing grease every six months.

GENERATOR.—G.H. 1012. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system.

Generator Test Data

Amperes	Hot Test R.P.M.	Amperes	Cold Test R.P.M.
0	700	0	660
6	1200	6	1000
10	1700	10	1300
12	2000	12	1500
13	2400	16	2400

The brush tension is 2 pounds. Charging rate is varied by adjustment of the third brush setting. Move the third brush in a counter-clockwise direction, looking at the commutator end, to increase the charging rate and in the opposite direction to decrease the charging rate. Reseat the brush after adjusting the position. Operating freely as a motor, generator takes 2.7 amperes, armature revolving at 450 R.P.M. Shunt field winding takes 1.7 amperes.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks the oiling must be done every 500 miles.

RELAY.—Relay closes at 10 miles per hour or 700 R.P.M. of the armature, and opens at 9 miles per hour or 600 R.P.M. of the armature. The discharge current is 0 to 2 amperes at opening of relay contacts. Clean the relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface them with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volts, 21 cp. Tail lamp is 6-8 volts, 2 cp. Dome lamp is 4 cp. (used only in closed bodies).

FUSES.—Fuse is 20 ampere.

CHEVROLET

SUPERIOR MODEL K (1925-26)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY:—Exide, Type 3-XC-13-1. Willard, Type XW-13. U. S. L., Type XY-13. 6 volt, 90 ampere hour. Starting capacity is 98 amperes for 20 minutes. The lighting capacity is 5 amperes for 18 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model 284-L. Distributor Model 374-A. Breaker contacts separate .030 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone or with a fine, flat jeweler's file. The distributor has no automatic advance. Manual advance is 30°.

Mounting:—Distributor is mounted on the generator head and is driven by the generator armature shaft. To remove distributor, disconnect the primary lead and manual advance rod. Remove distributor head with high tension cables intact. Then loosen the clamping bolts through the split collar on the generator housing and lift distributor out.

Oiling:—Refill the grease cup on the side of the distributor shaft and turn down one quarter turn every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing:—Breaker contacts separate when No. 1 piston entering power stroke is at dead center with the spark control lever and breaker assembly in the fully retarded position. To check timing, crank engine over until piston No. 1 enters the compression stroke. This is the upstroke with both valves closed. Fully retard the spark control lever and continue to crank engine until piston reaches top dead center. At this point the top dead center mark on the flywheel should be opposite the indicator on the flywheel housing. If breaker contacts are not beginning to separate, loosen the lock nut in the center of the breaker cam and pry cam upward. Rotate cam until contacts begin to separate. Make certain the cam is correctly seated on taper shaft and tighten the lock nut. Make certain the rotor is opposite the segment connected to the spark plug in cylinder No. 1 and connect the remaining plugs in order 2-4-3 clockwise, around the distributor head.

Firing Order:—The firing order is 1-2-4-3.

Spark Plugs:—Spark plug gaps are .025 inch.

VALVE TIMING:—Inlet Valves. Head diameter is 1 5/16 inches; stem diameter is 7/16 inch; stem length is 4 7/32 inches; tappet clearance is .004 inch. Inlet valves open at 16 degrees after top dead center and close 52 degrees after lower dead center.

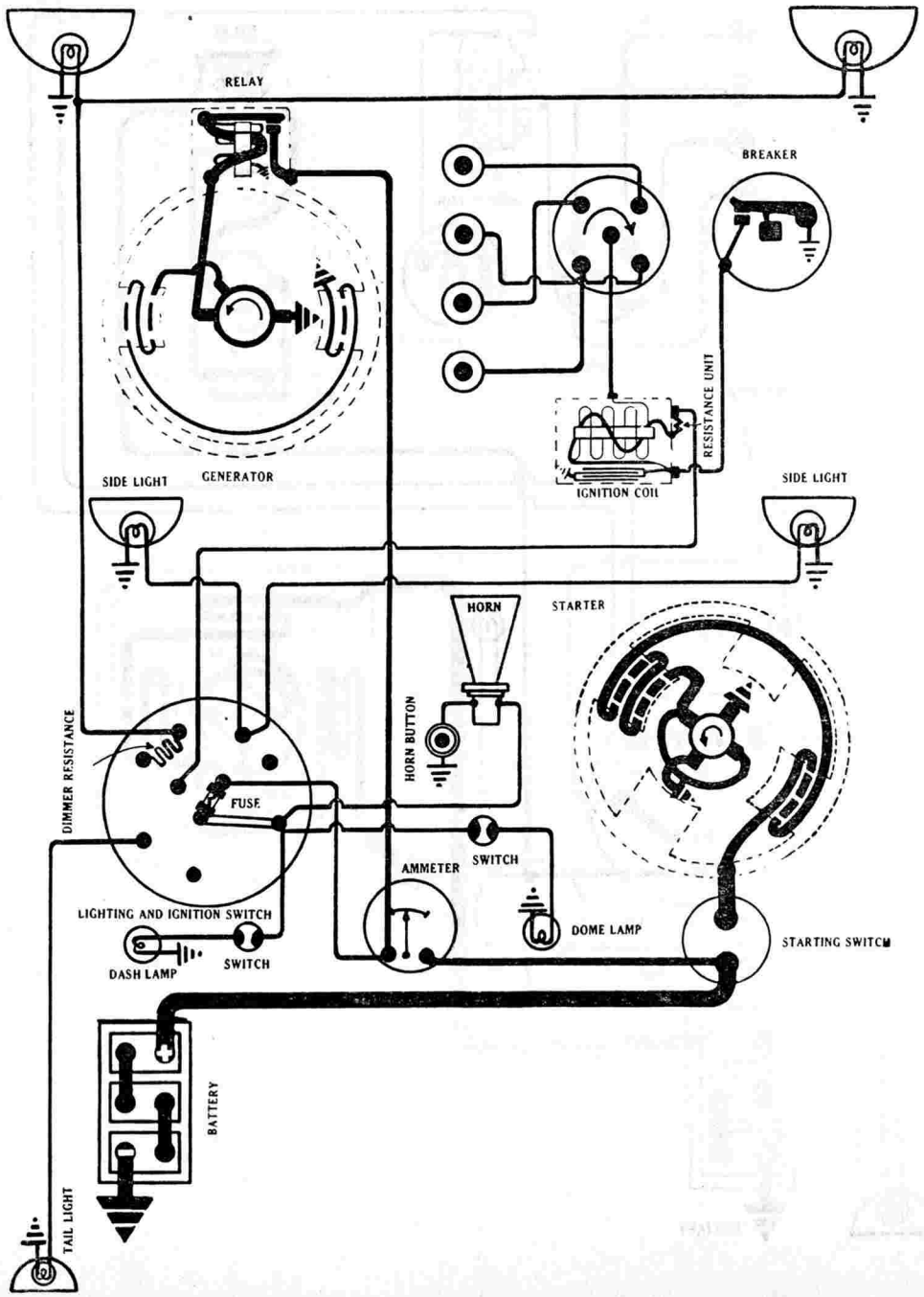
Exhaust Valves:—Head diameter is 1 5/16 inches; stem diameter is 7/16 inch; stem length is 4 7/32 inches. Tappet clearance is .004 inch. Exhaust valves open 40 degrees before lower dead center and close 16 degrees after top dead center.

STARTER:-Model No. 711-BX The direction of rotation looking at the commutator end is **counter-clockwise. Starter is connected to motor by a Bendix drive. Cranks the** at 160 R.P.M. taking 140 amperes. Starter brush tension should be 20-24 ounces each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
10 "	Lock	3.5	425

Mounting:—Starter is mounted at the right of the engine on the forward side of the flywheel housing. To remove the starter, disconnect cable and flange mounting bolts. Pull starter forward to disengage pinion on drive and lift from place.



CHEVROLET

SUPERIOR MODEL K (1925-26)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

Oiling.—Put 4 or 5 drops of light engine oil into starter oiler every two weeks. If car is driven over 500 miles in two weeks, this care must be given every 500 miles.

GENERATOR:-Model No. 950-B. The direction of rotation is counter-clockwise looking at commutator end. The third brush system is used for voltage regulation. The maximum charging rate is 18 amperes reached at 1800 R.P.M. of the generator armature. Brush tension is 14-18 ounces each. Shunt field current is 5 amperes at 6 volts.

Generator Data

Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	7.25	640			
7	7-7.3	880	12-15	8-8.5	1750
15-17	8.3-8.8	1750			
8.5-15.5		2500			

To adjust the generator charging rate, loosen the generator cover band and the screw on the generator end plate. Then shift the third brush in the direction of armature rotation to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment.

Mounting:—Generator is flange mounted on the right and to the front of the engine. Generator is driven by a gear meshing with the camshaft gear housed in the gear case at the forward end of the engine. To remove the generator, remove distributor and ignition coil which is mounted on top of the generator. Remove flange mounting cap screws and pull generator to the rear to disengage the driving gears. Then lift from place.

Oiling:—Put 4 or 5 drops of light engine oil into generator oiler every two weeks. If car is driven over 500 miles in two weeks, this attention must be given every 500 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay contacts close at 6-10 M.P.H. or 650 R.P.M. of the generator when the voltage reaches 7.25 volts and open with a discharge current of 0-2.5 amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING.—Clum Switch Model 10441. Head lamps are 6-8 volt, 21 cp. S.C. Dash, dome and tail lamps are each 6-8 volt, 3 cp. S.C.

FUSES.—Lighting fuse on switch is 15 amperes.

CHEVROLET

SUPERIOR MODEL K SERIES V (1926-27)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY.—Exide, Type 3-XC-13-1. Willard, Type XW-13. U. S. L., Type XY-13. 6 volt, 90 ampere hour. Starting capacity is 98 amperes for 20 minutes. The lighting capacity is 5 amperes for 18 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model 284-L. Distributor Model 374-A. Breaker contacts separate .030 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone or with a fine, flat jeweler's file. The distributor has no automatic advance. Manual advance is 30°.

Mounting.—Distributor is mounted at right of engine.

Oiling.—Refill the grease cup on the side of the distributor shaft and turn down one quarter turn every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing.—Breaker contacts separate when No. 1 piston entering power stroke is at top dead center with the spark control lever in the fully retarded position. To set timing, retard spark control lever and crank engine until piston No. 1 reaches this position. Then loosen lock nut on top of breaker cam and pry cam upward. Rotate cam until breaker contacts begin to separate. Tighten the nut making certain that cam is correctly seated on taper shaft.

Firing Order.—The firing order is 1, 2, 4, 3.

Spark Plugs.—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

STARTER:—Model 710-C, D. Starter is connected to the engine through an outboard Bendix drive, Type R-11. The direction of rotation is counter-clockwise looking at the commutator end. Starter cranks the engine at 140 R.P.M., taking 100 amperes at 4.8 volts. Starter switch is Model 405-C. The tension of the starter brush is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4500	5	70
10 "	Lock	3.7	450

Mounting.—Starter is mounted at left rear of engine. To remove starter, remove two flange mounting screws and lift from place.

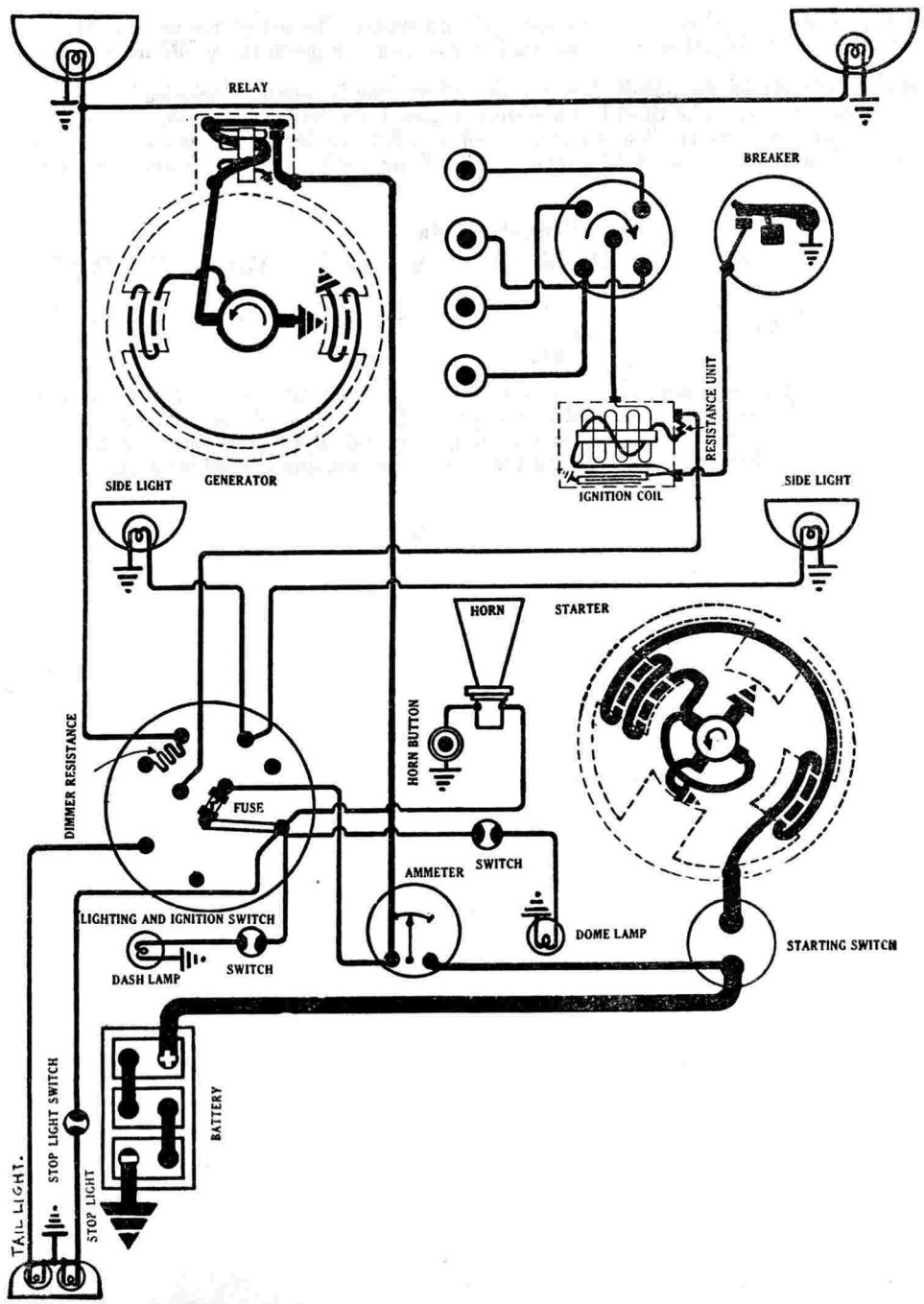
Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month. The drive end bearing is self-lubricating.

GENERATOR.—Model 943-B. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the charging rate, loosen the small screw on the generator end plate and shift the third brush mounting plate. Shifting the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. Tighten the nut after making the adjustment.

Generator Test Data

Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7-7.3	850			
15-17	7.95-8.05	1600	11-13	7.55-7.85	1800
11		2500			

Shunt field current is 6 amperes at 6 volts. Generator brush tension is 16-18 ounces each.



CHEVROLET

SUPERIOR MODEL K SERIES V (1926-27)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

Mounting.—Generator is mounted at left of engine by special mounting. To remove, remove special clamp screw and swing generator toward engine block. Slip off generator drive belt. Then remove two mounting screws and lift generator from place.

Oiling.—Put 4 or 5 drops of light engine oil into generator oiler every two weeks. If car is driven over 500 miles in two weeks, this attention must be given every 500 miles.

RELAY.—Model 265-B. Relay is mounted on top of the generator. Relay contacts close at 6-10 M.P.H. or 650 R.P.M. of the generator when the voltage reaches 7.25 volts and open with a discharge current of 0-2.5 amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed. Charging current at closing of contacts is 1-3 amperes.

LIGHTING:—Clum Switch Model 10633. Head lamps are 6-8 volt, 21 cp S.C. Dimming is by resistance on switch. Side lamps are 6-8 volt, 3 cp. S. C. Dash and tail lamps are each 6-8 volt, 3 cp. S. C. Stop lamp is 6-8 volt, 15 cp. S. C.

FUSES.—Lighting fuse on back of switch is 20 amperes.

CHEVROLET

NATIONAL MODEL (1928)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type XW-13. Exide, Type 3-XC-13-1. U.S.L., Type XY-13, 6 volt, 13 plates. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 18 hours. Battery is mounted under the front floor boards on the left frame member.

IGNITION:—Coil Model 284-W. Coil is mounted on right of engine on top of oil filter. Ignition current is 2 amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped.

Distributor Model 635-B. Breaker contacts separate .018-.024 inch. Set contact opening by loosening lock screw on stationary contact plate and turning eccentric adjusting screw until proper gap is secured. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 14-21 ounces. Distributor is semi-automatic. Maximum manual advance is 25 degrees (engine). Automatic advance begins at 1000 R.P.M. of engine. Maximum automatic advance is 20 degrees reached at 2400 R.P.M. Distributor rotation is clockwise viewed from the top.

Mounting:—Distributor is mounted on side of engine block at right of engine. To remove distributor, disconnect primary lead and manual advance rod and remove head with cables intact. Then back off set screw on side of shaft and lift distributor from place.

Oiling:—Put one drop of light oil on breaker arm pivot pin every 500 miles. Fill the grease cup on the side of the shaft and turn down one half turn every 1000 miles.

Timing:—Breaker contacts separate when the piston entering power stroke reaches top dead center with the manual advance lever fully retarded. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Then continue to crank engine until the flywheel mark '25' is opposite the pointer in the peephole in the front of the flywheel housing on the right side. Check distributor to see that rotor is pointed at right angles from the engine block away from the engine. If it is not in this position loosen set screw, pull distributor straight up to disengage gears and turn until rotor reaches proper position. Then remesh gears and tighten set screw. Fully advance spark control lever. Loosen clamp screw and turn distributor housing in a counter-clockwise direction until contacts begin to separate. Tighten the clamp screw and connect outer terminal to spark plug in cylinder No. 1. Connect remaining spark plugs in order 2-4-3 clockwise around the distributor head.

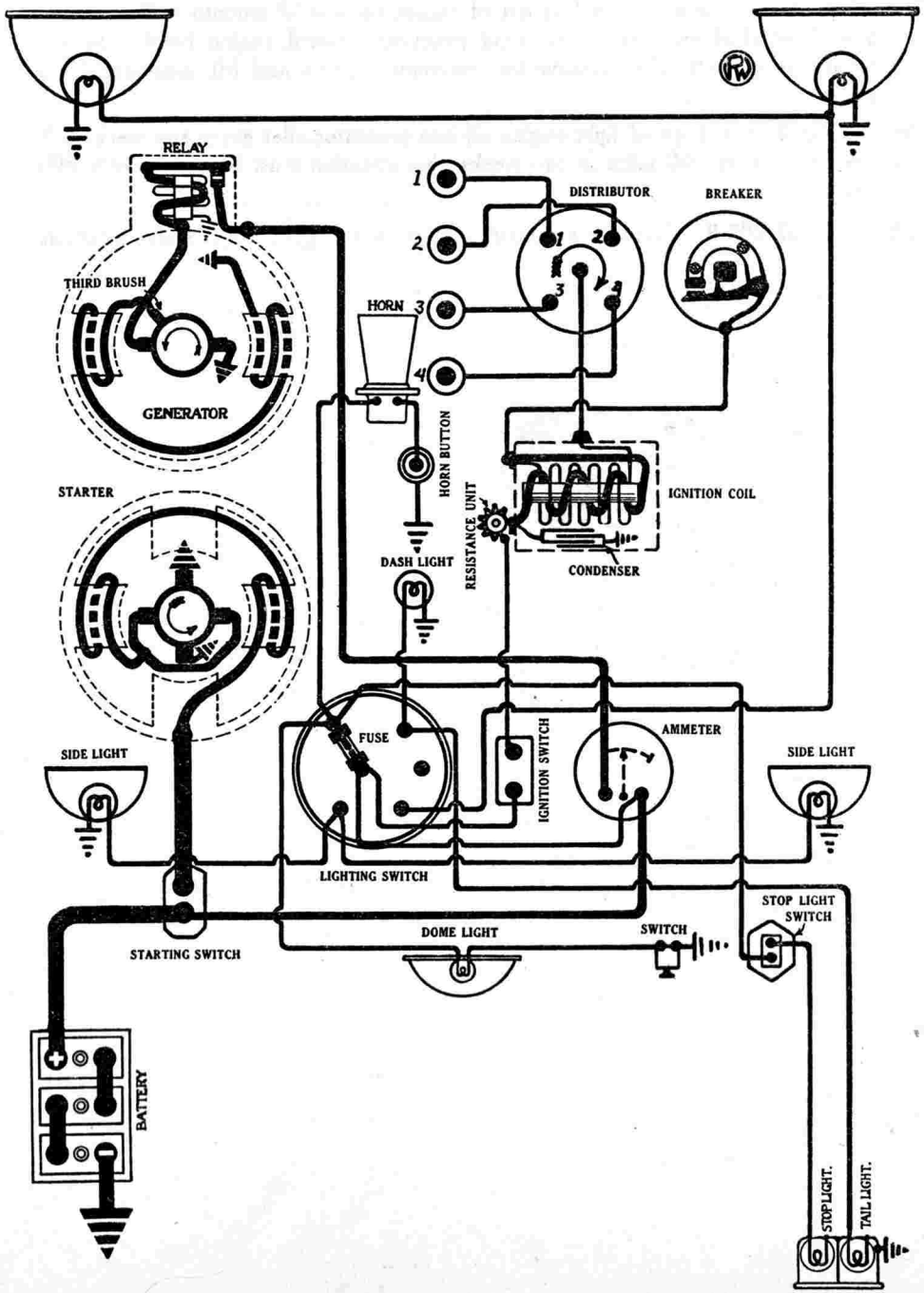
Firing Order:—The firing order is 1-2-4-3.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Gaps are .020-.030 inch.

VALVE TIMING:—Specifications:—Head diameter, 1 21/32 inches; stem diameter, 5/16 inch; stem length, 4 inches. Valve lift, 9/32 inch. Tappet clearance, .006 (intake) and .008 (exhaust) inch, hot. Valve stem guides are not removable. Oversize valve stems are not made.

Timing:—Inlet valves open 7 degrees before top dead center and close 75 degrees after lower dead center. Exhaust valves open 56 degrees before lower dead center and close 32 degrees after top dead center.

STARTER:—Model 710-D. Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 24-28 ounces each. Starter switch is Model 405-C. Starter cranks the engine at 140 R.P.M. drawing 100 amperes at 4.8 volts.



CHEVROLET

NATIONAL MODEL (1928)

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4500	5	70
10 "	Lock	3.7	450

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove flange mounting cap screws. Then pull starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light oil in the oiler on the commutator end of the starter every 500 miles. The drive end bearing is oilless.

GENERATOR:—Model 943-B. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen small round headed screw on generator end plate and remove cummutator cover band. Then shift third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment With standard car setting maximum charging rate is 18 amperes (cold) reached at 2100 R.P.M. or 25 miles per hour.

Generator Data

	Cold Test			Hot Test	
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
14-16	8	1700	12	7.5	1800

Shunt field current is 5 amperes at 6 volts. Brush spring tension is 16-18 ounces.

Mounting:—Generator is mounted at left front of engine by special swing mounting and is driven by the fan belt. To remove generator, disconnect lead, loosen clamp bolt and swing generator toward engine. Slip off drive belt, remove two mounting bolts in swing mounting and lift generator from place.

Belt Tension Adjustment:—Fan belt tension is adjusted by loosening clamp bolt in front flange and pulling generator away from engine block until proper tension is secured. Be careful not to get belt too tight.

Oiling:—Put 4 or 5 drops of light oil in each oiler every 500 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay closes at 8 miles per hour or 750 R.P.M. (armature) when the generator voltage reaches 6.75-7.5 volts and opens at 6 miles per hour or 560 R.P.M. with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Delco-Remy Switch, Model 476-C. Switch is mounted on instrument panel. Head lights are 6-8 volt, 21 cp. S.C. Mazda No. 1129. Cowl lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dash, tail and dome lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Lighting fuse on switch is 20 amperes capacity.

CHRYSLER SIX

MODEL B (1924) SERIAL NOS. 1001 UP.

REMY GENERATING, STARTING AND LIGHTING SYSTEM REMY IGNITION

BATTERY.—Westinghouse, Type 6-C-13, 6 volt, 105 ampere-hour. The starting capacity is 109 amperes for 20 minutes. The lighting capacity is 5 amperes for 21 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model 284A. Distributor Model 616F. Breaker contacts separate .022 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine flat jeweler's file or on a medium hard oilstone.

Oiling.—Refill the grease cup under the distributor head with soft cup grease and turn down one turn every two weeks. Place a very small amount of vaseline on the surface of the breaker cam and wipe out the distributor head with a clean cloth every two weeks. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when piston No. 1 on compression stroke reaches a position 20 deg. before top dead center (measured on the flywheel) when the flywheel marking "AD-SP" is opposite the indicator mark on the clutch housing with the spark control lever and breaker assembly in the fully advanced position. To set timing, crank the engine until piston No. 1 reaches this position. Then loosen the clamp screw which holds the timing lever to the distributor and after fastening the lever to the bracket on the cylinder head, rotate the distributor in a clockwise direction until the breaker contacts begin to separate. Tighten the clamp screw and replace the rotor and distributor head.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025-.030 inch.

STARTER.—Model 722-B. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The starter cranks the engine at 115 R.P.M., taking 125 amperes at 5.48 volts.

Starter Test Data

Torque	R.P.M.	Amperes	Volts
0	2500	70	5.
5.6 lb. ft.	660	200	5.2
10.7 lb. ft.	365	300	4.6
16.8 lb. ft.	200	400	4.0
28 lb. ft.	Lock	570	3.15

Starter brush tension should be 20-28 ounces each.

Oiling.—Put a few drops of light engine oil in each of the starter bearing oilers every 1000 miles or each month.

GENERATOR.—Model No. 917-T. Generator current regulation is by the third brush system. The direction of rotation is counter-clockwise, looking at the commutator end. The maximum charging rate is 18-20 amperes (generator cold) reached at 1900 R.P.M. of the armature or 24-26 M.P.H.. car speed in high gear.

Generator Test Data

	Hot Test			Cold Test	
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
			7	7.1	850
9-12	8.0-8.5	1900	18-20	8.3-8.5	1900

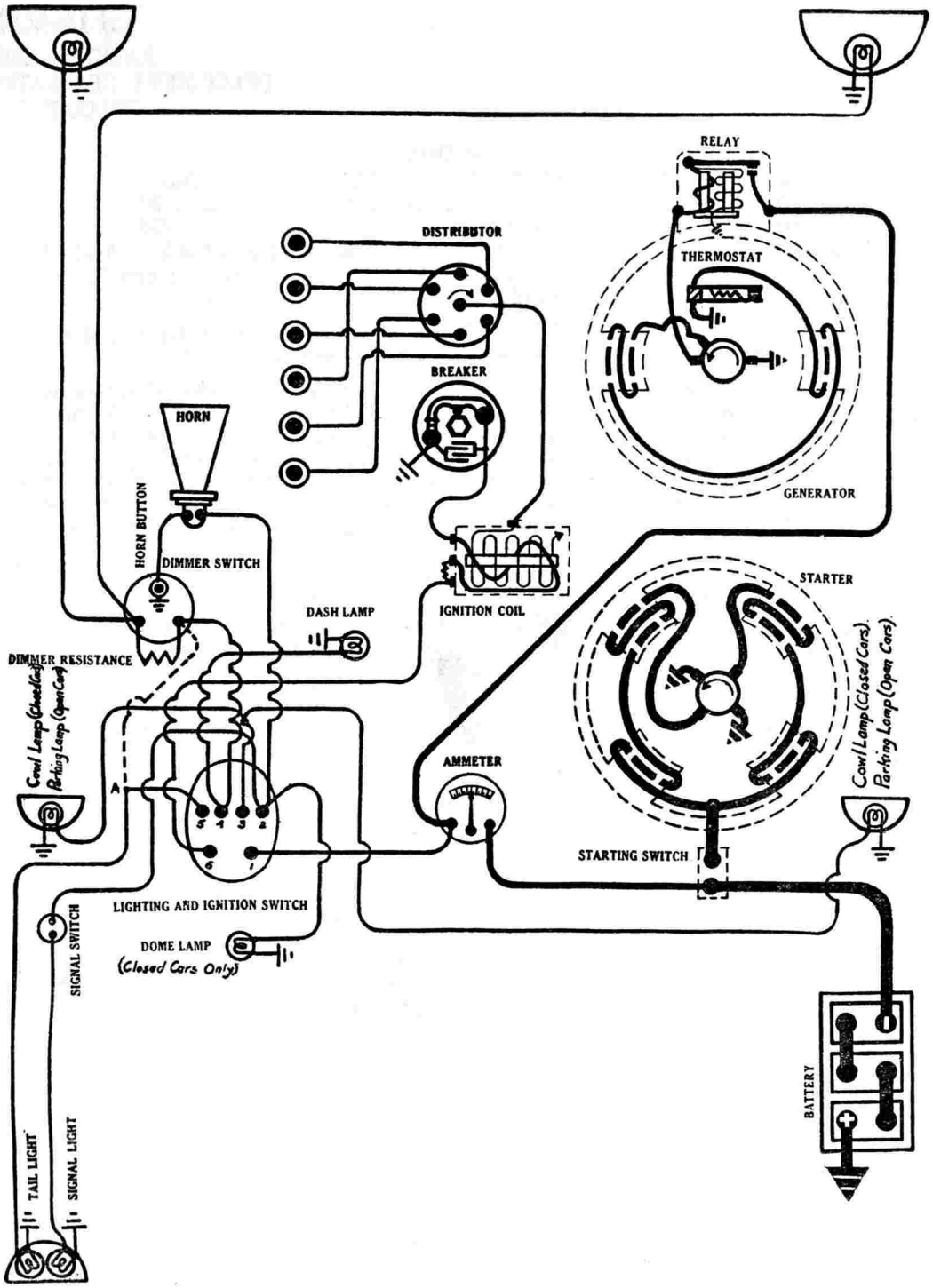
To adjust the generator output, remove the commutator cover band and loosen the third brush ring clamp screw. Then move the third brush in the direction of armature rotation (counter-clockwise) to increase the charging rate and the opposite (clockwise) direction to decrease the charging rate. Tighten the screw after making the adjustment. Motoring freely at 350 R.P.M. generator 5.1 amperes at 5.55 volts. Shunt field current is 4-5.9 amperes at 6 volts. Generator brush tension should be 22-28 ounces each.

Oiling.—Put a few drops of light engine oil in each of the generator bearing oilers every 1000 miles or each month.

RELAY:—Model No. 265A-B. Relay closes at 675 R.P.M. of the generator at 10.5 M.P.H. with a generator voltage of 7.2 volts and opens with a discharge current of 0-3 amperes. Relay contacts separate .014 inch. Air gap between relay armature and coil core is .014 inch, contacts closed.

LIGHTING.—Combination Switch Model No. 474-A. Head lamps are 6-8 volt, 21 cp. S.C. Stop lamp is 6-8 volt, 21 cp. S.C. Dash, tail and side lamps are each 6-8 volt, 2 cp. S.C. Dome lamp is 6-8 volt, 4 cp. S.C.

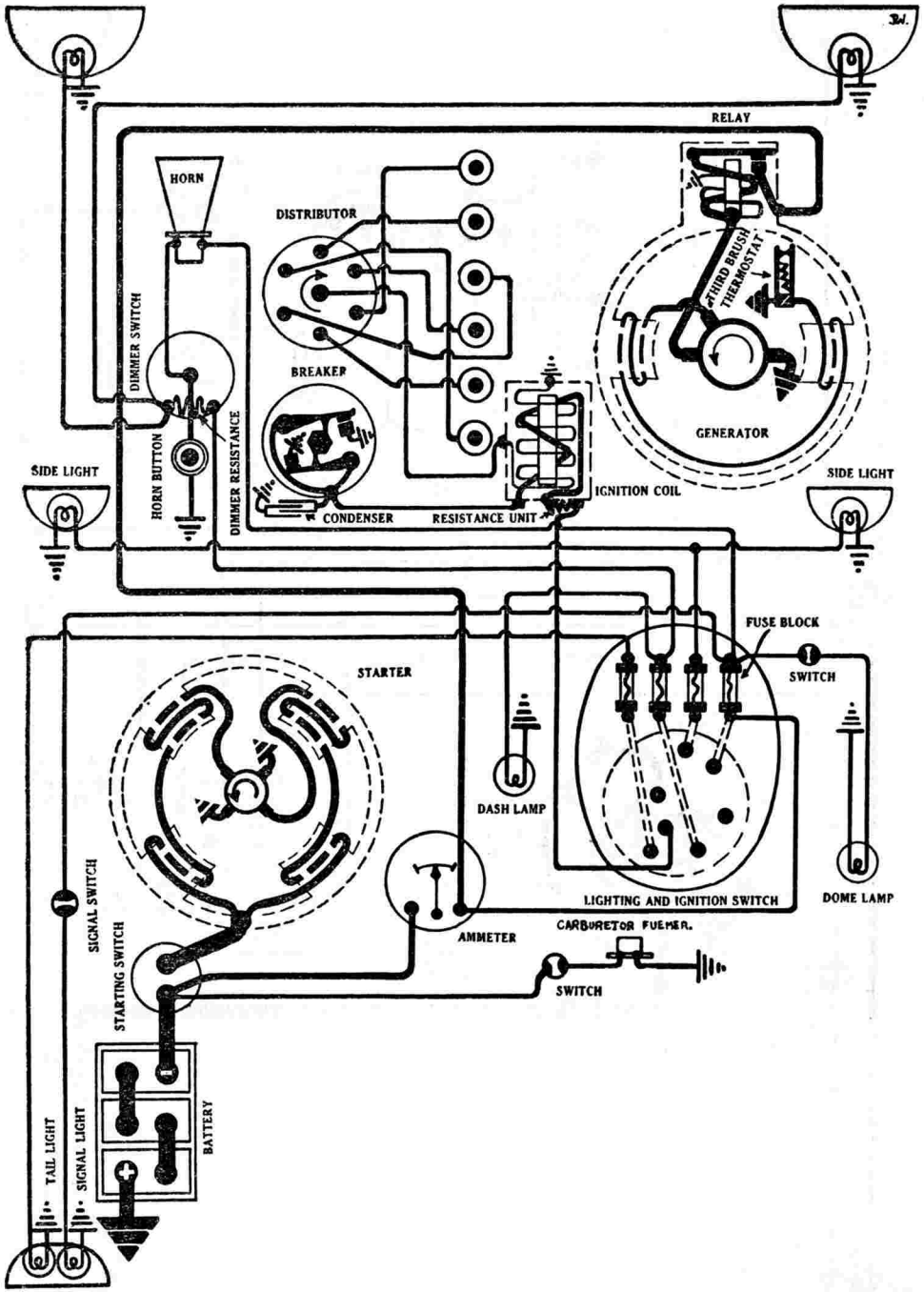
FUSES.—Lighting circuit fuses are 10 amperes capacity.



NOTE.—Connections as shown are for closed cars. On open cars the dotted connection takes the place of the line A-5.

CHRYSLER

MODEL B (1925) SERIAL NOS. 32000 UP
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION



BATTERY:—Willard, Type CRR-15. 6 volt, 100 ampere hour. The starting capacity is 125 amperes for 20 minutes. The lighting capacity is 5 amperes for 20 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model 284A. Distributor Model 656B. Breaker contacts separate .022 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine flat jeweler's file or on a medium hard oilstone. A double set of breaker contacts are used. They must be synchronized to open together.

Oiling:—Refill the grease cup under the distributor head with soft cup grease and turn down one turn every two weeks. Place a very small amount of vaseline on the surface of the breaker cam and wipe out the distributor head with a clean cloth every two weeks. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing:—Breaker contacts begin to separate when piston No. 1 on compression stroke reaches a position 14° before top dead center (measured on the flywheel) when the flywheel marking "Ad-SP" is opposite the indicator mark on the clutch housing with the spark control lever and breaker assembly in the fully advanced position. To set timing, crank the engine until piston No. 1 reaches this position. Then loosen the clamp screw which holds the timing lever to the distributor and after fastening the lever to the bracket on the cylinder head, rotate the distributor in a counter-clockwise direction until the breaker contacts begin to separate. Then tighten the clamp screw.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025-.030 inch.

STARTER:—Model 724-A. C. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 115-144 R.P.M. taking 125-127 amperes at 5.25-5.5 volts. Brush spring tension is 22-28 ounces. Starter switch is Model 404-R or T.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	5	70
22.5 "	Lock	3.15	570

Oiling:—Put a few drops of light engine oil in each of the starter bearing oilers every 1000 miles or each month.

GENERATOR:—Model No. 917-T. Generator current regulation is by the third brush system. The direction of rotation is counter-clockwise, looking at the commutator end. The maximum charging rate is 18-20 amperes (generator cold) reached at 1900 R.P.M. of the armature or 24-26 M.P.H., car speed in high gear.

Generator Test Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7.1	850	9-12	8.05-8.5	1900
18-20	8.3-8.5	1900			

To adjust the generator output, remove the commutator cover band and loosen the third brush ring clamp screw. Then move the third brush in the direction of armature rotation (counter-clockwise) to increase the charging rate and the opposite (clockwise) direction to decrease the charging rate. Tighten the screw after making the adjustment. Motoring freely at 350 R.P.M. generator 5.1 amperes at 5.55 volts. Shunt field current is 4-5.9 amperes at 6 volts. Generator brush tension should be 22-28 ounces each.

Oiling:—Put a few drops of light engine oil in each of the generator bearing oilers every 1000 miles or each month.

RELAY:—Model No. 265A-B. Relay closes at 675 R.P.M. of the generator at 10.5 M.P.H. with a generator voltage of 7.2 volts and opens with a discharge current of 0-3 amperes. Relay contacts separate .014 inch. Air gap between relay armature and coil core is .014 inch, contacts closed.

LIGHTING:—Combination Switch Model 474-B. Head and stop lamps are 6-8 volt, 21 cp. S. C. Dome lamp is 6-8 volt, 4 cp. Tail lamp is 6-8 volt, 2 cp. S. C. Dash. and tonneau lamps are 6-8 volt, 3 cp. S. C.

FUSES:—Lighting circuit fuses are 10 amperes capacity.

CHRYSLER

MODEL 25-F. SERIAL NOS. WW-100-W UP.
MODEL F-58 SERIAL NOS. WY 223-P UP (1926)
REMY GENERATING, STARTING AND LIGHTING SYSTEM.
REMY IGNITION

BATTERY:—Willard Type LWR-13. 6 volt, 93 ampere hour. The starting capacity is 115 amperes for 20 minutes. The lighting capacity is 5 amperes for 18.5 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model No. 284-P Distributor Model No. 634-A. Breaker contacts separate .022 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file. Manual advance is 20°. Automatic advance is 18°. The tension of the contact arm spring should be 20 ounces.

Oiling:—Screw down the grease cup on the side of the distributor housing two turns every month or each 1000 miles if the car is driven more than 1000 miles in a month. Put 4 or 5 drops of light engine oil in the oiler on the auxiliary bracket every 1000 miles.

Timing:—On 1925 cars breaker contacts begin to separate when the piston entering power stroke reaches a position .060 inch before top dead center with the spark lever in the fully advanced position. On 1926 cars the piston position should be .020 inch before top dead center.

Firing Order:—The firing order is 1-3-4-2.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .027-.030 inch.

STARTER:—Model No. 712-D. The starter is connected to the engine by means of a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 150 R.P.M. taking 150 amperes at 5 volts. Starting switch is Model 404-S.

Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
11 "	Lock	3.6	450

The starter brush tension should be 28-32 ounces each.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month. The bearing on the drive end of the starter is of the oilless type.

GENERATOR:—Model No. 951-C. The direction of rotation is counter-clockwise, looking at the commutator end. The generator is belt driven, and care must be taken to see that the fan belt is not tight enough to crowd the generator bearings and yet should not permit the generator to slip. The third brush system is used for current regulation. To adjust generator output, loosen the hexagon-headed screw on the generator end plate and shift the third brush. Shifting the brush in the direction of generator rotation increases the charging rate and in the opposite direction decreases the output. The maximum charging rate is 15-17 amperes reached at 1800 R.P.M. of the armature or 20.4 M.P.H.

Generator Data.

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	7.25	750			
7	7.4	925	11.6	7.85	1978
16	8.3	1800			

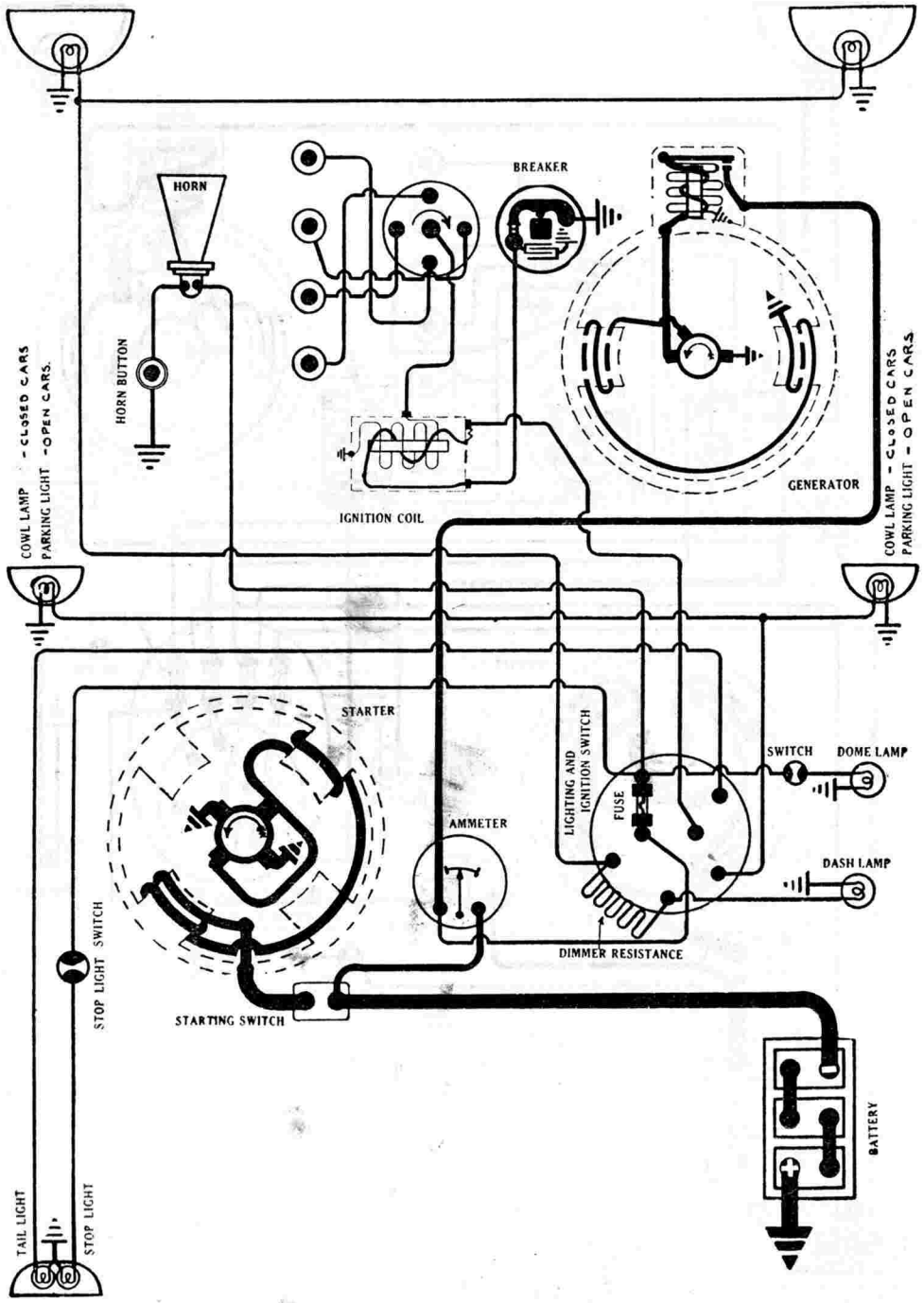
Running freely as a motor, generator makes 440 R.P.M. drawing 6.5 amperes at 7.1 volts. Field current is 4-6 amperes at 6 volts. The tension of the generator brushes should be 18-24 ounces each.

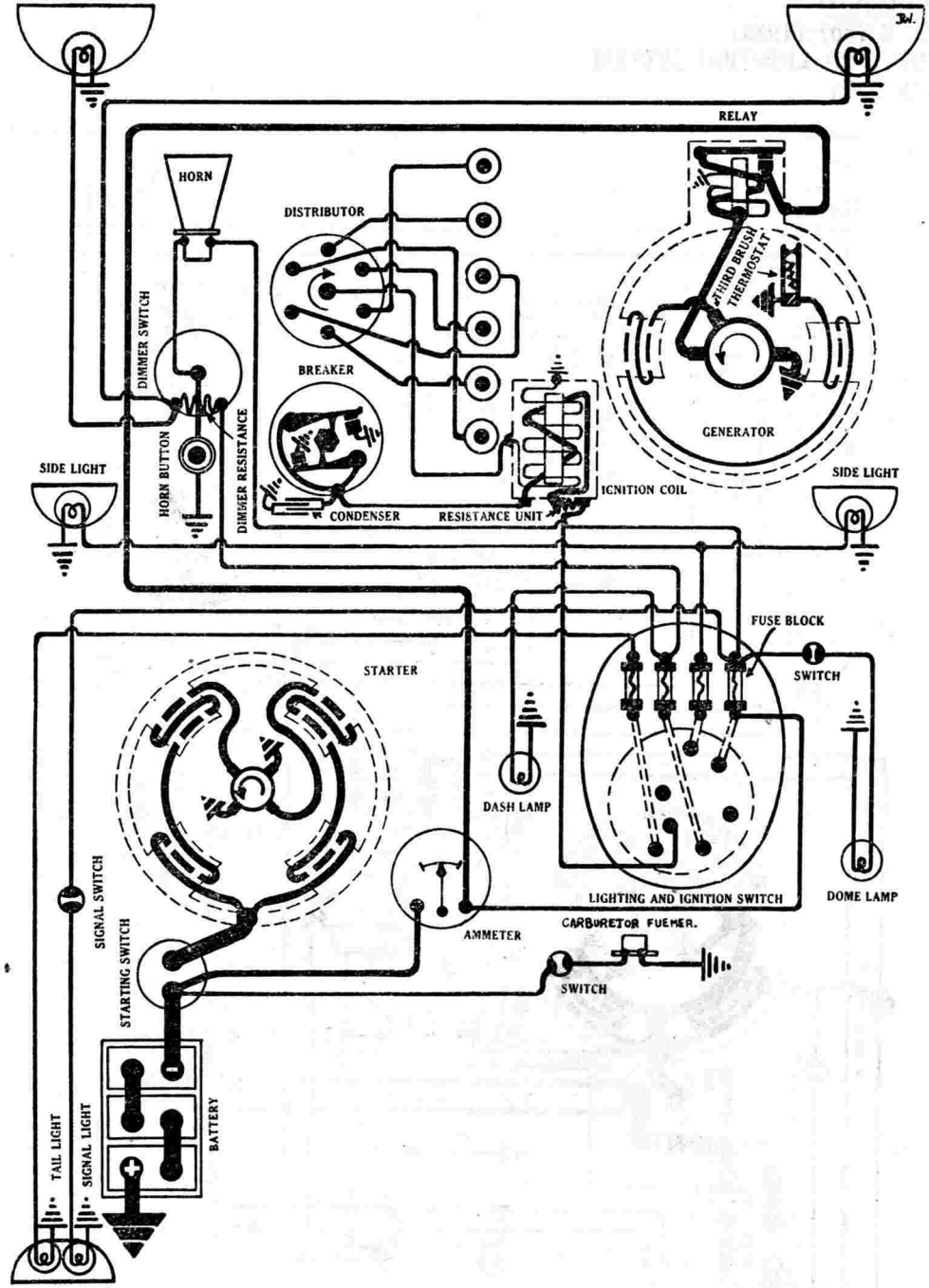
Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY:—Model No. 265-B. Relay closes at 750 R.P.M. when the generator voltage reaches 7.25 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .020 inch. Air gap between the relay armature and coil core is .016 inch, contacts closed.

LIGHTING.—Switch Model 475-B. Head and stop lamps are each 6-8 volt, 21 cp. Dash, dome, side and tail lamps are each 6-8 volt, 3 cp.

FUSES:—Lighting fuse is 20 amperes.





CHRYSLER

MODEL G (70) (1926)

REMY GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY.—Willard, Type CRR-15. 6 volt, 105 ampere hour. Starting capacity is 125 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The positive (+) terminal is grounded. Type CWR-15 is used on the Coach. The electrical characteristics are the same.

IGNITION.—Coil Model 284-A. Distributor Model 656-B. Breaker contacts separate .022 inch. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Double contacts are used. They must be synchronized. Set stationary contacts to open .022 inch with the breaker arm on the high point of the cam. Then loosen screw holding mounting plate on which other contacts are mounted and shift until breaker arm is also on the high point of the cam. Adjust breaker gap being careful to keep it within the limits of .018-.024 inch. The tension of the breaker arm spring should be 17.5-20.5 ounces. Distributor is equipped with both manual and automatic advance. Manual advance is 25°. Automatic advance is 15°.

Oiling.—Fill the grease cup under the distributor head with medium cup grease and turn down two turns every two weeks or each 500 miles. Place a small bit of vaseline on the face of the breaker cam every 500 miles.

Timing.—Breaker contacts begin to separate when the piston entering power stroke reaches a position .100 inch before top dead center with the manual advance lever in the fully advanced position.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .027-.030 inch.

STARTER.—Model 724-C. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 144 R.P.M. taking 157 amperes at 5.27 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2700	5.6	70
4.2 "	1200	5.0	200
12.0 "	350	4.0	400
16.5 "	150	3.5	500
22.5 "	Lock	3.0	600

Oiling.—Put 4 or 5 drops of light engine oil in the starter bearing oiler every month or each 1000 miles.

GENERATOR.—Model 941-C. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system combined with a thermostat. Thermostat contacts open at 165° F. cutting a resistance into the shunt field circuit and reducing the output approximately 50%. To adjust the charging rate loosen the small round headed screw on the generator end plate and shift the third brush mounting bracket. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Shunt field current is 5 amperes at 6 volts. Generator brush tension should be 22-28 ounces.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	7.2	675			
7	7.1	850	9-12	8-8.5	1900
18-20	8.3-8.5	1900			

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles.

RELAY.—Model 265-B. Relay is mounted on top of the generator. Relay contacts close at 675 R.P.M. of the generator armature when the voltage reaches 7.2 volts and open with a discharge current of 0-3 amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING.—Switch Model 475-P. Head and stop lamps are 6-8 volt, 21 cp. S. C. Dash, tail, side and dome lamps are 6-8 volt, 3 cp. S. C.

FUSES.—Lighting fuses are 10 amperes.

CHRYSLER

IMPERIAL MODEL E (80) (1926)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Prest-O-Lite, Type A-617-SH. 6 volt. Starting capacity is 170 amperes for 20 minutes. Lighting capacity is 5 amperes for 32 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model 525-B. Distributor Models 656-C and 656-D. Breaker contacts separate .022 inch. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Double contacts are used. They must be synchronized. Set stationary contacts to open .022 inch with the breaker arm on the high point of the cam. Then loosen screw holding mounting plate on which other set of contacts are mounted and shift until breaker arm is also on high point of cam. Set breaker contacts, being careful to keep gap within limits of .018-.024 inch. Distributor is equipped with both manual and automatic advance. Manual advance is 15°. Automatic advance is 30°. On the Model 656-D distributor, manual advance is 15°, and automatic advance is 18°.

Oiling.—Fill the grease cup under the distributor head with medium cup grease and turn down two turns every two weeks or each 500 miles.

Timing.—On cars using Distributor Model 656-C, breaker contacts begin to separate when piston entering power stroke reaches a position .010 inch before top dead center. With Distributor Model 656-D, piston position should be .040-.050 inch before top dead center. The manual advance lever should be in the fully advanced position in each case.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .028 inch.

STARTER.—Model 732-A. Starter is connected to the engine through a manual pinion shift incorporated in the starting switch. Starter drives pinion through reduction gears and Delco clutch, cranking the engine at 102 R.P.M., taking 117 amperes at 5.35 volts. The direction of rotation is clockwise, looking at the commutator end. Starter brush tension should be 20-28 ounces each.

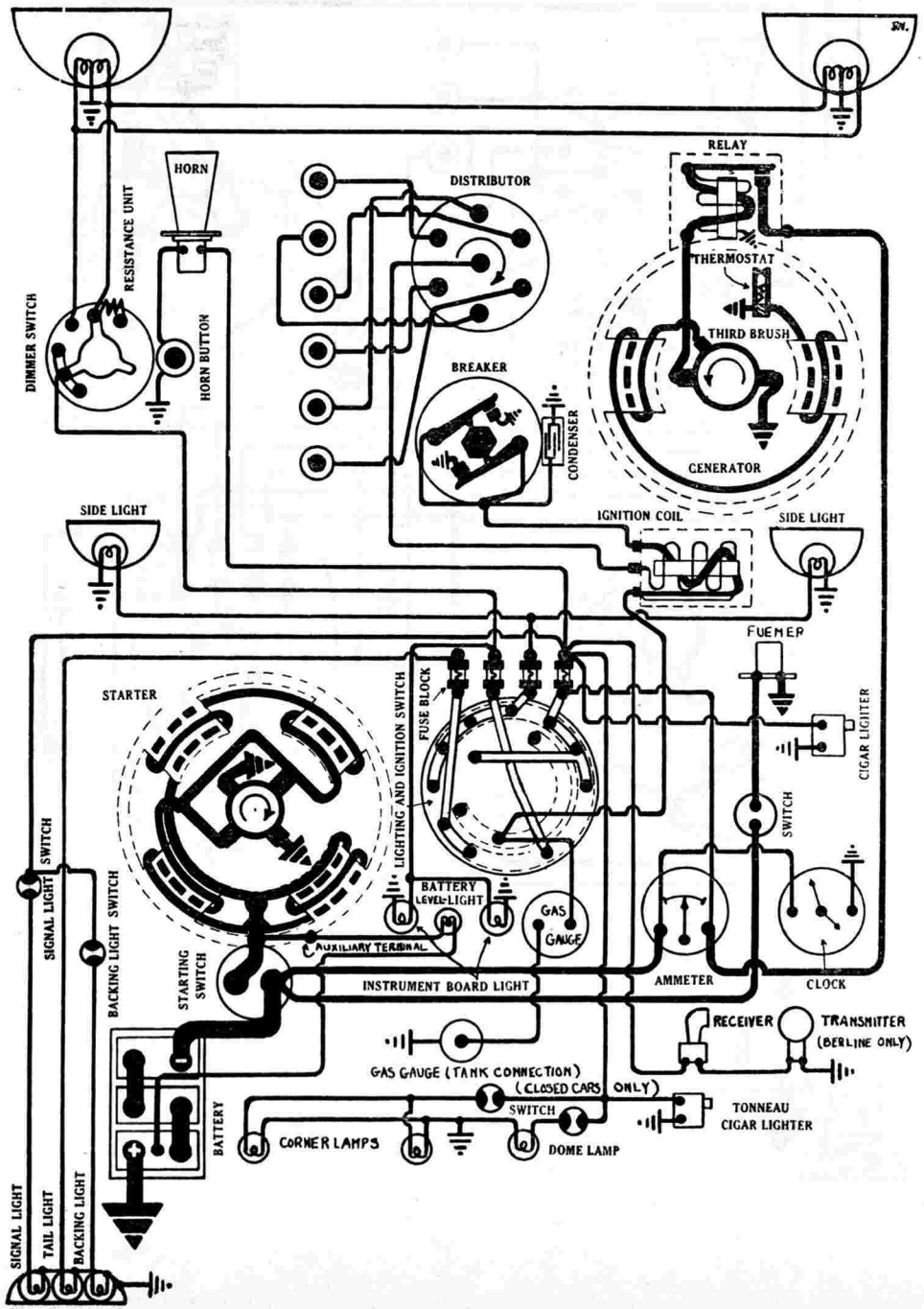
Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	5	65
32 "	Lock	3	600

A small auxiliary terminal is located on the starter frame. The battery levelite line is connected to it and is connected to the battery when the starter switch is closed.

Oiling.—Put 4 or 5 drops of light engine oil in the starter bearing oilers every 1500 miles. The reduction gear compartment is packed with graphite grease. A small pipe plug on the top of the gear case should be removed to add grease when this becomes necessary.

GENERATOR.—Model 945-B. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system combined with a thermostat. Thermostat contacts open at 165° F. and cut a resistance into the field circuit, reducing the output approximately 50%. To adjust charging rate, loosen the small round headed screw on the outside of the generator end plate and shift the third brush mounting bracket. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. Tighten the screw after making the adjustment. The maximum charging rate is 19 amperes, reached at 1600 R.P.M. or 24 miles per hour. Generator brush tension should be 22-28 ounces.



CHRYSLER

IMPERIAL MODEL E (80) (1926)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

Generator Data

Cold Test (67° F.)			Hot Test (233° F.)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.58	495	0	6.95	670
16	8.5	1090	8	7.92	1108
19.2	8.95	1855	12	8.29	2075
16	8.78	2560	9.2	8.15	3520
9.4	8.35	3840	8.05	8.10	4000

Oiling.—Put 4 or 5 drops of light engine oil in the generator bearing oilers every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay contacts close at 600 R.P.M. of the generator armature when the voltage reaches 7.2 volts and open with a discharge current of 0-3 amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING.—Head lamps are 6-8 volt, 21 cp., using double filament. A dimmer resistance mounted on the dimmer switch at the foot of the steering column is used for dimming. Stop and backing lamps are each 6-8 volt, 21 cp. S. C. Side, dash, dome, tail and tonneau lamps are each 6-8 volt, 3 cp. S. C. Battery solution level indicator lamp is 3-4 volt, 3 cp. D. C.

Switches.—Lighting switch is Model 475-S. Dimmer switch is Model 482-D. Carburetor Choke Control lever is Model 495-D.

FUSES.—Lighting fuses are 20 amperes.

CHRYSLER

MODEL 50 (1927) SERIAL NOS. FWOOH UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type WR-13. 6 volt, 84 ampere hour. Starting capacity is 98 amperes for 20 minutes. Lighting capacity is 5 amperes for 16.6 hours. The positive (+) terminal is grounded. Battery is mounted at left of frame under the front floor board.

IGNITION:—Coil Model 525-E. Distributor Model 638-B. Breaker contacts separate .018-.023 inch. Resurface contacts on a medium hard oilstone or with a fine flat contact file. To adjust contact opening, loosen lock screw located behind stationary contact and turn eccentric adjusting screw on crescent shaped contact mounting arm until desired breaker gap is obtained. Then tighten lock screw to hold adjustment. Distributor is of the semi-automatic type. Manual advance is 22°. Automatic advance begins at 400 R.P.M. and reaches a maximum of 18° at 1800 R.P.M. The breaker arm spring tension should be 15-20 ounces. Ignition current is 2 amperes at 6 volts with engine running, and 5 amperes at 6 volts with engine stopped.

Mounting:—Distributor is mounted at front of engine and is accessible from the right side. Drive is by slotted tongue from the forward end of the cam shaft. To remove distributor, disconnect breaker lead and high tension cables or remove distributor head. Then remove two mounting bolts holding distributor bracket and gear case to forward end of engine gear case. Distributor can then be lifted from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down two turns every month or each 1000 miles. Keep the oiler on the distributor gear compartment filled with light engine oil.

Timing:—Breaker contacts begin to separate when piston entering power stroke reaches a position .063 inches before top dead center with the manual spark control lever in the fully advanced position. To set timing, crank engine until piston No. 1 enters compression stroke (the up-stroke with both valves closed). Then continue to crank engine until piston No. 1 and No. 4 reach a position .063 inch before top dead center. Make certain that the spark control lever is in the fully advanced position. Loosen the clamp screw holding distributor in position on spark control lever and rotate distributor until contacts begin to separate. Tighten the clamp screw and replace the rotor and distributor head. Make certain that the rotor is opposite the segment connected to the spark plug in cylinder No. 1.

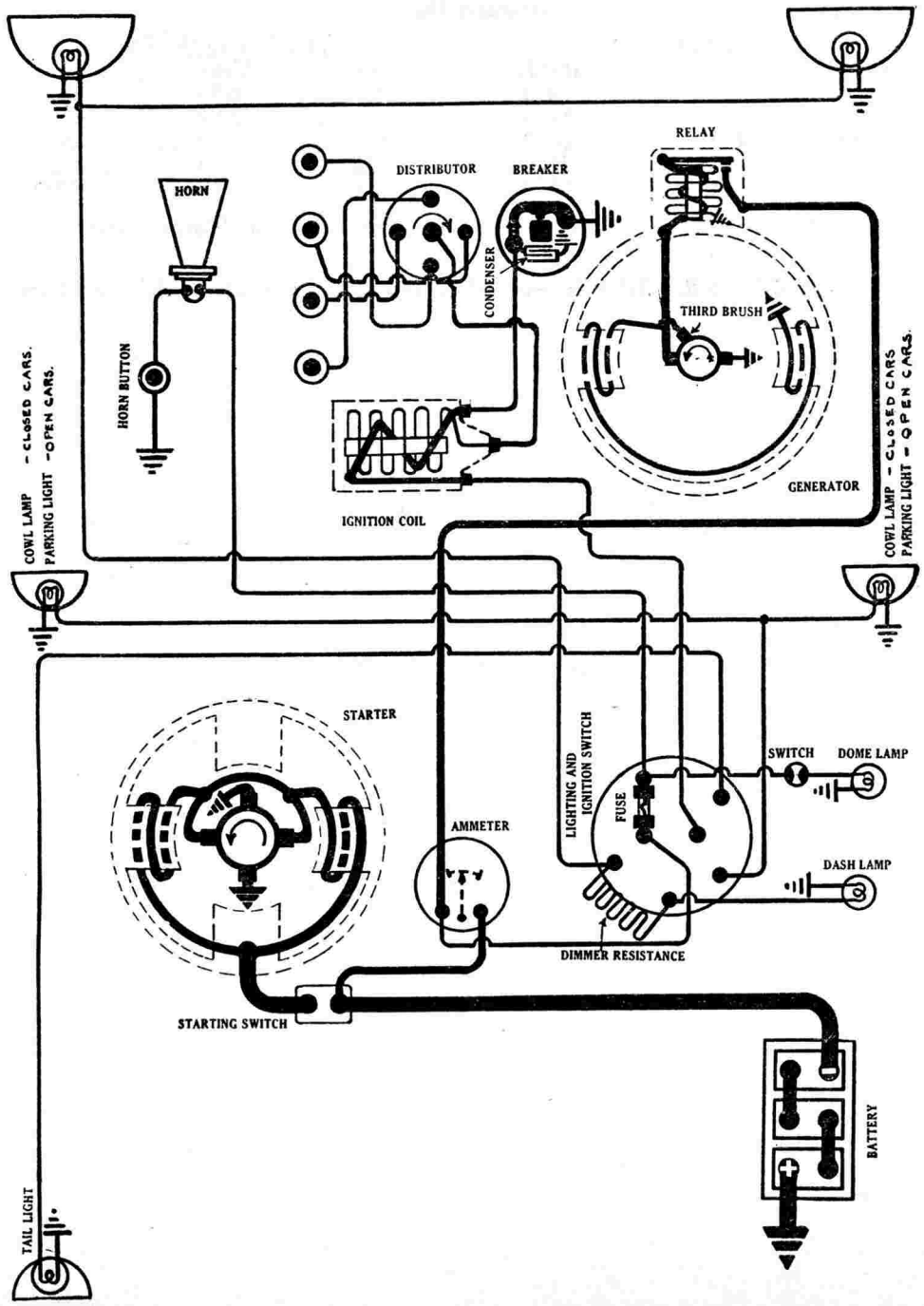
"Red Head" Engines. On cars with high compression 'Red Head' engines breaker contacts begin to separate with the piston .004 inch before top dead center with full advance. Allowable variation is .002 inch with piston limits .002 or .006 inch before top dead center. Special spark plugs and special material valves are used in "Red Head' engines.

Valve Timing:—INLET VALVES:—Head diameter, 1 7/16 inches; stem diameter, 3/8 inch; stem length, 5 1/16 inches; tappet clearance, .004 inch (hot); spring pressure, 35-42 pounds; valve lift, 9/32 inch; intake opens at top dead center and closes at 40° past lower dead center.

EXHAUST VALVES:—Head diameter, 1 7/16 inches; stem diameter, 3/8 inch; stem length, 5 1/16 inches; tappet clearance, .006 inch (hot); spring pressure, 35-42 pounds; valve lift, 9/32 inch; exhaust opens at 48° before lower dead center and closes 2° past top dead center. Stem guides are removable. No oversize valve stems are made.

Firing Order:—The firing order is 1-3-4-2.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Gaps are .030 inch.



CHRYSLER

MODEL 50 (1927) SERIAL NOS. FWOOH UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

STARTER:—Model 712-F. Starter is connected to the engine through an outboard Bendix drive Type R-11-X. The direction of rotation is counter-clockwise looking at the commutator end. Starter cranks the engine at 150 R.P.M. taking 150 amperes at 5 volts. Starter switch is Model 404-V. Starter brush tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5.6	70
1.6 "	1560	5.2	150
3.0 "	1250	5.0	200
4.2 "	800	4.7	250
6.0 "	550	4.4	300
9.4 "	150	4.0	400
11.0 "	Lock	3.7	450

Mounting:—Starter is flange mounted at left of engine on forward side of bell housing. To remove starter, disconnect starter cable and remove two flange mounting screws. Then slide starter from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The bearing on the drive end is oilless.

GENERATOR:—Model 947-A. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust charging rate, remove the commutator cover band and loosen the small round headed screw on the commutator end plate of the generator. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Maximum output is 17 amperes (cold) reached at 1800 R.P.M. or 20-22 M.P.H.

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
2	6.6	570	5	6.9	1175
4	6.8	850	9	7.4	1550
7	7.1	1050	11-13	7.6	2125
10	7.5	1225	9	7.4	3000
15-17	8.0	1800	8	7.2	3500
11	7.6	3000			
9.4	7.4	3500			

Field current is 4.5 amperes at 6 volts. The generator brush tension should be 24-28 ounce.

Mounting:—Generator is cradle mounted at front end of the engine and is belt driven. The fan is mounted on the forward side of the generator drive belt. To remove generator, disconnect generator lead and loosen the generator cradle stud nut which is the large nut directly under the generator holding the generator cradle bracket in position. Then lower generator and cradle and slip off drive belt. Loosen nut on generator mounting strap and slide generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on each end of the generator every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay closes when the voltage of the generator reaches 7.25 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING:—Clum Switch Model 10607. Head and stop lamps are each 6-8 volt, 21 cp. Dimming is by resistance on the switch. Dash, side and tail lamps are each 6-8 volt, 3 cp. Dome lamp is 6-8 volt, 15 cp. Stop lamp connected to fuse terminal on switch is 6-8 volt, 15 cp.

FUSES:—Lighting fuse on back of switch is 30 amperes.

CHRYSLER

MODEL 60 (1926-27)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

BATTERY.—Willard, Type LWR-13. 6 volt. 98 ampere hour. Starting capacity is **107** amperes for 20 minutes. Lighting capacity is 5 amperes for 18.6 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model 525-E. Distributor Model 637-N. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts with a fine, flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 25° (engine). Maximum automatic advance is 18° (engine). Breaker arm spring tension is 15-20 ounces.

Oiling.—Fill the grease cup under the distributor head with medium cup grease and turn down two turns every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing.—Breaker contacts begin to separate when the piston entering power stroke reaches a position .030 inch before top dead center with the manual spark control lever in the fully advanced position.

'RED HEAD' Engines. On cars equipped with high compression 'Red Head' engines, breaker contacts begin to separate when the piston entering power stroke reaches a position .008 inch before top dead center with the spark fully advanced. A variation of .002 is permissible with piston limits of .010 to .006 inch before top dead center. Special material valves and special spark plugs are used in all 'Red Head' engines.

Mounting.—Distributor is mounted on top of the cylinder head. To remove, disconnect manual advance rod and remove manual advance stop screw. Then lift distributor from place.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .027-.030 inch.

Valve Timing:—INLET VALVES:—Head diameter, 1 5/16 inches; stem diameter, 3/8 inch; stem length, 4 21/32 inches; tappet clearance, .004 inch; spring pressure, 72-80 pounds; valve lift, 5/16 inch; inlet opens 3° after top dead center and closes 137° after top dead center (or 43° before lower dead center).

EXHAUST VALVES:—Head diameter, 1 5/16 inches; stem diameter, 3/8 inch; stem length, 4 21/32 inches; tappet clearance, .006 inch; spring pressure, 72-80 pounds; valve lift, 5/16 inch; exhaust opens 135° after top dead center (or 45° before lower dead center) and closes 5° after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

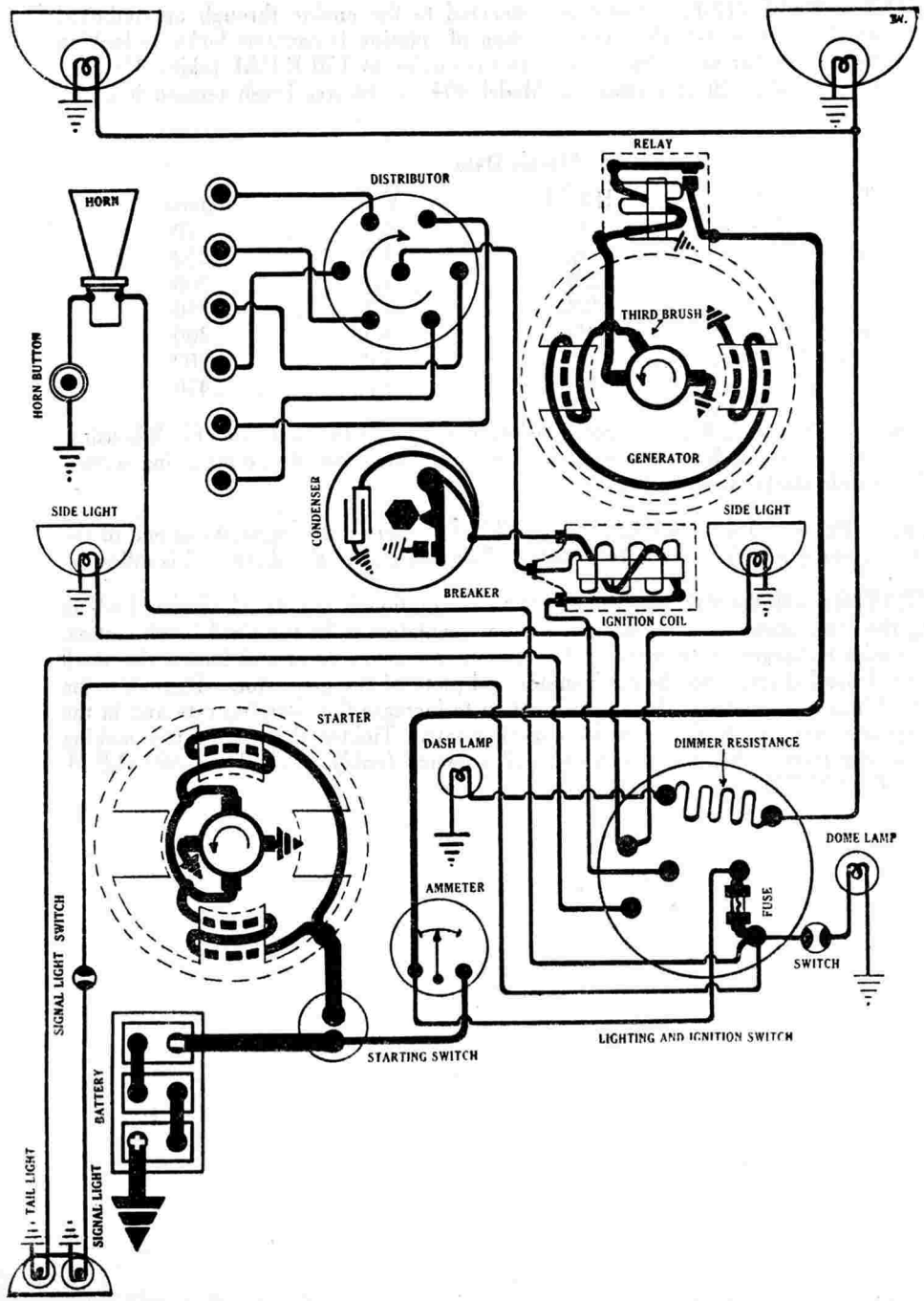
STARTER.—Model 714-D. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 178 R.P.M., taking 164 amperes at 5.1 volts. Starter brush tension is 26 ounces each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5.0	65
2 "	1650	5.1	150
6 "	700	4.5	280
12 "	Lock	3.63	475

Switch.—Starting switch is Model 404-T.

Mounting.—Starter is barrel mounted at left of flywheel housing. To remove starter, remove pilot set screw on top of housing and slide starter from position.



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CHRYSLER

MODEL 60 (1926-27)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR.—Model 941-X. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, loosen the small round headed screw on the generator end plate and shift the third brush. Shifting the brush in a counter-clockwise direction increases the charging rate. and in the opposite direction decreases the charging rate. Tighten the screw after making the adjustment. Maximum charging rate is 14-16 amperes reached at 1500 R.P.M. or 22 M.P.H.

Generator Test Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	525	0	6.4	600
6	7.0	725	6	7.0	975
12	7.8	1075	11	7.6	1700
15	8.0	1600	8.6	—	2500
10.8	—	2500			

Shunt field current is 5 amperes at 6 volts. Generator brush tension should be 18-24 ounces each.

Mounting.—Generator is mounted at right of engine by a No. 3 S. A. E. flange mounting to the timing gear chain case. To remove generator remove cover plate on front of case and remove three nuts holding generator in place. Then slide generator to rear, removing chain, but being careful that chain does not slip over cam shaft sprocket, or engine camshaft timing will be disturbed.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles if the car is driven more than 1000 miles in a month. The drive end bearing is oiled by splash from the gear case.

RELAY.—Model 265-B. Relay is mounted on top of the generator. Relay closes when the generator reaches 600 R.P.M. with a terminal voltage of 7.25 volts and opens at approximately 500 R.P.M with a discharge current of 0-2.5 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch. contacts closed.

LIGHTING:—Clum Switch Model 10607, 10629. Head lamps are 6-8 volt, 21 cp. S.C. Stop and dome lamps are each 6-8 volt, 15 cp. S.C. Side, dash and tail lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Lighting fuse on switch is 20 amperes.

NOTE:—Electric gasoline gauge is connected to the ignition terminal on the lighting switch.

CHRYSLER

MODEL G (70) (1927)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—Willard, Type CWR-15. 6 volt, 100 ampere hour. Starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model 525-E. Distributor Model 656-F. Breaker contacts separate .022 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine flat jeweler's file. Distributor is of the semi-automatic type. Manual advance is 25°. Automatic advance is 15° at maximum. Breaker arm spring tension is 17.5-20.5 ounces. Distributor uses two sets of breaker contacts operating on a three sided cam and opening alternately. The opening of the second set of contacts must be correctly set. (See Timing.) Distributor Model 656-N is used on special "Red Head" engines with 6 to 1 compression. Maximum automatic advance on this model distributor is 22 degrees at 2900 R.P.M.

Mounting:—Distributor is mounted on top of cylinder block. To remove distributor, disconnect coil lead and high tension cables or remove distributor head. Then disconnect manual advance rod and remove manual advance stop screws. Lift distributor from place.

Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down two turns every two weeks or each 500 miles. Place a small bit of vaseline on the face of the breaker cam every 500 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position .087 inch before top dead center with the spark advance lever in the fully advanced position. To set timing first check both sets of contacts for proper timing interval. Use special factory tool to set breakers to open at intervals of 60° corresponding to 120° of crankshaft rotation. Then crank engine until piston No. 1 entering power stroke is .087 before top dead center. Loosen the lock screw holding distributor cam and rotate cam until stationary contacts begin to separate. Tighten the screw.

On "Red Head" engines with Distributor Model 656-N, breaker contacts separate with the piston .010 inch before top dead center. The allowable variation is .002 inch with piston limits .012 or .008 inch before top dead center. Spark plugs and valves in "Red Head" engines are special.

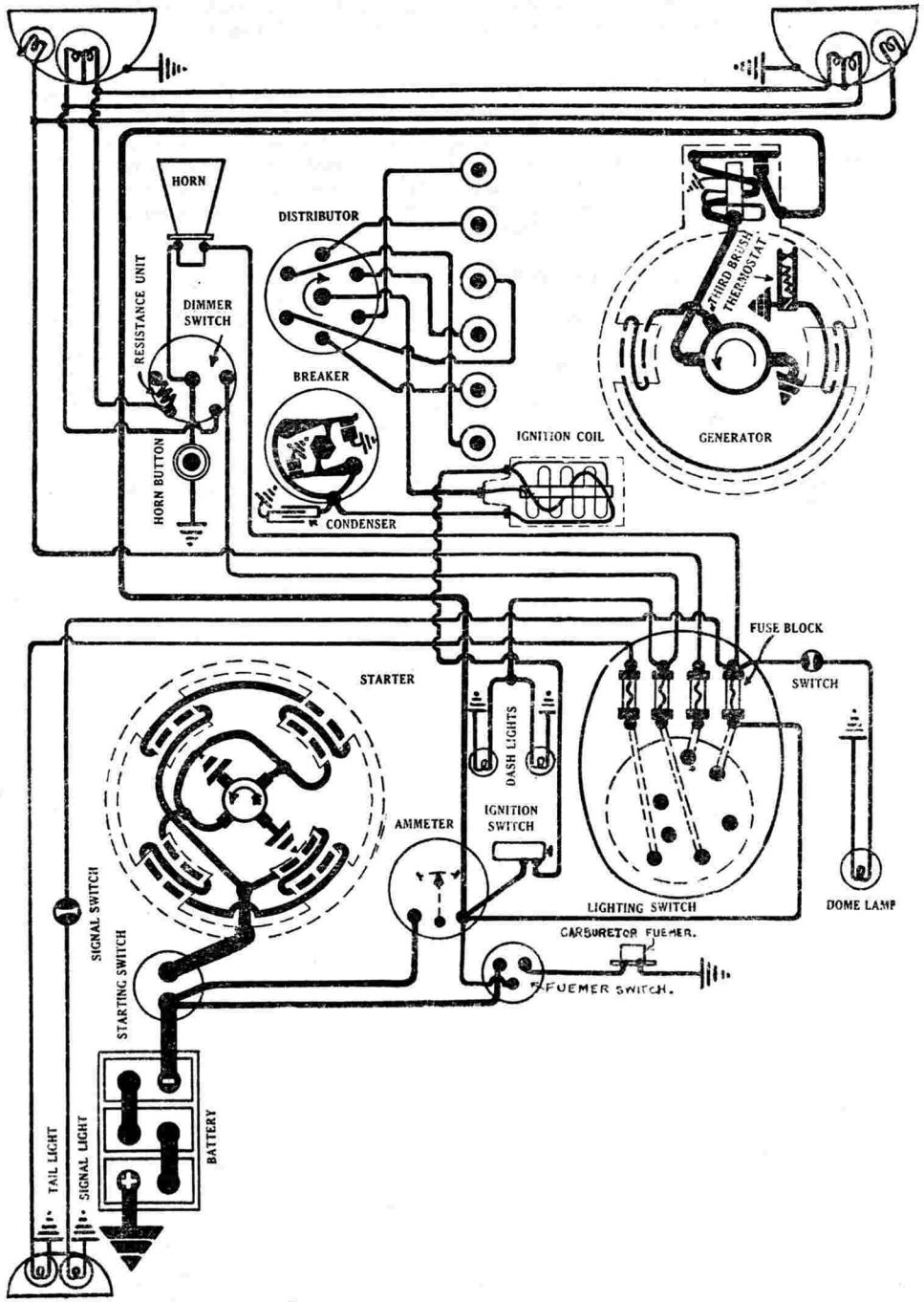
Valve Timing:—INLET VALVES:—Head diameter, 1 7/16 inches; stem diameter, 11/32 inch; stem length, 5 9/16 inches; tappet clearance, .004 inch; spring pressure, 75-80 pounds; valve lift, 5/16 inch; inlet opens 6° after top dead center and closes 46° after lower dead center.

EXHAUST VALVES:—Head diameter, 1 7/16 inches; stem diameter, 11/32 inch; stem length, 5 9/16 inches; tappet clearance, .006 inch; spring pressure, 75-80 pounds; valve lift, 5/16 inch; exhaust opens 42° after lower dead center and closes 8° after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

Firing order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .027-.030 inch.

STARTER:—Model 724-C. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 144 R.P.M. taking 157 amperes at 5.27 volts.



CHRYSLER

MODEL G (70) (1927)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2700	5.6	70
4.2 "	1200	5.0	200
12.0 "	350	4.0	400
16.5 "	150	3.5	500
22.5 "	Lock	3.0	600

Mounting:—Starter is mounted on forward side of flywheel housing at left of engine. To remove starter, disconnect starter cable and remove large pilot mounting screw and lock nut. Then slide starter forward and lift from place.

Oiling:—Put 4 or drops of ligh engine oil in the starter bearing oiler every month or each 1000 miles.

GENERATOR:—Model 941-C, 949-K. Direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system combined with a thermostat. Thermostat contacts open at 165° F. cutting a resistance into the shunt field circuit and reducing the output approximately 50%. To adjust the charging rate loosen the small round headed screw on the generator end plate and shift the third brush mounting bracket. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Shunt field current is 5 amperes at 6 volts. Generator brush tension should be 22-28 ounces.

Generator Data

Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	500	0	6.4	700
10	7.5	800	8	7.4	1200
18	8.2	1225	11	7.6	1800
19.5-20	8.4	1500	8.4	—	2800
12	—	2800			

Mounting:—Generator is mounted at right of engine at rear of timing chain case. To remove generator, disconnect generator lead and remove three flange mounting nuts. Then slide generator to rear, being careful to leave intermediate flange in place. If this is not done the timing chain will slip, affecting the valve timing.

Oiling:—Put 4 drops of light engine oil in the starter bearing oiler every month the commutator end of the generator every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay contacts and open with a discharge current of 0-3 amperes. Contacts separate .020 inch. close at 675 R.P.M. of the generator armature when the voltage reaches 7.2 volts Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING:—Remy Switch No. 479-A. Head lamps are 6-8 volt, 21 cp. double filament, using second 21 cp. bulb for dimming. Dash and tail lamps are 6-8 volt, 3 cp. S.C. Dome lamp is 6-8 volt, 15 cp. S.C. Stop and backing lamps are 6-8 volt, 15 cp. S.C.

FUSES:—Lighting fuses are 20 amperes.

ACCESSORIES:—The gasoline gauge is connected to the ignition line at the ignition coil.

CHRYSLER

IMPERIAL MODEL E (80) (1927)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—Willard, Type SJ WR6, 6 volt. Starting capacity is 166 amperes for 20 minutes. Lighting capacity is 5 amperes for 30.6 hours. The positive (+) terminal is grounded. Battery is mounted under front floor boards.

IGNITION:—Coil Model 525-E. Distributor Model 656-E. Breaker contacts separate .022 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine flat contact file. Distributor is of the semi-automatic type. Manual advances 15° (engine). Automatic advance begins at 400 R.P.M. and reaches a maximum of 20.5° at 3200 engine R.P.M. Total advance is 35.5°. Distributor uses two sets of breaker contacts on a three sided cam and opens alternately at intervals of 60° corresponding to 120° of crankshaft rotation. (See timing for contact adjustment). Distributor Model 656-N is used on special "Red Head" engines with 6 to 1 compression. Maximum automatic advance on this model distributor is 22 degrees at 2900 R.P.M.

Mounting:—Distributor is mounted on top of engine block on right side. To remove distributor, disconnected coil lead and high tension cables or remove distributor head. Then disconnect manual advance rod and remove manual advance stop screw. Lift distributor from place.

Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down two turns every two weeks or each 500 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position .046 inch before top dead center with the spark control lever in the fully advanced position. The second set of contacts open exactly 60° after this point when the piston in the next cylinder firing also reaches a position .046 inch before top dead center. To check timing crank engine until contacts mounted on stationary breaker plate begin to separate. See that piston position is .046 before top dead center. Check contacts on adjustable plate by special scale furnished by diistributor manufacturer. If interval between two firing points is not 60° loosen two last plate locking screws and turn adjusting screw until the proper position is reached. Then tighten the lock screws.

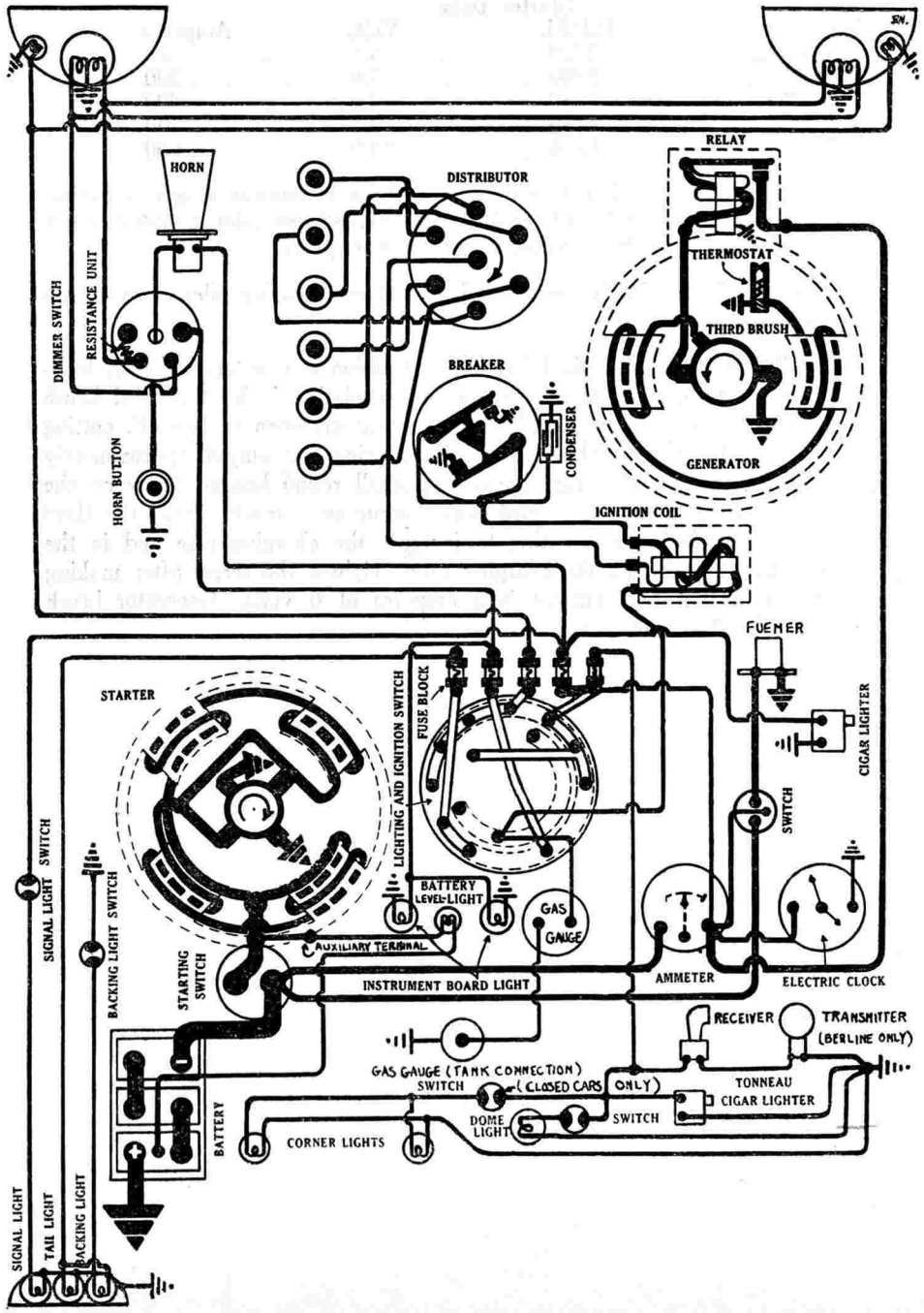
On "Red Head" engines with 5.4 to 1 compression using 656-E distributor, breaker contacts separate with the piston .046 inch before top dead center. The allowable variation is .009-.007 inch with piston limits .055 or .039 inch before top dead center. On special "Red Head" engines with 6 to 1 compression, breaker contacts separate at top dead center. The allowable variation is .0005 inch with piston limits .0005 inch before or after top dead center. Spark plugs and valves in "Red Head" engines are special.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .028 inch.

Valve Timing:—INLET VALVES:—Head diameter, 1 21/32 inches; stem diameter, 3/8 inch; stem length, 6 3/16 inches; tappet clearance, .006 inch; spring pressure, 90-95 pounds; valve lift, 5/16 inch; inlet opens 6° after top dead center and closes 46° after lower dead center.

EXHAUST VALVES:—Head diameter, 1 21/32 inches; stem diameter, 3/8 inch; stem length, 6 3/16 inches; tappet clearance, .008 inch; spring pressure, 90-95 pounds; valve lift, 5/16 inch; exhaust opens 42° before lower dead center and closes 8° after top dead center. Valve stem guides are removable. Oversize valve stems are not made.



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CHRYSLER

IMPERIAL MODEL E (80) (1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

STARTER.—Model 732-AB. Starter is connected to the engine through a manual pinion shift incorporated in the starting switch. Starter drives pinion through reduction gears and Delco clutch, cranking the engine at 102 R.P.M., taking 117 amperes at 5.35 volts. The direction of rotation of armature shaft is clockwise, looking at the commutator end. Starter brush tension should be 24-28 ounces each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2000	5.6	65
5.6 "	680	5.0	200
10.8 "	400	4.5	300
17.2 "	240	4.0	400
24.0 "	120	3.5	500
30.8 "	Lock	3.0	600

A small auxiliary terminal is located on the starter frame. The battery levelite line is connected to it and is connected to the battery when the starter switch is closed.

Mounting:—Starter is mounted at left of engine on forward side of flywheel housing. The oil-filler pipe must be removed before the starter can be taken off the engine. To remove starter, disconnect cables on starter switch and battery level-lite wire from auxiliary terminal. Then disconnect starter shifting lever rod. Loosen lock nut and remove large pilot mounting screw from flywheel case above starter mounting sleeve. Slide starter forward from place.

Oiling:—Put 4 or 5 drops of light engine oil in the starter bearing oilers every 1500 miles. The reduction gear compartment is packed with graphite grease. A small pipe plug on the top of the gear case should be removed to add grease when this becomes necessary.

GENERATOR:—Model 945-B. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system combined with a thermostat. Thermostat contacts open at 165° F. and cut a resistance into the field circuit reducing the output approximately 50%. To adjust charging rate, loosen the small round headed screw on the outside of the generator end plate and shift the third brush mounting bracket. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. Tighten the screw after making the adjustment. The maximum charging rate is 20 amperes at 8.5 volts, reached at 1300 R.P.M. Generator brush tension should be 22-28 ounces. Shunt field current is 5 amperes at 6 volts.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	340	0	6.4	460
8	7.2	560	6	7.0	720
14	7.9	740	12	7.6	1400
19	8.4	1300	8.8	—	2400
12	—	2400			

Mounting:—Generator is mounted at right of engine at rear of timing chain case. To remove generator, disconnect generator lead and remove three flange mounting nuts holding generator to chain case. Slide generator to rear, being careful not to disturb intermediate flange carrying drive gear.

Oiling:—Put 4 or 5 drops of light engine oil in the generator bearing oilers every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay contacts close at 600 R.P.M. of the generator armature when the voltage reaches 7.2 volts and open with a discharge current of 0-3 amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .015 inch, contacts closed.

LIGHTING:—Head lamps are 6-8 volt, 21 cp., using double filament. A dimmer resistance mounted on the dimmer switch at the foot of the steering column is used for dimming. Stop and backing lamps are each 6-8 volt, 15 cp. S.C. Dome lamp is 6-8 volt. 15 cp. S.C. Tail and tonneau lamps are each 6-8 volt, 3 cp. S.C. Battery solution level indicator lamp is 3-4 volt, 3 cp. S.C.

Switches:—Remy Lighting Switch No. 816609.

FUSES:—Lighting fuses are 30 amperes.

CHRYSLER

MODEL 52 (LATE 1927)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—Willard, Type WXR-13, 6 volt. Starting capacity is 98 amperes for 20 minutes. Lighting capacity is 5 amperes for 16.8 hours. The positive (+) terminal is grounded. Battery is mounted under floor boards of front compartment on left frame member.

IGNITION:—Coil Model 525-C. Distributor Model 638-C. Breaker contacts separate .018-.023 inch. Resurface contacts on a medium hard oilsone or with a fine flat contact file. To adjust contact opening, loosen lock screw located behind stationary contact and turn eccentric adjusting screw on crescent shaped contact mounting arm until desired breaker gap is obtained. Then tighten lock screw to hold adjustment. Distributor is of the semi-automatic type. Manual advance is 22°. Automatic advance begins at 400 R.P.M. Maximum automatic advance is 18° at 1800 R.P.M. Breaker arm spring tension is 15-20 ounces. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

Mounting:—Distributor is mounted at front of engine and is accessible from the right side. Drive is by slotted tongue from the forward end of the cam shaft. To remove distributor, disconnect breaker lead and high tension cables or remove distributor head. Then remove two mounting bolts holding distributor bracket and gear case to forward end of engine gear case. Distributor can then be lifted from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down two turns every month or each 1000 miles. Keep the oiler on the distributor gear compartment filled with light engine oil.

Timing:—Breaker contacts begin to separate when piston entering power stroke reaches a positon .063 inch before top dead center with the manual spark control lever in the fully advanced position. To set timing, crank engine until piston No. 1 enters compression stroke (the up stroke with both valves closed). Then continue to crank engine until pistons No. 1 and No. 4 reach a position .063 inch before top dead center. Make certain that the spark control lever is in the fully advanced position. Loosen the clamp screw holding distributor in position on spark control lever and rotate distributor until contacts begin to separate. Tighten the clamp screw and replace the rotor and distributor head. Make certain that the rotor is opposite the segment connected to spark plug in cylinder No. 1. In setting timing, a variation of .011 inch is allowable. Piston limits are .075-.052 inch before top dead center.

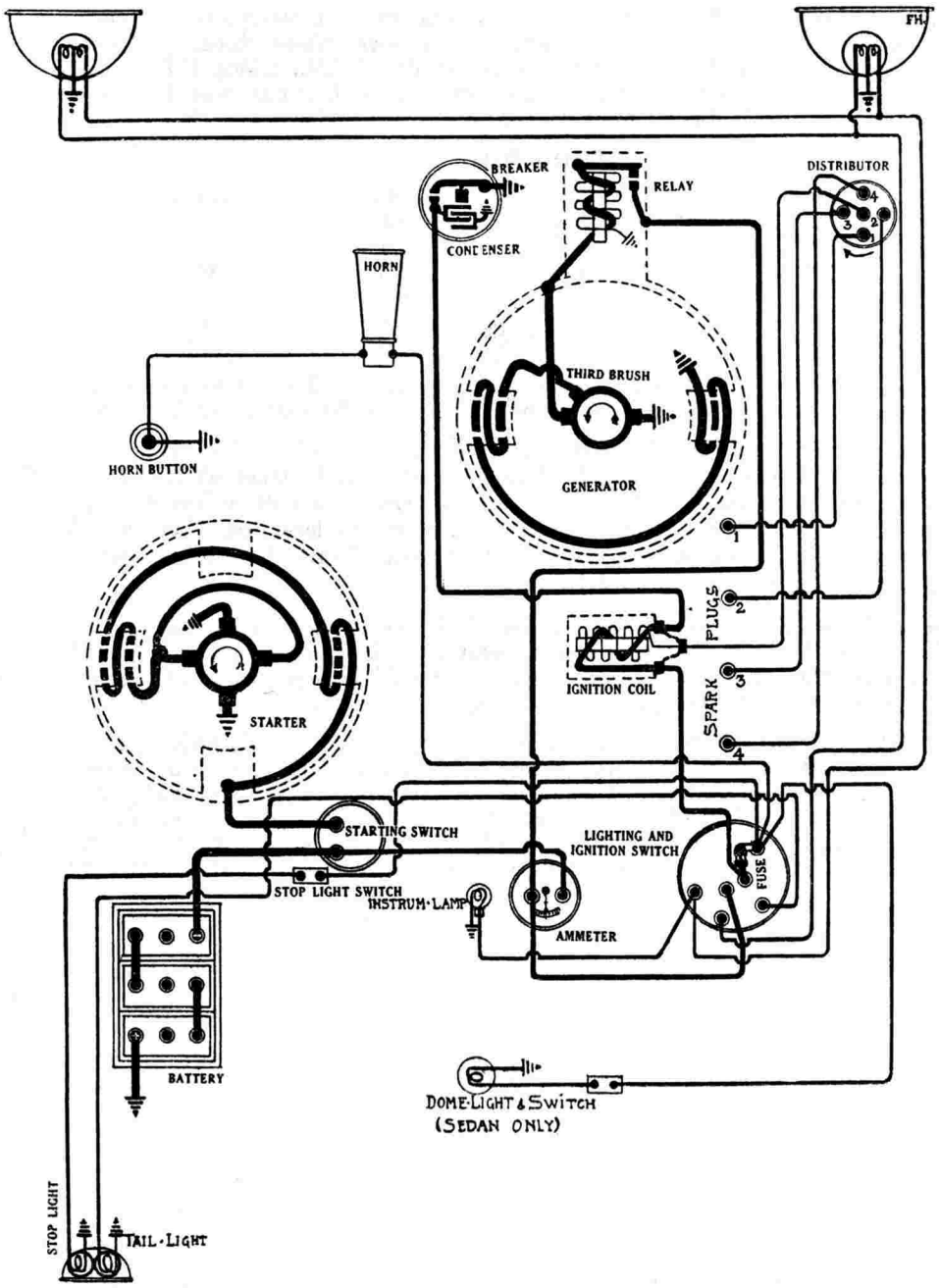
'RED HEAD' engines are specially timed. Breaker contacts separate with piston .004 inch before top dead center with spark fully advanced. Allowable variation is .002 inch. Piston limits are .002-.006 inch before top dead center.

Valve Timing:—INLET VALVES:—Head diameter, 1 7/16 inches; stem diameter, 3/8 inch; stem length, 5 1/16 inches; tappet clearance, .004 inch (hot); spring pressure, 35-42 pounds; valve lift, 9/32 inch; intake opens at top dead center and closes at 40° past lower dead center.

EXHAUST VALVES:—Head diameter, 1 7/16 inches; stem diameter, 3/8 inch; stem length, 5 1/16 inches; tappet clearance, .006 inch (hot); spring pressure, 35-42 pounds; valve lift, 9/32 inch; exhaust opens at 48° before lower dead center and closes 2° past top dead center. Stem guides are removable. No oversize valve stems are made. Valves in 'RED HEAD' engines are of special material.

Firing Order:—The firing order is 1-3-4-2.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Gaps are .030 inch. Special plugs are used in 'Red Head' engines.



CHRYSLER

MODEL 52 (LATE 1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

STARTER:—Model 712-F. Starter is connected to the engine through an outboard Bendix drive, Type R-11-X. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 150 R.P.M. taking 150 amperes at 5 volts. Starter switch is Model 404-V. Starter brush tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5.6	70
1.6 "	1560	5.2	150
3.0 "	1250	5.0	200
4.2 "	800	4.7	250
6.0 "	550	4.4	300
9.4 "	150	4.0	400
11.0 "	Lock	3.7	450

Mounting:—Starter is flange mounted at left of engine on forward side of bell housing. To remove starter, disconnect starter cable and remove two flange mounting screws. Then slide starter from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The bearing on the drive end is oilless.

GENERATOR:—Model 947-B. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust charging rate, remove the commutator cover band and loosen the small round headed screw on the commutator end plate of the generator. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Maximum output is 17 amperes (cold) reached at 1800 R.P.M. or 20-22 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	775	0	6.4	850
4	6.8	925	4	6.8	1075
8	7.3	1100	6	7.0	1250
12	7.7	1375	10	7.5	1700
15	8.0	1800	11	7.6	2100
13	7.8	2500	10.6	7.5	2500
11	7.6	3000	9.4	7.4	3000

Shunt field current is 4.5 amperes at 6 volts. Generator motoring draws 5.5 amperes at 6 volts. Brush spring tension is 24-28 ounces.

Mounting:—Generator is cradle mounted at front end of the engine and is belt driven. The fan is mounted on the forward side of the generator drive belt. To remove generator, disconnect generator lead and loosen the generator cradle stud nut which is the large nut directly under the generator holding the generator cradle bracket in position. Then lower generator and cradle and slip off drive belt. Loosen nut on generator mounting strap and slide generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on each end of the generator every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay coses when the voltage of the generator reaches 7.25 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING:—Briggs and Stratton Switch or Clum Switch Model 10607. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Stop lamps are 6-8 volt, 15 cp. S.C. Dome lamp is 6-8 volt, 15 cp. S.C. Dash and tail lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Lighting fuse on back of switch is 20 amperes.

CHRYSLER

MODEL 62 (LATE 1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type LWR-4, 6 volt. Starting capacity is 107 amperes for 20 minutes. Lighting capacity is 5 amperes for 18.6 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model 525-E. Distributor Model 637-J, N. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts with a fine, flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 25° (engine). Automatic advance is 18° (engine). Breaker arm spring tension is 15-20 ounces.

Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down two turns every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position .030 inch before top dead center with the spark control lever in the fully advanced position. A variation of .005 inch is permitted with piston limits at .025 and .035 inch before top dead center.

'RED HEAD engines must be timed differently. Breaker contacts separate with piston .008 inch before top dead center with spark fully advanced. Allowable variation is .002 inch with piston limits at .004 and .008 inch before top dead center.

Valve Timing:—INLET VALVES:—Head diameter, 1 5/56 inches; stem diameter, 3/8 inch; stem length, 4 21/32 inches; tappet clearance, .004 inch; spring pressure, 72-80 pounds; valve lift, 5/16 inch; inlet opens 3° after top dead center and closes 137° after top dead center (or 43° before lower dead center).
EXHAUST VALVES:—Head diameter, 1 5/16 inches; stem diameter, 3/8 inch; stem length, 4 21/32 inches; tappet clearance, .006 inch; spring pressure, 72-80 pounds; valve lift, 5/16 inch; exhaust opens 135° after top dead center (or 45° before lower dead center and closes 5° after top dead center. Valve stem guides are removable. Oversize valve stems are not made. Valves used on 'RED HEAD' engines are of special material.

Mounting:—Distributor is mounted on top of the cylinder head. To remove, disconnect manual advance rod and remove manual advance stop screw. Then lift distributor from place.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8 inch. Gaps are .027-.030 inch. Special plugs are used in 'Red Head' engines.

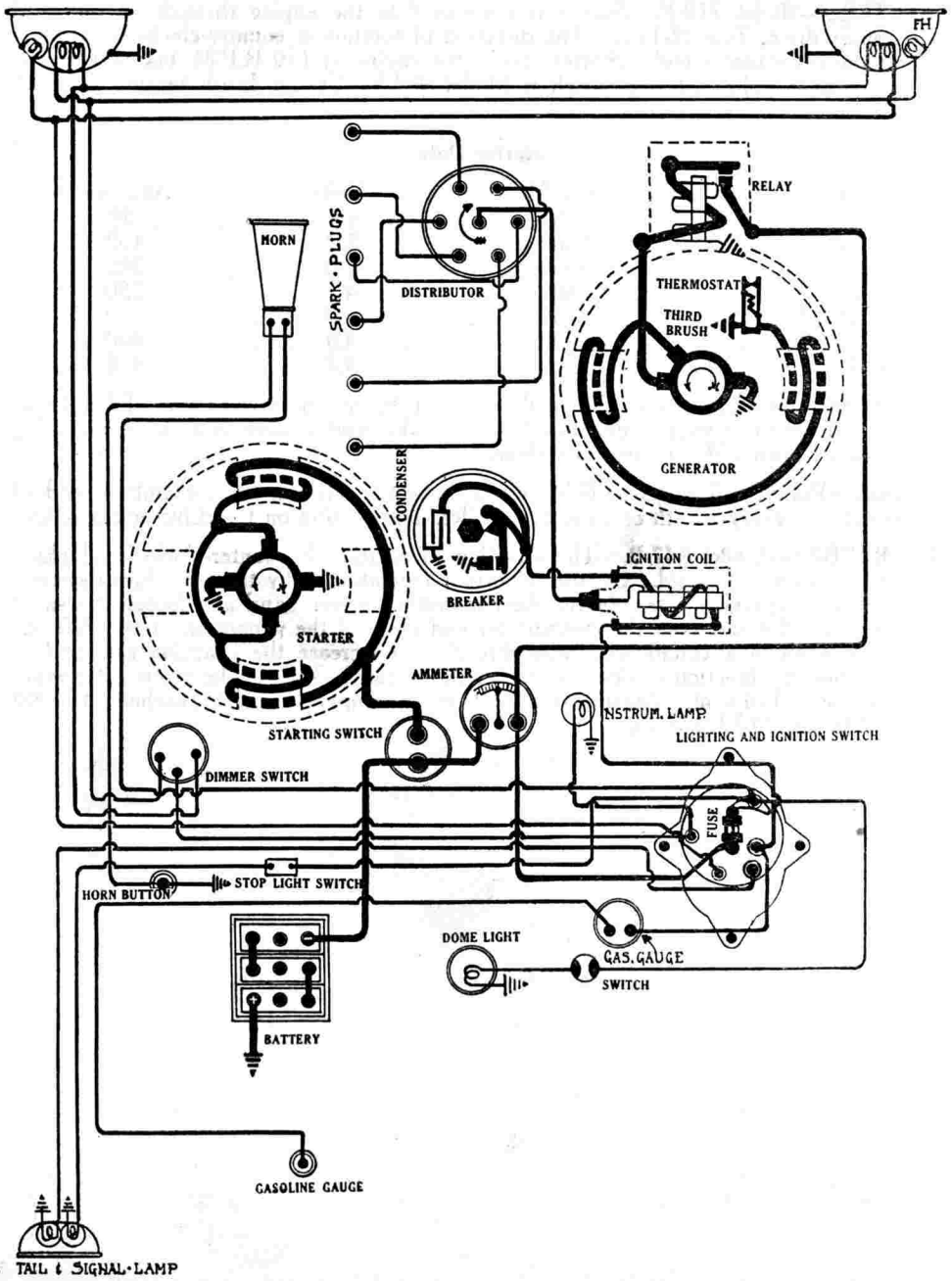
STARTER:—Model 714-D. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 178 R.P.M., taking 164 amperes at 5.1 volts. Starter brush tension is 26 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5.0	65
2 "	1650	5.1	150
6 "	700	4.5	280
12 "	Lock	3.63	475

Switch:—Starting Switch is Model 404-T.

Mounting:—Starter is barrel mounted at left of flywheel housing. To remove starter, remove pilot screw on top of housing and slide starter from position.



CHRYSLER

MODEL 62 (LATE 1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR:—Model 949-L. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, loosen the small round headed screw on the generator end plate and shift the third brush. Shifting the brush in a counter-clockwise direction increases the charging rate, and in the opposite direction decreases the charging rate. Tighten the screw after making the adjustment. Maximum charging rate is 14-16 amperes reached at 1500 R.P.M. or 22 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	575	0	6.4	700
4	6.8	700	4	6.8	850
8	7.2	850	8	7.2	850
12	7.8	1050	10.5	7.5	1250
15	8.0	1275	12	7.7	1575
16	8.1	1500	11	7.6	2000
14	7.9	2000	9.5	7.4	2500

Shunt field current is 5 amperes at 6 volts. Generator brush tension should be 18-24 ounces.

Mounting:—Generator is mounted at right of engine by a No. 3 S.A.E. flange mounting to the timing gear chain case. To remove generator, remove cover plate on front of case and remove three nuts holding generator in place. Then slide generator to rear, removing chain, but being careful that chain does not slip over cam shaft sprocket, or engine camshaft timing will be disturbed.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles if the car is driven more than 1000 miles in a month. The drive end bearing is oiled by splash from the gear case.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay closes when the generator reaches 600 R.P.M. with a terminal voltage of 7.25 volts and opens at approximately 500 R.P.M. with a discharge current of 0-2.5 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING:—Clum Switch Model 10629. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Stop and dome lamps are each 6-8 volt, 15 cp. S.C. Dash and tail lamps are each 6-8 volt, 3 cp. S.C. Auxiliary head lamps are 6-8 volt, 3 cp. S.C.

FUSES:—Lighting fuse on back of switch is 20 amperes.

CHRYSLER

MODEL 72 (LATE 1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type CWR-15, 6 volt, 100 ampere hour. Starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model 525-E. Distributor Model 659-A or 659-B. Breaker contacts separate .022 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine flat contact file. Distributor is semi-automatic. Manual advance is 25° (engine). Maximum automatic advance is 22° (engine). Breaker arm spring tension is 17.5-20.5 ounces. Distributor uses two sets of contacts operating on a three sided cam and opening alternately at intervals of 60° corresponding to 120° of crankshaft rotation. This firing interval must be correctly set (see Timing). Because of the Electrolock used with this distributor, the distributor and Electrolock should be removed from the car and replaced whenever service is necessary.

Mounting:—Distributor is mounted on top of cylinder block. To remove distributor, disconnect coil lead and high tension cables or remove distributor head. Then disconnect manual advance rod and remove manual advance stop screws. Lift distributor from place.

Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down two turns every two weeks or each 500 miles. Place a small bit of vaseline on the face of the breaker cam every 500 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position .067 inch before top dead center with the spark advance lever in the fully advanced position. A variation of .007 inch is allowable in piston position. The piston limits are .075 and .060 inch before top dead center. In checking timing, first set distributor with correct firing interval between opening of two sets of contacts. Check contact opening of stationary set of contacts. Then place Delco-Remy No. 820751 synchronizing tool on shaft with left hand side of spring in slot in shaft. Then turn shaft until left hand graduations are near slot in rim of distributor cup. Continue to turn shaft and note reading when stationary contacts separate. For an accurate check, connect a six volt lamp in primary circuit. The lamp will go out at the instant the contacts separate. Continue to turn shaft until the same reading on the other scale is opposite the slot. If second set of contacts are not separating, loosen two lock screws on mounting plate and turn eccentric adjusting screw until contacts begin to separate. Tighten the lock screws and check the contact opening. If contact opening has shifted outside of limits .018-.024 inch, repeat the operation.

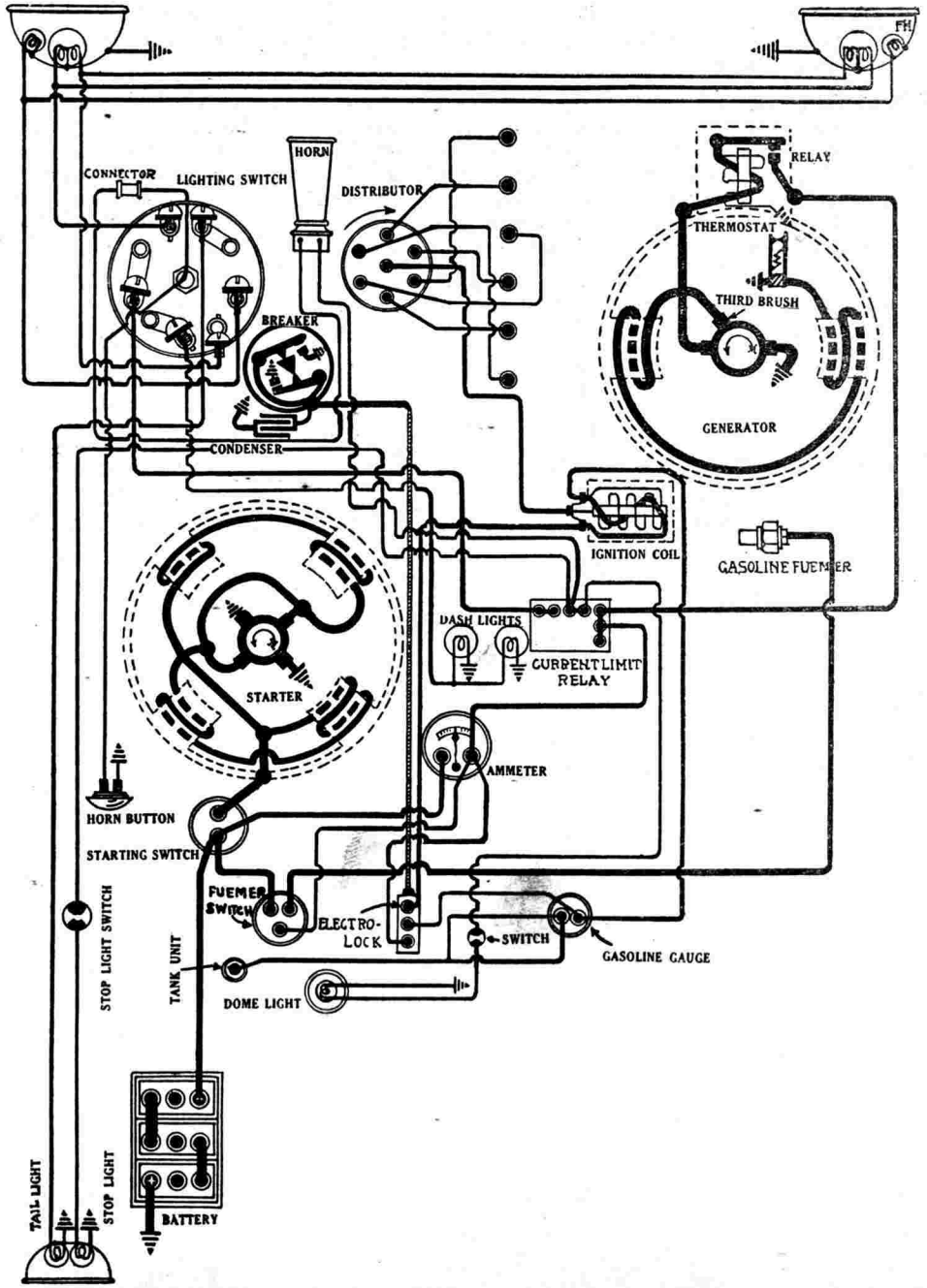
'RED HEAD' engines are specially timed. Breaker contacts separate with piston .004 inch before top dead center with spark fully advanced. Allowable variation in piston position is .005-.002 inch before top dead center.

Valve Timing:—INLET VALVES:—Head diameter, 1 19/32 inches; stem diameter, 11/32 inch; stem length, 7⅛ inches; valve lift, 5/16 inch; spring pressure, 52-82 pounds; tappet clearance, .005 inch. Inlet valves open 6° after top dead center and close 46° after lower dead center.

EXHAUST VALVES:—Head diameter, 1 23/32 inches; stem diameter, 11/32 inch; stem length, 7⅛ inches; valve lift, 5/16 inch; spring pressure, 52-82 pounds; tappet clearance, .007 inch. Exhaust valves open 42° before lower dead center and close 8° after top dead center. Valve stem guides are removable. Oversize valve stems are not made. Valves in 'RED HEAD' engines are of special material.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are ⅞ S.A.E. Gaps are .027-.030 inch. Special plugs are used in 'RED HEAD' engines.



CHRYSLER

MODEL 72 (LATE 1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

STARTER:—Model 724-C. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 144 R.P.M. taking 157 amperes at 5.27 volts. Starter Switch is Model 404-T.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2700	5.6	70
4.2 "	1200	5.0	200
12.0 "	350	4.0	400
16.5 "	150	3.5	500
22.5 "	Lock	3.0	600

Mounting:—Starter is mounted on forward side of flywheel housing at left of engine. To remove starter, disconnect starter cable and remove large pilot mounting screw and lock nut. Then slide starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the starter bearing oiler every month or each 1000 miles.

GENERATOR:—Model 949-L. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, loosen the small round headed screw on the generator end plate and shift the third brush. Shifting the brush in a counter-clockwise direction increases the charging rate, and in the opposite direction decreases the charging rate. Tighten the screw after making the adjustment. Maximum charging rate is 14-16 amperes reached at 1500 R.P.M. or 22 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	575	0	6.4	700
4	6.8	700	4	6.8	850
8	7.2	850	8	7.2	1050
12	7.8	1050	10.5	7.5	1250
15	8.0	1275	12	7.7	1575
16	8.1	1500	11	7.6	2000
14	7.9	2000	9.5	7.4	2500
11.5	7.6	2500			

Shunt field current is 5 amperes at 6 volts. Generator brush tension should be 18-24 ounces each.

Mounting:—Generator is mounted at right of engine by a No. 3 S.A.E. flange mounting to the timing gear chain case. To remove generator remove cover plate on front of case and remove three nuts holding generator in place. Then slide generator to rear, removing chain, but being careful that chain does not slip over cam shaft sprocket, or engine camshaft timing will be disturbed.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles if the car is driven more than 1000 miles in a month. The drive end bearing is oiled by splash from the gear case.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay closes when the generator reaches 600 R.P.M. with a terminal voltage of 7.25 volts and opens at approximately 500 R.P.M. with a discharge current of 0-2.5 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING:—Clum Switch Model 10636. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Auxiliary head lamps are 6-8 volt, 3 cp. S.C. Dome, stop and backing lamps are each 6-8 volt, 15 cp. S.C. Dash and tail lamps are each 6-8 volt, 3 cp. S.C.

CIRCUIT BREAKER:—Model 410-B. Lighting circuits are protected by two vibrating circuit breakers mounted in a single unit on the dash. Circuit breaker begins to operate with a current of 25-30 amperes limiting the current to 12-15 amperes.

CHRYSLER

MODEL 52 (1928)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type WXR-13, 6 volt. Starting capacity is 98 amperes for 20 minutes. Lighting capacity is 5 amperes for 16.8 hours. The positive (+) terminal is grounded. Battery is mounted under floor boards of front compartment on left frame member.

IGNITION:—Coil Model 525-E. Distributor Model 630-A. Breaker contacts separate .018-.024 inch. Resurface contacts on a medium hard oilstone or with a fine flat contact file. To adjust contact opening, loosen lock screw located behind stationary contact and turn eccentric adjusting screw on crescent shaped contact mounting arm until desired breaker gap is obtained. Then tighten lock screw to hold adjustment. Distributor is of the semi-automatic type. Manual advance is 22 degrees. Automatic advance begins at 600 R.P.M. Maximum automatic advance is 18 degrees at 2180 R.P.M. Breaker arm spring tension is 17-21 ounces. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

Mounting:—Distributor is mounted at front of engine and is accessible from the right side. Drive is by slotted tongue from the forward end of the cam shaft. To remove distributor, disconnect breaker lead and high tension cables or remove distributor head. Then remove two mounting bolts holding distributor bracket and gear case to forward end of engine gear case. Distributor can then be lifted from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down two turns every month or each 1000 miles. Keep the oiler on the distributor gear compartment filled with light engine oil.

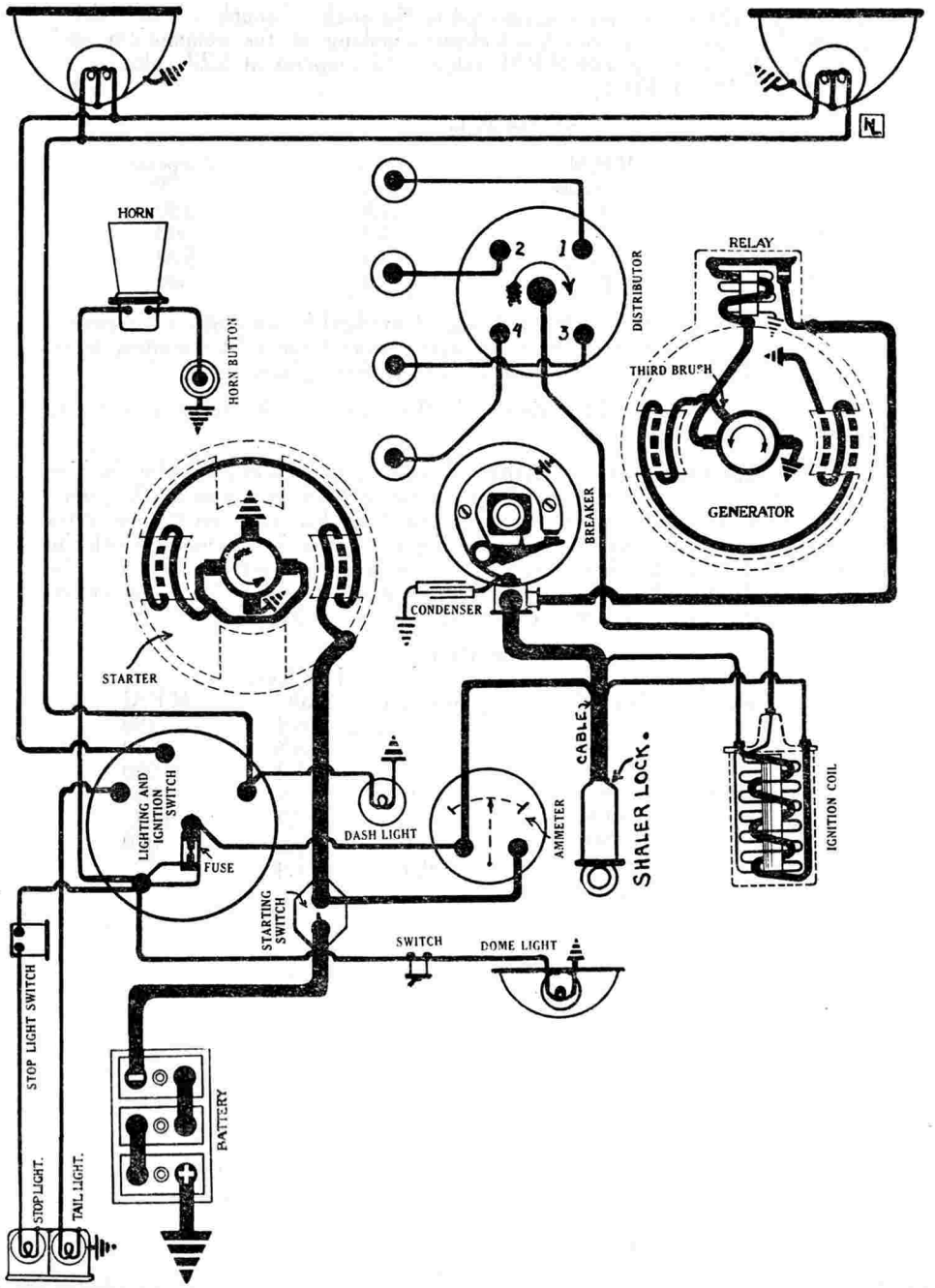
Timing:—Breaker contacts begin to separate when piston entering power stroke reaches a position .063 inch before top dead center with the manual spark control lever in the fully advanced position. To set timing, crank engine until piston No. 1 enters compression stroke (the up stroke with both valves closed). Then continue to crank engine until pistons No. 1 and No. 4 reach a position .063 inch before top dead center. Make certain that the spark control lever is in the fully advanced position. Loosen the clamp screw holding distributor in position on spark control lever and rotate distributor until contacts begin to separate. Tighten the clamp screw and replace the rotor and distributor head. Make certain that the rotor is opposite the segment connected to spark plug in cylinder No. 1. In setting timing, a variation of .011 inch is allowable. Piston limits are .075-.052 inch before top dead center.

'RED HEAD' engines are specially timed. Breaker contacts separate with piston .004 inch before top dead center with spark fully advanced. Allowable variation is .002 inch. Piston limits are .002-.006 inch before top dead center.

Valve Timing:—INLET VALVES:—Head diameter, 1 7/16 inches; stem diameter, 3/8 inch; stem length, 5 1/16 inches; tappet clearance, .004 inch (hot); spring pressure, 35-42 pounds; valve lift, 9/32 inch; intake opens at top dead center and closes at 40° past lower dead center.
EXHAUST VALVES:—Head diameter, 1 7/16 inches; stem diameter, 3/8 inch; stem length, 5 1/16 inches; tappet clearance, .006 inch (hot); spring pressure, 35-42 pounds; valve lift, 9/32 inch; exhaust opens at 48° before lower dead center and closes 2° past top dead center. Stem guides are removable. No oversize valve stems are made. Valves in 'RED HEAD' engines are of special material.

Firing Order:—The firing order is 1-3-4-2.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Gaps are .030 inch. Special plugs are used in 'Red Head' engines.



CHRYSLER

MODEL 52 (1928)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

STARTER:—Model 712-F. Starter is connected to the engine through an outboard Bendix drive Type R-11-X. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 150 R.P.M. taking 150 amperes at 5 volts. Starter switch is Model 404-V. Starter brush tension is 24-28 ounces.

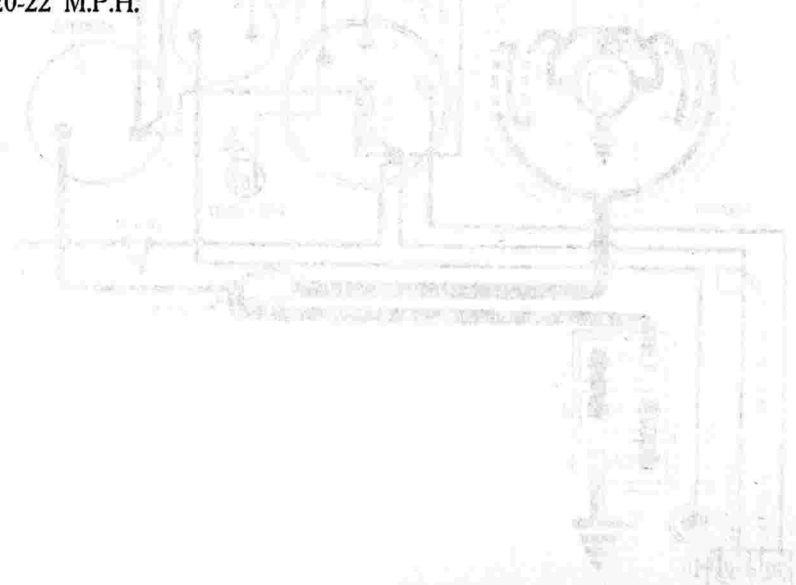
Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5.6	70
1.6 "	1560	5.2	150
3.0 "	1250	5.0	200
4.2 "	800	4.7	250
6.0 "	550	4.4	300
9.4 "	150	4.0	400
11.0 "	Lock	3.7	450

Mounting:—Starter is flange mounted at left of engine on forward side of bell housing. To remove starter, disconnect starter cable and remove two flange mounting screws. Then slide starter from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The bearing on the drive end is oilless.

GENERATOR:— Model 947-B. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust charging rate, remove the commutator cover band and loosen the small round headed screw on the commutator end plate of the generator. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Maximum output is 17 amperes (cold) reached at 1800 R.P.M. or 20-22 M.P.H.



Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	775	0	6.4	850
4	6.8	925	4	6.8	1075
8	7.3	1100	6	7.0	1250
12	7.7	1375	10	7.5	1700
15	8.0	1800	11	7.6	2100
13	7.8	2500	10.6	7.5	2500
11	7.6	3000	9.4	7.4	3000

Shunt field current is 5 amperes at 6 volts. Generator motoring draws 5.5 amperes at 6 volts. Brush spring tension is 24-28 ounces.

Mounting:—Generator is cradle mounted at front end of the engine and is belt driven. The fan is mounted on the forward side of the generator drive belt. To remove generator, disconnect generator lead and loosen the generator cradle stud nut which is the large nut directly under the generator holding the generator cradle bracket in position. Then lower generator and cradle and slip off drive belt. Loosen nut on generator mounting strap and slide generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on each end of the generator every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay closes when the voltage of the generator reaches 7.25 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING:—Briggs and Stratton Switch or Clum Switch Model 10607. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Stop lamp is 6-8 volt, 15 cp. S.C. Dome lamp is 6-8 volt, 15 cp. S.C. Dash and tail lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Lighting fuse on back of switch is 20 amperes.

CHRYSLER

MODEL 62 (1928)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—Willard, Type LWR-4, 6 volt. Starting capacity is 107 amperes for 20 minutes. Lighting capacity is 5 amperes for 18.6 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model 525-E. Distributor Model 631A-B. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 25 degrees (engine). Automatic advance begins at 400 R.P.M. Maximum automatic advance is 18 degrees at 2600 R.P.M. Breaker arm spring tension is 15-21 ounces.

Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down two turns every month or each 1000 miles if the car is driven more than 1000 miles a month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position .030 inch before top dead center with the spark control lever in the fully advanced position. A variation of .005 inch is permitted with piston limits at .025 and .035 inch before top dead center.

'RED HEAD' engines must be timed differently. Breaker contacts separate with piston .008 inch before top dead center with spark fully advanced. Allowable variation is .002 inch with piston limits at .004 and .008 inch before top dead center.

Valve Timing:—INLET VALVES:—Head diameter, 1 5/16 inches; stem diameter, 3/8 inch; stem length, 4 21/32 inches; tappet clearance, .004 inch; spring pressure, 72-80 pounds; valve lift, 5/16 inch; inlet opens 3° after top dead center and closes 137° after top dead center (or 43° before lower dead center).
EXHAUST VALVES:—Head diameter, 1 5/16 inches; stem diameter, 3/8 inch; stem length, 4 21/32 inches; tappet clearance, .006 inch; spring pressure, 72-80 pounds; valve lift, 5/16 inch; exhaust opens 135° after top dead center (or 45° before lower dead center) and closes 5° after top dead center. Valve stem guides are removable. Oversize valve stems are not made. Valves used on 'RED HEAD' engines are of special material.

Mounting:—Distributor is mounted on top of the cylinder head. To remove, disconnect manual advance rod and remove manual advance stop screw. Then lift distributor from place.

Firing Order:—The firing order is 1-5-3-6-2-4.

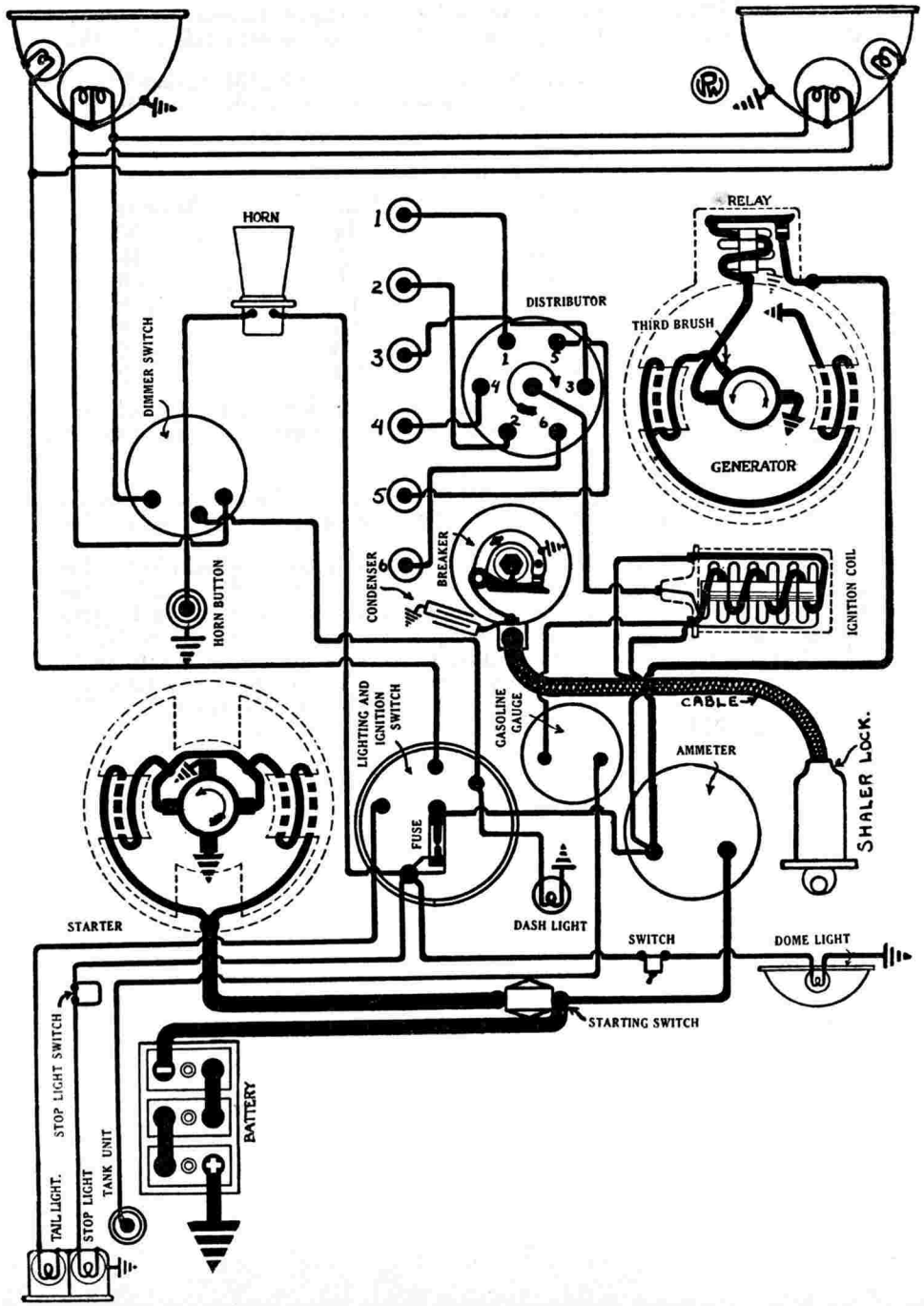
Spark Plugs:—Spark plugs are 7/8 inch. Gaps are .027-.030 inch. Special plugs are used in 'Red Head' engines.

STARTER:—Model 714-D. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 178 R.P.M., taking 164 amperes at 5.1 volts. Starter brush tension is 26 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5.0	65
2 "	1650	5.1	150
6 "	700	4.5	280
12 "	Lock	3.63	475

Switch:—Starting Switch is Model 404-T.



CHRYSLER

MODEL 62 (1928)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

Mounting:—Starter is barrel mounted at left of flywheel housing. To remove starter, remove pilot screw on top of housing and slide starter from position.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 if the the car is driven more than 1000 miles in a month.

GENERATOR:—Model 949-L. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, loosen the small round headed screw on the generator end plate and shift the third brush. Shifting the brush in a counter-clockwise direction increases the charging rate, and in the opposite direction decreases the charging rate. Tighten the screw after making the adjustment. Maximum charging rate is 14-16 amperes reached at 1500 R.P.M. or 22 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	575	0	6.4	700
4	6.8	700	4	6.8	850
8	7.2	850	8	7.2	1050
12	7.8	1050	10.5	7.5	1250
15	8.0	1275	12	7.7	1575
16	8.1	1500	11	7.6	2000
14	7.9	2000	9.5	7.4	2500
11.5	7.6	2500			

Shunt field current is 5 amperes at 6 volts. Generator motoring draws 5.5 amperes at 6 volts. Brush spring tension is 24-28 ounces.

Mounting:—Generator is mounted at right of engine by a No. 3 S.A.E. flange mounting to the timing gear chain case. To remove generator remove cover plate on front of case and remove three nuts holding generator in place. Then slide generator to rear, removing chain, but being careful that chain does not slip over cam shaft sprocket, or engine camshaft timing will be disturbed.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles if the car is driven more than 1000 miles in a month. The drive end bearing is oiled by splash from the gear case.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay closes when the generator reaches 600 R.P.M. with a terminal voltage of 7.25 volts and opens at approximately 500 R.P.M. with a discharge current of 0-2.5 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING:—Clum Switch Model 10629. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Stop and dome lamps are each 6-8 volt, 15 cp. S.C. Dash and tail lamps are each 6-8 volt, 3 cp. S.C. Auxiliary head lamps are 6-8 volt, 3 cp. S.C.

FUSES:—Lighting fuse on back of switch is 20 amperes.

CHRYSLER

MODEL 'L' 80 (1927-28)
SERIAL NUMBERS EP-000-T UP
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type SJWR-6, 6 volt, 17 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 166 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 30.6 hours. Battery is mounted under front floor boards on left frame member.

IGNITION:—Coil Model 525-E. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped. Coil is mounted on the dash.

Distributor Model 659-A or 659-B. Breaker contacts separate .022 inch with breaker arm on lobe of cam. To set contact opening, loosen lock screw on stationary contact plate and turn eccentric adjusting screw until proper contact opening is secured. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17.5-20.5 ounces. The breaker has two sets of breaker contacts on a three sided cam opening alternately at intervals of 60° corresponding to 120° of crankshaft rotation. This firing interval is very important must be accurately set. See Timing. Distributor is semi-automatic. Maximum manual advance is 25° (engine). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 22° (engine) reached at 2900 R.P.M. An electrolock is used on the distributor. Whenever the distributor requires service, the entire distributor and electrolock should be removed as a unit and replaced.

Mounting:—Distributor is mounted on top of cylinder block. To remove distributor, disconnect manual advance rod and remove head with cables intact. Remove manual advance stop screw and lift distributor from place. The distributor and electrolock must be removed as a unit.

Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down two turns every 500 miles. Put a small bit of vaseline on the face of the breaker cam every 500 miles.

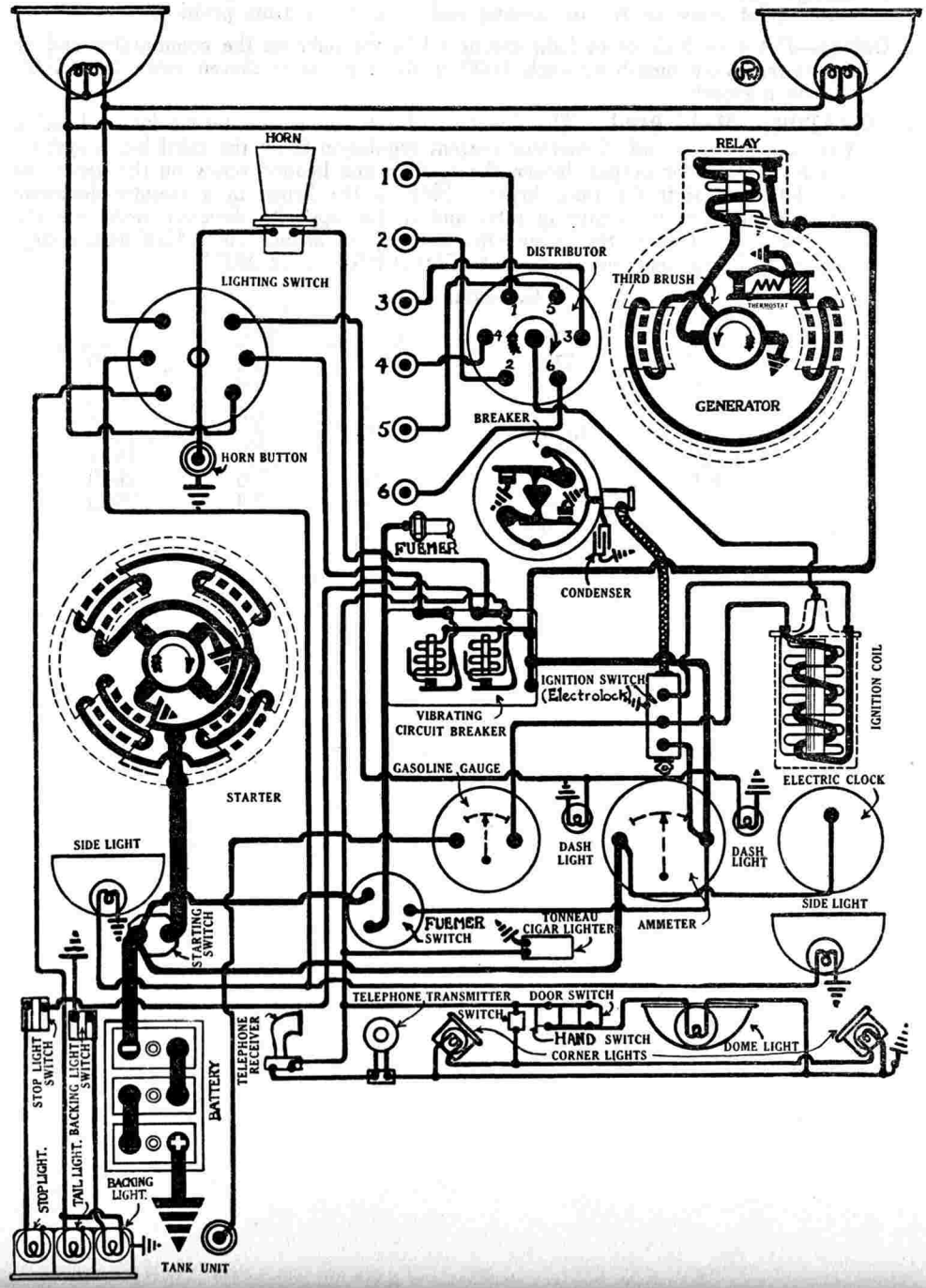
Timing:—Synchronization of Contacts:—Use Delco-Remy Tool, Part No. 829751, and follow directions on Page S-30. Connect a 6 volt lamp in series with primary circuit at coil to accurately determine when contacts open. The lamp will go out at the instant the contacts separate. After synchronizing contacts, check contact opening. If it is not within limits of .018-.024 inch, reset at .022 inch and repeat synchronizing operation.

Timing Distributor to Engine:—Breaker contacts begin to separate when piston entering power stroke reaches a position .035 inch before top dead center with the manual spark lever fully advanced. A variation of plus or minus .005 inch is allowable with piston position limits of .040-.030 inch before top dead center. To set timing, crank engine until piston No. 1 reaches firing position. Fully advance spark lever and loosen advance arm clamp screw. Rotate distributor until one set of contacts begins to separate. Tighten the clamp screw and make certain that the segment opposite the rotor is connected to the spark plug in cylinder No. 1. These directions apply only to standard engines with compression ratio of 4.75 to 1. For Red Head engines with 6 to 1 compression see following paragraph.

Special Directions for RED HEAD Engine Timing:—On Red Head engines breaker contacts separate with the piston entering power stroke on top dead center with the manual spark lever fully advancd. The allowable variation is plus or minus .0005 inch with piston position limits .0005 inch before or after top dead center.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .027-.030 inch. Special plugs are used in Red Head Engines.



CHRYSLER

MODEL 'L' 80 (1927-28)
SERIAL NUMBERS EP-000-T UP
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

VALVE TIMING:—INLET VALVES:—Head diameter, 1 13/16 inches; stem diameter, 3/8 inch; stem length, 7 inches. Valve lift, 5/16 inch. Spring pressure, 57 pounds closed and 94 pounds open. Tappet clearance, .006 inch. Inlet valves open 6° past top dead center and close 46° past lower dead center.

EXHAUST VALVES:—Head diameter, 1 15/16 inches; stem diameter, 3/8 inch; stem length, 7 inches. Valve lift, 5/16 inch. Spring pressure, 57 pounds closed and 94 pounds open. Tappet clearance, .008 inch. Exhaust valves open 46° before lower dead center and close 8° past top dead center. Valve stem guides are removable. Oversize valve stems are not made. Special material valves are used in Red Head engines.

STARTER:—Model 728-A. Starter is connected to the engine through a Bendix drive. The direction of rotation of the armature shaft is clockwise, looking at the commutator end. Starter cranks the engine at 110 R.P.M. drawing 130 amperes at 5.2 volts. Brush spring tension is 24-28 ounces. Starter switch is Model 404-T.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	5.7	65
1 "	1520	5.5	100
4 "	760	5.0	200
10 "	460	4.5	300
15.5 "	260	4.0	400
19.5 "	120	3.5	500
26 "	Lock	3.0	600

Mounting:—Starter is sleeve mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and shift lever and remove large pilot mounting screw from housing directly above starter sleeve. Then pull starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light oil in the starter bearing oiler every 1000 miles.

GENERATOR:—Model 949-Q. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts into the field circuit and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting the maximum charging rate is 19 amperes (cold) reached at 1600 R.P.M. or 27 miles per hour.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	575	0	6.4	700
4	6.8	675	5	6.9	1000
10	7.4	850	10	7.4	1500
16	8.1	1150	12	7.7	2000
19	8.4	1600	10	7.6	2600
10	7.5	3250			

Motoring generator draws 5 amperes at 6 volts. Shunt field current is 4 amperes at 6 volts. Brush spring tension is 24-28 ounces.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case by standard S.A.E. No. 4 flange mounting. To remove generator, disconnect lead and remove 3 flange mounting cap screws. Then pull generator to the rear being careful not to disturb intermediate flange carrying sprocket and timing chain. Then lift generator from place.

Oiling:—Put 4 or 5 drops of light oil in the generator oilers every 1000 miles.

RELAY:—Relay Model 265-B. Relay is mounted on the generator. Relay contacts close at 600 R.P.M. when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Clum Switch Model 10661. Switch is mounted at lower end of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second filament instead of dimming) Mazda No. 1110. Auxiliary head lights (in head lamps) are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop, backing, dome, corner and tonneau lights are each 6-8 volt, 15 cp. S.C. Mazda No. 87. Side, dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

CLEVELAND

MODEL 40 (1919-20)

GRAY AND DAVIS GENERATING, STARTING AND LIGHTING SYSTEM

BOSCH IGNITION

BATTERY.—Prest-O-Lite, 6 volt, 94 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Bosch, Type B-6. Breaker contacts separate .014-.016 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 2 or 3 drops of light engine oil in each of the magneto oilers every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the flywheel marking "DC 1 & 6" is opposite the mark on the hole in the flywheel housing, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .026 inch.

STARTER.—Model No. 500. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 80 R.P.M., taking 150 amperes. Running freely starter current is 45-50 amperes. Lock torque is 15 pound-feet.

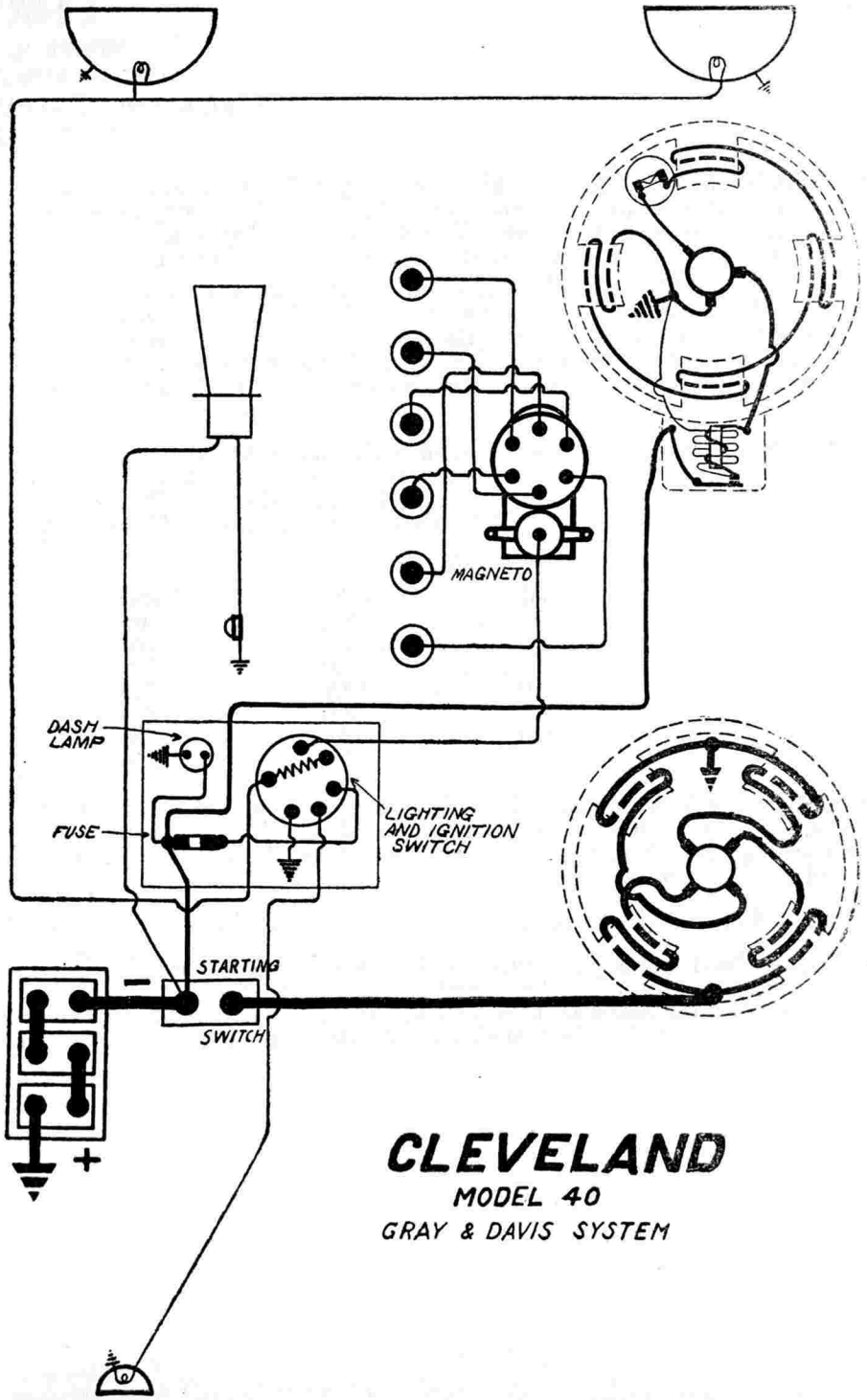
OILING.—Put 5 or 6 drops of light engine oil in each of the starter bearing oilers every month.

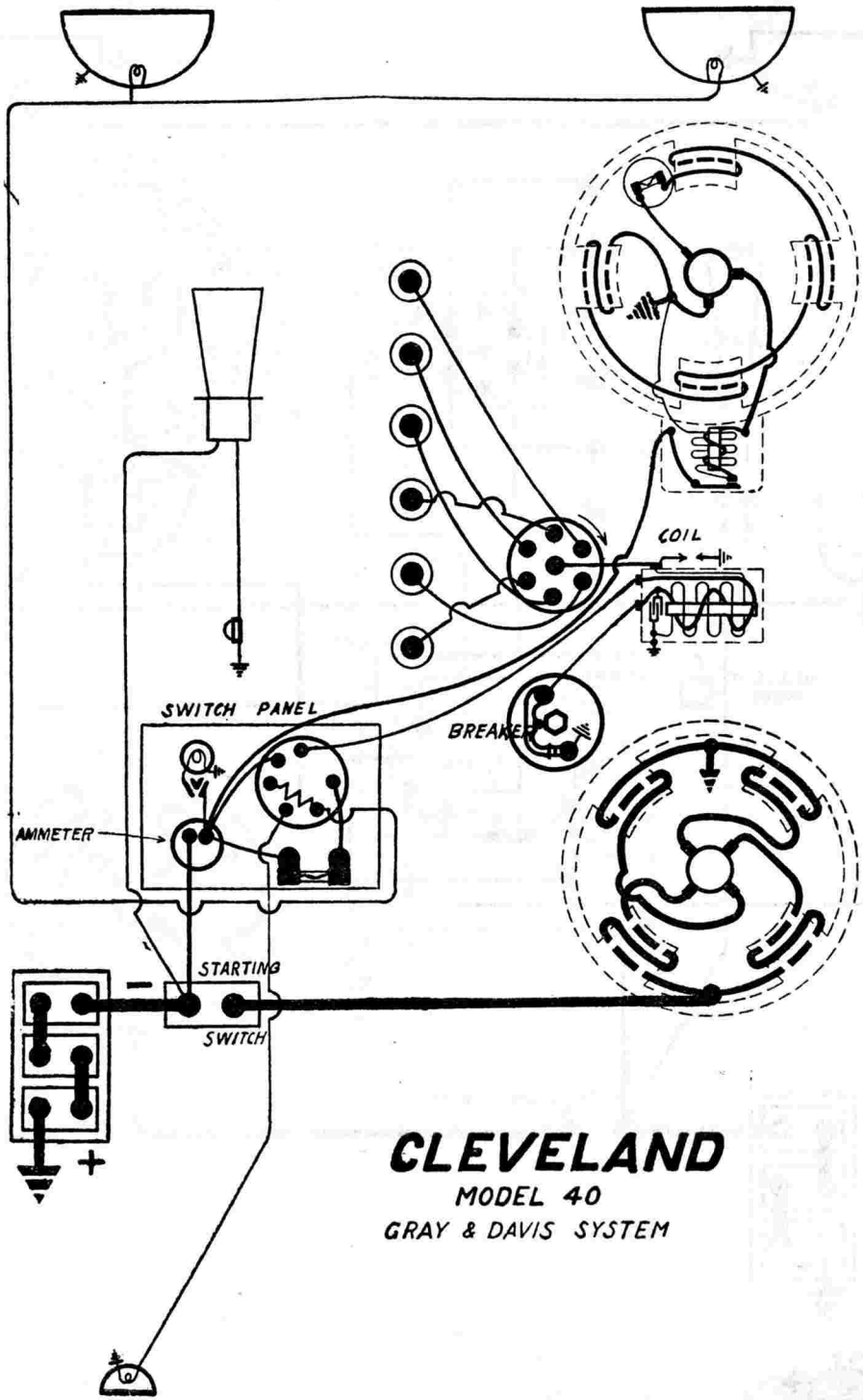
GENERATOR.—Model No. 604. Generator current regulation is by third brush system. The maximum charging rate is 15 amperes, reached at 1400 R.P.M. of the armature or 25 miles per hour. Shunt field current is 2.5 amperes at 6.5 volts. Charging rate is varied by adjusting third brush setting. Turn the adjusting screw at the commutator end to the right to increase the charging rate and to the left to decrease the charging rate.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes at 7-9 miles per hour and opens at 5-7 miles per hour. Contacts separate .012 to .015 inch. Air gap between relay armature and coil core is .018 inch. Charging current is 1-2 amperes at closing, and the discharge current 0-2 amperes at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are 6-8 volt, 2 cp.





CLEVELAND

MODEL 40 (1920)

GRAY AND DAVIS GENERATING, STARTING AND LIGHTING SYSTEM

GRAY AND DAVIS IGNITION

BATTERY.—Prest-O-Lite, 6 volt, 94 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .015 inch. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 4 or 5 drops of light engine oil in the distributor bearing oil cup every two weeks. Put a small amount of vaseline on the cam, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the flywheel marking "DC 1 & 6" is opposite the mark on the hole in the flywheel housing, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model No. 500. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 80 R.P.M., taking 150 amperes. Running freely starter current is 45-50 amperes. Lock torque is 15 pound-feet.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter bearing oilers every month.

GENERATOR.—Model No. 604. Generator current regulation is by third brush system. The maximum charging rate is 15 amperes, reached at 1400 R.P.M. of the armature or 25 miles per hour. Shunt field current is 2.5 amperes at 6.5 volts. Charging rate is varied by adjusting the third brush setting. Turn the adjusting screw at the commutator end to the right to increase the charging rate and to the left to decrease the charging rate.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes at 7-9 miles per hour and opens at 5-7 miles per hour. Contacts separate .012 to .015 inch. Air gap between relay armature and coil core is .018 inch. Charging current is 1-2 amperes at closing, and the discharge current 0-2 amperes at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are 6-8 volt, 2 cp.

CLEVELAND

MODEL 40 (1921) 41 (1922)
BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH MAGNETO IGNITION

BATTERY.—Prest-O-Lite, Type 611-RHN, 6 volt, 94 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type B-6. Breaker contacts separate .014 to .016 inch. They are made of platinum. When the condtion of the contacts affects the ignition, resurface them with a fine flat jeweler's file.

Oiling.—Put 3 or 4 drops only of light machine oil in the oil cup at the side of the distributor housing every 500 miles. Care must be taken not to over oil the magneto.

Timing.—Breaker contacts begin to separate when the flywheel marking "DC 1&6" has 1⅛ inches to travel before reaching the mark on the hole in the flywheel housing, spark control lever and breaker assembly in the fully retarded position. On 1920 cars, breaker contacts separate with piston on top dead center.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—The spark plug gaps are .021 inch.

STARTER.—Model No. 900. Direction of rotation is counter-clockwise, looking at the commutator end. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 110 R.P.M., taking 150 amperes. Running free, the current is 45-50 amperes.

Starter Data.—No. 900

Torque	R.P.M.	Amperes
2 lb. ft.	1600	130
6 lb. ft.	600	280
10 lb. ft.	250	410
12 lb. ft.	125	465
15 lb. ft.	Lock	540

The pressure of the brushes on the commutator is 2 pounds.

Oiling.—Oilless bearings are used. No oil is required.

GENERATOR.—Model No. 1000. The direction of rotation is counter-clockwise, looking The maximum charging rate is 15 amperes, reached at 1600 R.P.M. of the armature, or 37 mlies per hour.

Generator Data.—Model 1000

Hot Test		Cold Test	
Amperes	R.P.M.	Amperes	R.P.M.
0	550	0	500
4	760	4	640
8	1100	12	1100
10	1600	15	1600
8	2280	12	2240

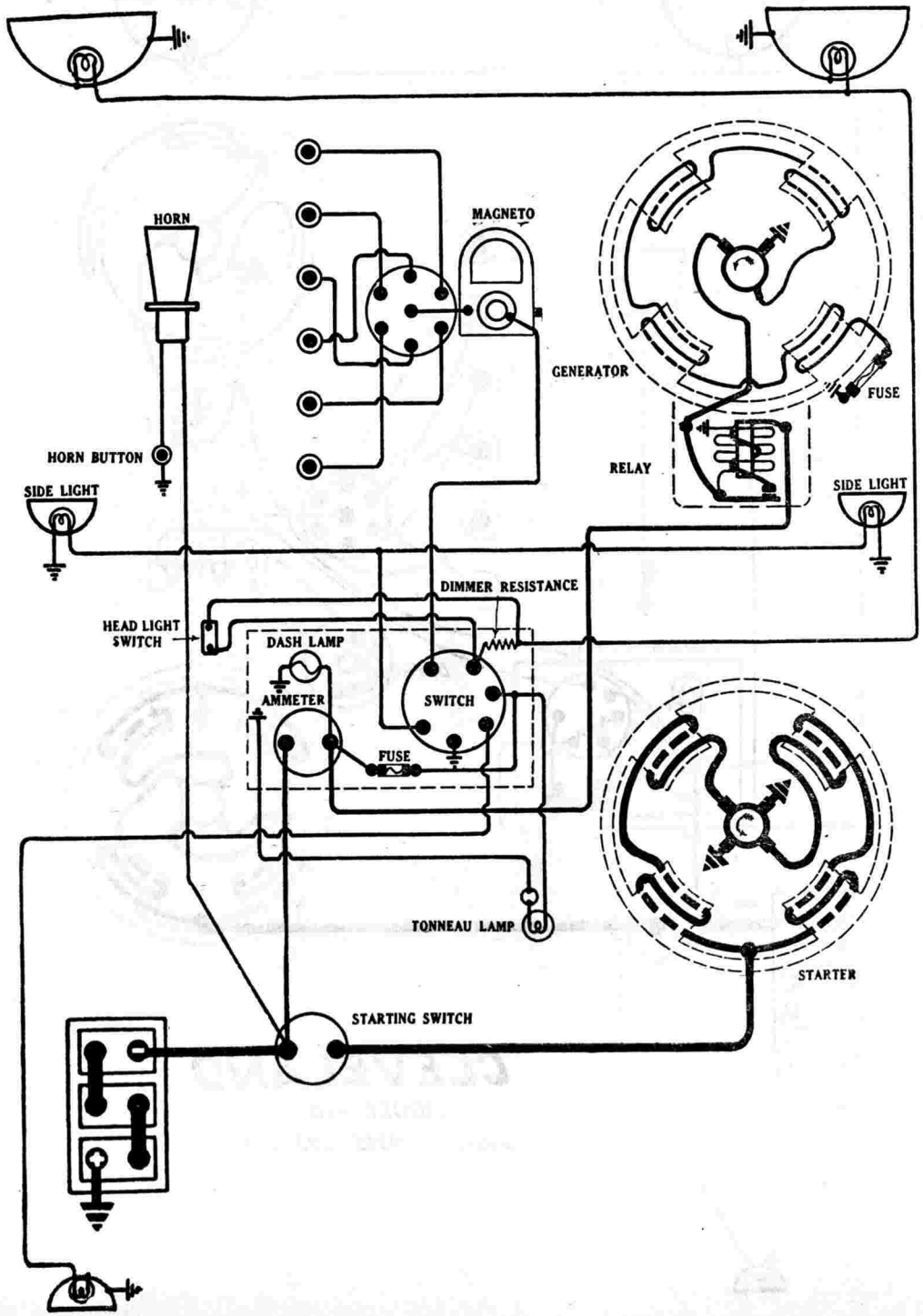
The pressure of all of the brushes on the commutator is 1¾ pounds.

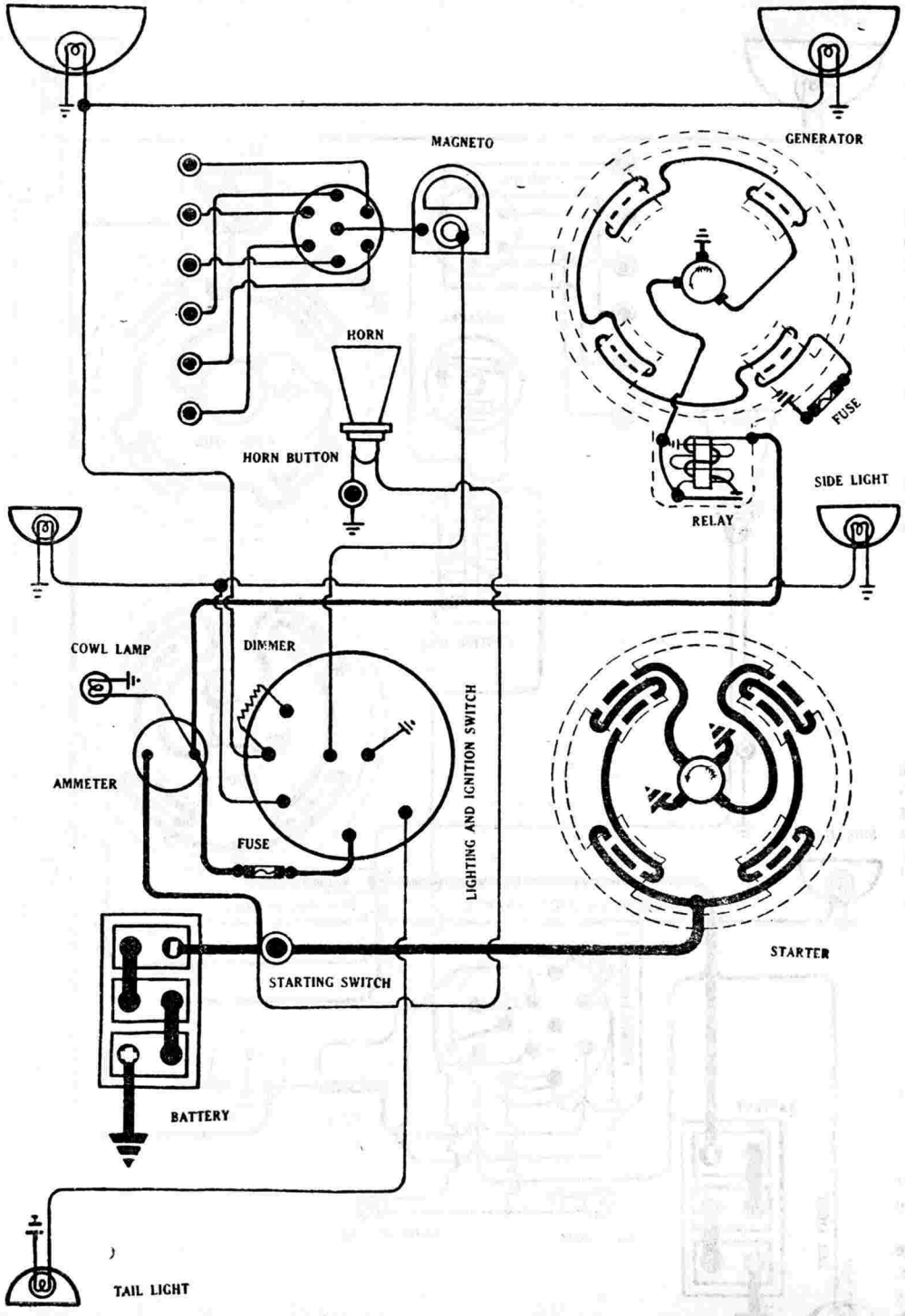
Oiling.—Put 4 or 5 drops of light engine oil in the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes when the voltage reaches 6.5 to 7.5 volts, and opens when there is a discharge current of 0-2 amperes. The contacts separate .012 to .015 inch. The air gap between the coil core and the relay armature is .018 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with worn No. 000 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dash, tail and tonneau lamps are 6-8 volt, 2 cp. Side lamps are 6-8 volt, 4 cp.

FUSES.—Lighting fuse is 20 ampere. Generator fuse is 5 ampere.





CLEVELAND

MODEL 41 (1922) 42 (1923-24)

BOSCH GENERATING, STARTING AND LIGHTING SYSTEM

BOSCH MAGNETO IGNITION

BATTERY:—Prest-O-Lite, Type 611-RHN, 6 volt, 94 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type AT-6. Breaker contacts separate .014 to .016 inch. They are made of platinum. When the condition of the contacts affects the ignition, resurface them with a fine flat jeweler's file.

Oiling.—Put 3 or 4 drops of light machine oil in the oil cup at the side of the distributor housing every 500 miles. Care must be taken not to over oil the magneto.

Timing.—Breaker contacts begin to separate when the flywheel marking "DC 1&6" has 1⅛ inches to travel before reaching the mark on the hole in the flywheel housing. spark control lever and breaker assembly in the fully retarded position. On 1922 cars, breaker contacts begin to separate when piston reaches top dead center.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—The spark plug gaps are .021 inch.

STARTER:—Model No. 900. Direction of rotation is counter-clockwise, looking at the commutator end. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 110 R.P.M., taking 150 amperes. Running free, the current is 45-50 amperes.

Starter Data.—No. 900

Torque	R.P.M.	Amperes
2 lb. ft.	1600	130
6 lb. ft.	600	280
10 lb. ft.	250	410
12 lb. ft.	125	465
15 lb. ft.	Lock	540

Oiling:—Oilless bearings are used. No oil is required.

GENERATOR:—Model No. 1021. The direction of rotaton is counter-clockwise looking at the commutator end. Generator current regulation is by the third brush system. The maximum charging rate is 15 amperes, reached at 1600 R.P.M. of the armature, or 37 miles per hour.

Generator Data.—Model 1021

Amperes	Hot Test R.P.M.	Amperes	Cold Test R.P.M.
0	550	0	500
4	760	4	640
8	1100	12	1100
10	1600	15	1600
8	2280	12	2240

The pressure of all of the brushes on the commutator is 1¾ pounds.

Oiling:—Put 4 or 5 drops of light engine oil in the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY:—Relay is mounted on the generator frame. Relay closes when the voltage reaches 6.5 to 7.5 volts, and opens when there is a discharge current of 0-2 amperes. The contacts separate .012 to .015 inch. The air gap between coil core and the relay armature is .018 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with worn No. 000 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS:—Head lamps are 6-8 volt, 21 cp. Dash, tail and tonneau lamps are 6-8 volt, 2 cp. Side lamps are 6-8 volt, 4 cp.

FUSES:—Lighting fuse is 20 ampere. Generator fuse is 5 ampere.

CLEVELAND

MODEL 41 (1922) 42 (1923-24)

AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

BATTERY.—Prest-O-Lite, Type 611-RHN, 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model TC-30. Distributor Model T-6190. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition remove and resurface on a medium hard oilstone.

Oiling.—Fill the oil cup on the side of the distributor housing with light engine oil. Put one drop of light engine oil on the lever pivot post and place a bit of hard grease on the side of the interrupter block nearest to post. The above instructions must be followed every two weeks. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—To time ignition, turn the engine over until the flywheel marking "DC 1&6" is directly under the notch cast in the crankcase over the flywheel. Then rotate the flywheel to the right or in a clockwise direction until a point 3½ teeth before dead center is under the notch. With the spark control lever and breaker assembly fully advanced, the breaker contacts should just begin to separate at this point. On 1922 cars, breaker contacts separate when the piston reaches top dead center.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—The spark plug gaps are .021 inch.

STARTER.—Model No. 900. Direction of rotation is counter-clockwise, looking at the commutator end. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 110 R.P.M., taking 150 amperes. Running free, the current is 45-50 amperes.

Starter Data.—No. 900

Torque	R.P.M.	Amperes
2 lb. ft.	1600	130
6 lb. ft.	600	280
10 lb. ft.	250	410
12 lb. ft.	125	465
15 lb. ft.	Lock	540

The pressure of the brushes on the commutator is 2 pounds.

Oiling.—Oilless bearings are used. No oil is required.

GENERATOR.—Model No. 1021. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Moving the third brush in the direction of rotation (counter-clockwise) increases the charging rate; moving the brush in the opposite direction decreases the charging rate. The maximum charging rate is 13-14 amperes, reached at 1500-1600 R.P.M. of armature or 20 M.P.H., car speed in high gear. When making adjustment of generator, the generator should be cold (50°-80° F. at frame) and battery fully charged. The pressure of all brushes is 1¾ to 2¼ pounds.

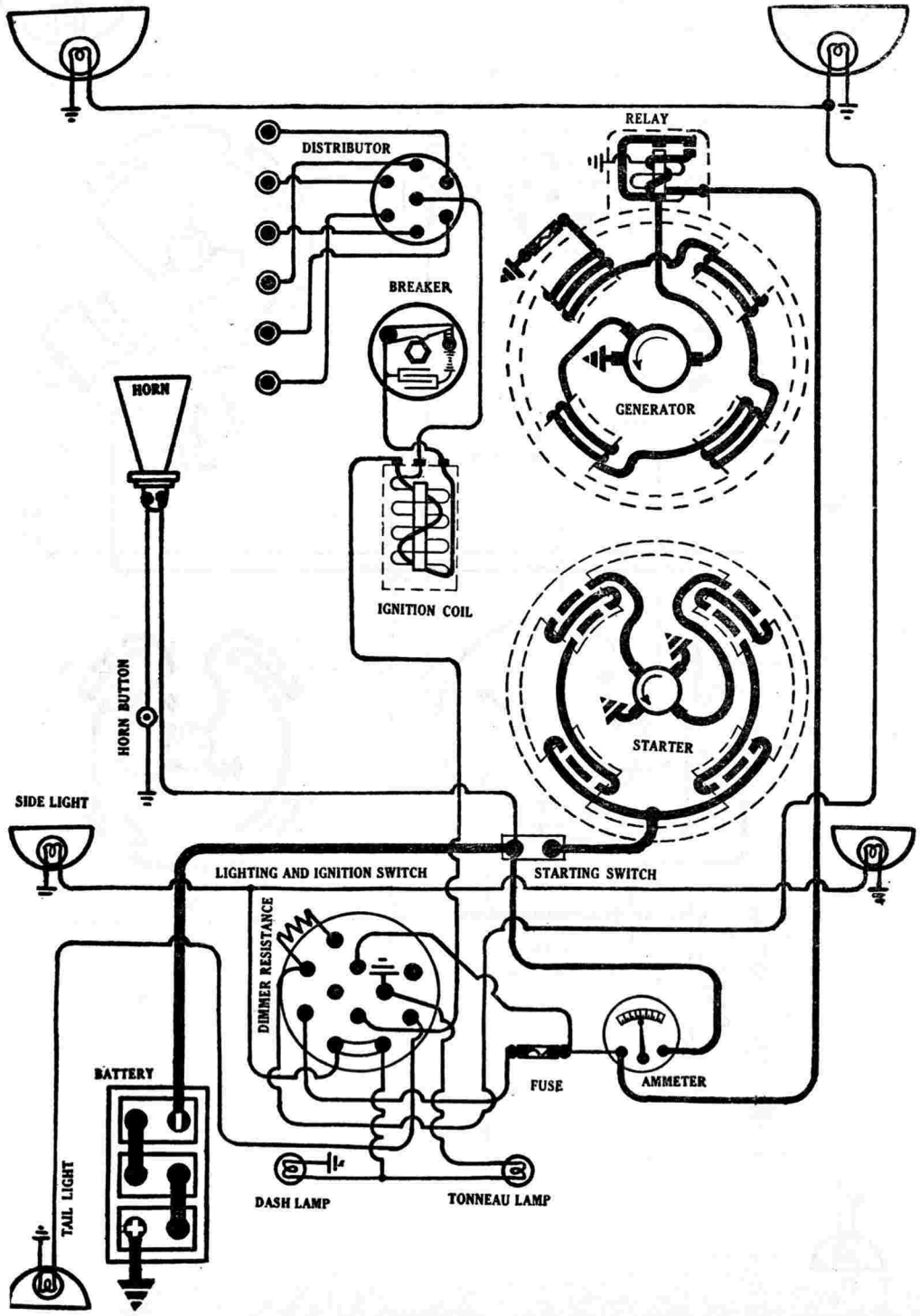
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0.0	6.0	520	0.0	6.0	600
7	7.0	800	4	6.6	800
12	7.5	1200	8.5	7.0	1200
13.6 (Max.)	7.7	1600	9.8 (Max.)	7.3	1600
12.8	7.6	2000	9.6	7.3	2000
11.6	7.4	2400	8.8	7.0	2400
10.0	6.9	2800	7.7	6.6	2800
8.3	6.0	3200	6.0	5.6	3200

Frame temperature—Cold, 20°C.; hot, 85°C.

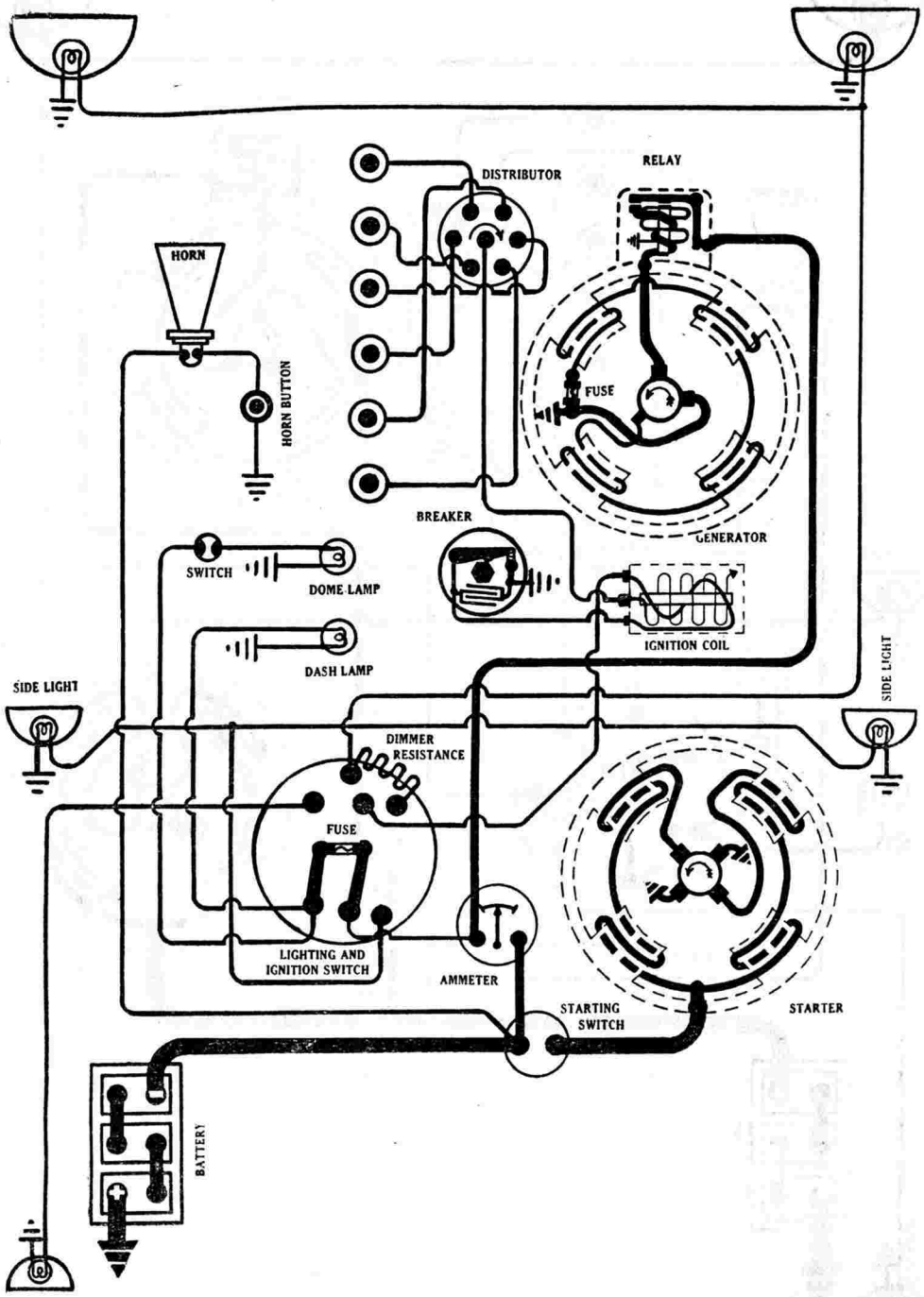
Oiling.—Put 4 or 5 drops of light engine oil in the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes when the voltage reaches 6.5 to 7.5 volts, and opens when there is a discharge current of 0-2 amperes. The contacts separate .012 to .014 inch. The air gap between the coil core and the relay armature is .018 inch. Clean relay contacts by drawing unglazed peper between them. If badly burned or pitted, resurface with well worn No. 000 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volts, 21 cp. Dash, tail and side lamps are 6-8 volts, 2



CLEVELAND
MODEL 31 (1925-26)
AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION.



BATTERY:—Prest-O-Lite, Type 611-RHK. 6 volt, 80 ampere hour. The starting capacity is 95 amperes for 20 minutes. The lighting capacity is 5 amperes for 16 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model No. TC-30. Distributor Model No. T-6600. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone.

Oiling:—Distributor oiling is automatic.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control lever in the fully advanced position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Model No. 955. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The starter cranks the engnie at 110 R.P.M. taking 150 amperes at 6 volts. The brush tension of the starter brushes should be 1¾ to 2 pounds each. Starter switch in model S-203.

Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	6	45-60
2 "	1600	6	130
6 "	600	6	280
10 "	250	6	410
12 "	125	6	465
15 "	Lock	6	540

With a terminal voltage of 4 volts, the motor develops 12 lb ft. lock torque, drawing, at a maximum, 450 amperes.

Oiling:—Starter is fitted with self-lubricating graphite bushings. They require no attention.

GENERATOR.—Models 1060-1069. Direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Charging rate is adjusted by shifting the third brush by means of an adjusting screw located on the end of the generator. Shifting the brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. The maximum charging rate is 13-14 amperes reached at 1400-1800 R.P.M. on the model 1060 and at 1600-1800 R.P.M. on the model 1069 generator. This is approximately 19-21 M.P.H.

Generator Data.

Cold Test (20°C)			Hot Test (85°C)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6	520	0	6	520
7	7	800	4	6.6	800
13.6	7.7	1600	9.8	7.3	1600
11.6	7.4	2400	8.8	7	2400
8.3	6	3200	6	5.6	3200

Motoring freely the Model 1060 generator draws 5 amperes at 6 volts. The field current is 2.3 amperes at 6 volts. The model 1068 generator motors at 500 R.P.M. drawing 4-6 amperes at 6 volts. The field current is 3.2 amperes at 6 volts. The brush tension of all the brushes should be 1-1¼ pounds each.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator oilers each two weeks or every 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Model I-1560. Relay contacts close at 800 R.P.M. of the armature or 9 M.P.H. when the generator voltage reaches 6.5-7.5 volts and open at 500 R.P.M. of the armature or 6 M.P.H. Charging current is 1-2 amperes at closing of contacts and discharge current 1-3 amperes at opening. Relay contacts separate .010 inch. Air gap between relay armature and coil core is .015 inch, contacts closed. Resistance of the shunt coil is 45 ohms.

LIGHTING:—Clum Combination Switch. Head lamps are each 6-8 volt, 21 cp S.C. With dimmer resistance, head lamps are approximately 3 cp. The dash, dome, side, tonneau and tail lamps are each 6-8 volt, 3 cp.S.C.

FUSES:—Generator field fuse is 5 ampere. Lighting fuse is 20 ampere.

CLEVELAND

MODEL 43 (1925-26)

AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

BATTERY:—Prest-O-Lite, Type 611-RHK, 6 volt, 80 ampere hour. The starting capacity is 95 amperes for 20 minutes. The lighting capacity is 5 amperes for 16 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model TC-30. Distributor Model T-6230. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone.

Oiling:—Distributor oiling is from the chassis lubricating system.

Timing:—Breaker contacts begin to separate when piston entering power stroke reaches top dead center with the manual spark control lever in the fully advanced position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Model No. 943. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks engine at 110 R.P.M. taking 150 amperes at 6 volts.

Starter Data.

Torque	R.P.M.	Volts	Amperes.
0 lb. ft.	4000	6	45-50
2 „	1500	-	130
6 „	600	-	280
10 „	250	-	410
12 „	125	-	465
15 „	Lock	6	540

Oiling:—Oilless bearings are used. They require no attention.

GENERATOR:—Model No. 1052. The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Shift the third brush by means of the adjusting screw on the outside of the generator. Shifting the brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. The maximum charging rate is 13 to 14 amperes reached at 1500-1600 R. P. M. of the generator armature or 21.8 M.P.H.

Generator Data.

Cold Test (20°C)			Hot Test (85°C)		
Amperes.	Volts.	R.P.M.	Amperes.	Volts.	R.P.M.
0	6.	520	0	6.	520
7	7.0	800	4	6.6	800
13.6	7.7	1600	9.8	7.3	1600
11.6	7.4	2400	8.8	7.0	2400
8.3	6.0	3200	6.0	5.6	3200

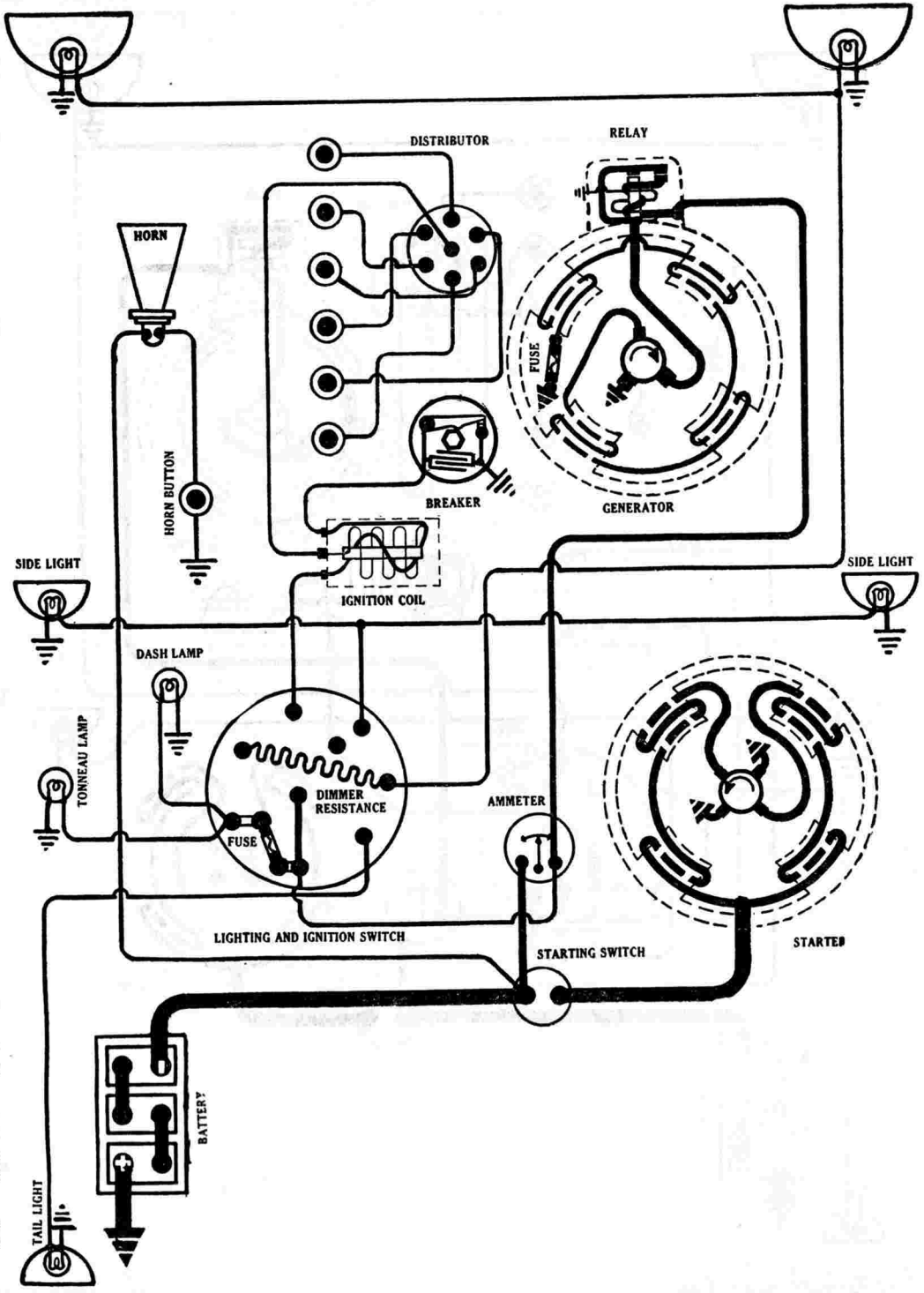
Motoring freely at 500 R.P.M. the generator draws 4 amperes at 6 volts. The shunt field current is 2-3 amperes at 6 volts. Brush pressure should be 1¾ to 2¼ pounds each.

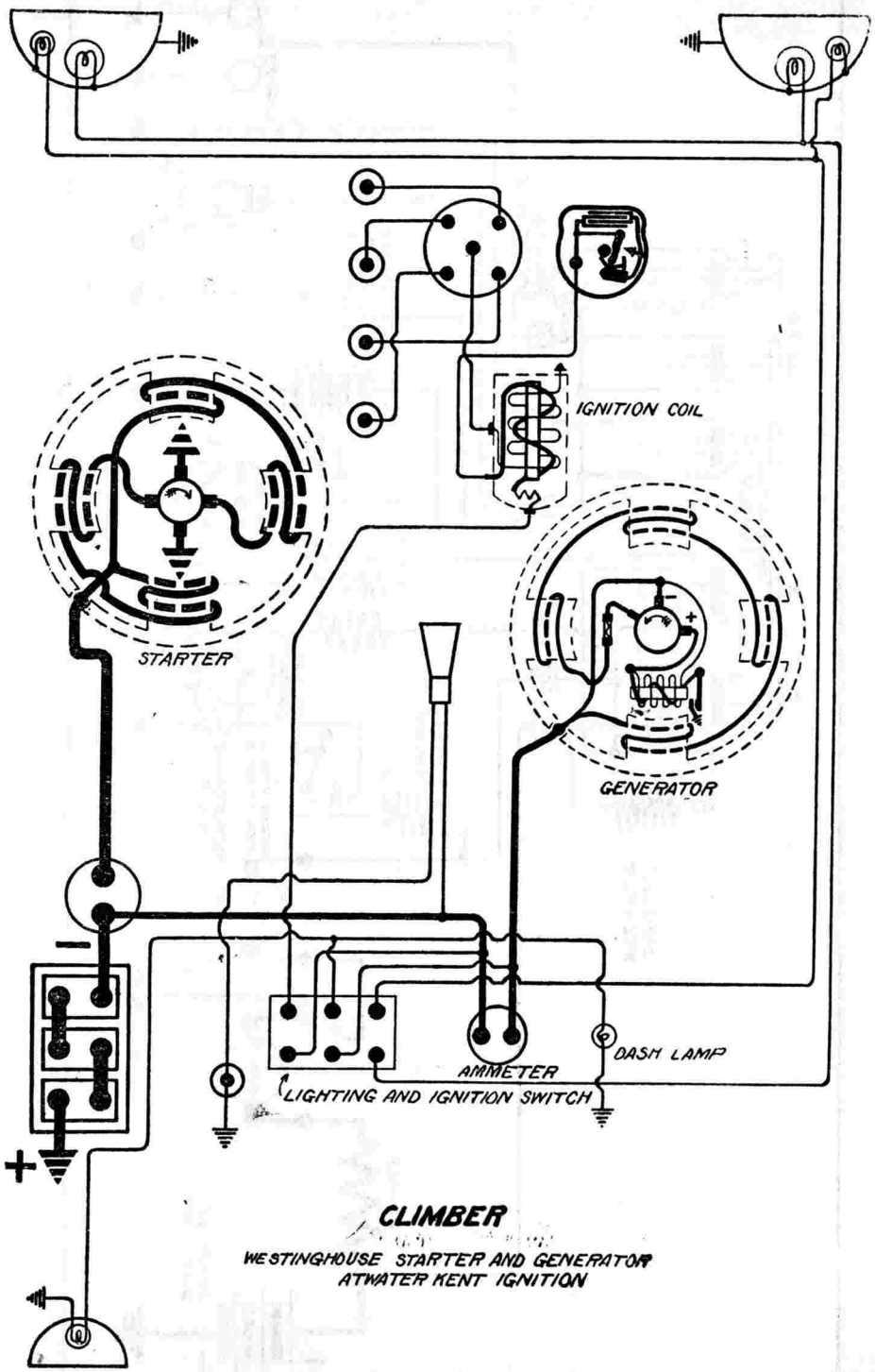
Oiling:—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks this oiling should be done every 500 miles.

RELAY:—Relay is mounted on top of the generator. Relay contacts close at 800 R.P.M. or 11 M.P.H. when the generator voltage reaches 6.5 to 7.5 volts and open at 500 R.P.M. or 7 M.P.H. with a discharge current of 0 to 2 amperes. Charging current at closing of contacts is approximately 0 to 2 amperes. Contacts separate .012 to .014 inch. Air gap between relay armature and coil core is .018 inch.

LIGHTING:—Clum Switch Model 10463. Head lamps are 6-8 volts, 21 cp. Dash, tail, tonneau, dome and side lamps are 6-8 volt, 3 cp. With dimming resistance, head lamps are approximately 3 cp.

FUSES:—Generator field fuse is 5 ampere. Lighting fuse is 20 ampere.





CLIMBER

MODEL T (1919-20). SERIAL NOS. 0 UP
MODELS T & K (1921-22-23-24-25) SERIAL NOS. 700 UP
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY.—Battery is 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

IGNITION—Type CC. Breaker contacts separate .006 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Remove the distributor cap and put 4 or 5 drops of light engine oil in the exposed oil hole every two weeks. Put a small amount of vaseline on the cam, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power storoke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUGS.—Diameter 7/8 inch. Spark plugs are .030 inch.

STARTER.—Frame No. 100. ..Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 130 R.P.M., taking 250-300 amperes.

Starter Data

Torque	R.P.M.	Amperes	Volts
0 lb. ft.	4100-7000	35-45	5.5
1.75 lb. ft.	1600	145	5.5
12 lb. ft.	Lock	475	4.0

Pressure of brushes on the commutator is 1¼ to 1½ pounds.

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR.—Frame No. 765. Generator current regulation is by third brush system. Maximum current output is 15-17 amperes at 900-1400 R.P.M of the armature or 20-25 miles per hour.

Amperes	Generator Data	R.P.M.
0		375
8		550
15-17		900-1400
7-11		2500
	Hot Test	
11-13		1200

Field winding takes 3.25 to 3.75 amperes at 6 to 6.3 volts. Running freely as a motor, generator takes 6 amperes at 6 to 6.3 volts. Charging rate is varied by adjustment of the third brush setting.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 375-425 R.P.M. of the armature or 8-10 miles per hour and opens at 350-375 R.P.M. of the armature or 6-8 miles per hour. Adjust relay spring tension so that contacts open with a discharge current of 0-3 amperes from the battery. Adjust armature stop (which determines the air gap between the relay armature and coil core) so that the contacts close when the voltage of the generator reaches 6.2 to 6.5 volts. Contacts separate .030 to .035 inch. Air gap between relay armature and coil core is .005 inch, contacts closed. Resistance of the shunt winding is 68 ohms. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 20 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 4 cp. Tail lamp has single contact base. All others have double contact base.

COLE

MODEL 6-50, 6-51 (1915)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

Battery. Exide Type, 3-X-155-1, 6 volt, 120 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Coil Model 2111. Breaker contacts separate .010 inch. When contacts are closed, contact blade and clip separate .015 inch. See that pigtail conducting current to the contact blade is not disconnected. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or No. 00 sand paper.

Oiling.—Put several drops of light engine oil in timer bearing oiler every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Timing.—Breaker contacts begin to separate when the top dead center mark on flywheel is 1¾ inches past indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .027 to .030 inch.

Starter-Generator.—Model No. 59. Starter and generator are combined into one unit. Starter is connected to engine through a set of gears meshed by operator. Two overrunning clutches are provided. In connection with the ignition switch, a circuit is closed allowing current to flow through the generator windings, causing the armature to revolve slowly, aiding the meshing of the reduction gears. One clutch permits this rotation, and also permits a relatively high speed of the armature, necessary when operating as a starter. The second overrunning clutch prevents the engine driving the armature through the reduction gears. Depressing the starting pedal meshes the reduction gears, opens the generator circuit and allows the motor brush to come in contact with the commutator, closing the starter circuit and cranking the engine. When the pedal is released, a spring reverses these operations.

Generator.—Generator voltage regulation is by automatic field rheostat operated from a governor on the distributor shaft. Generator begins to supply current 7-9 miles per hour or 350-400 R. P. M. of armature. Maximum charging rate of 16-17 amperes is reached at 20-25 M. P. H. or 900-1050 R. P. M. of armature.

GENERATOR DATA, MOTOR-GENERATOR MODEL NO. 59

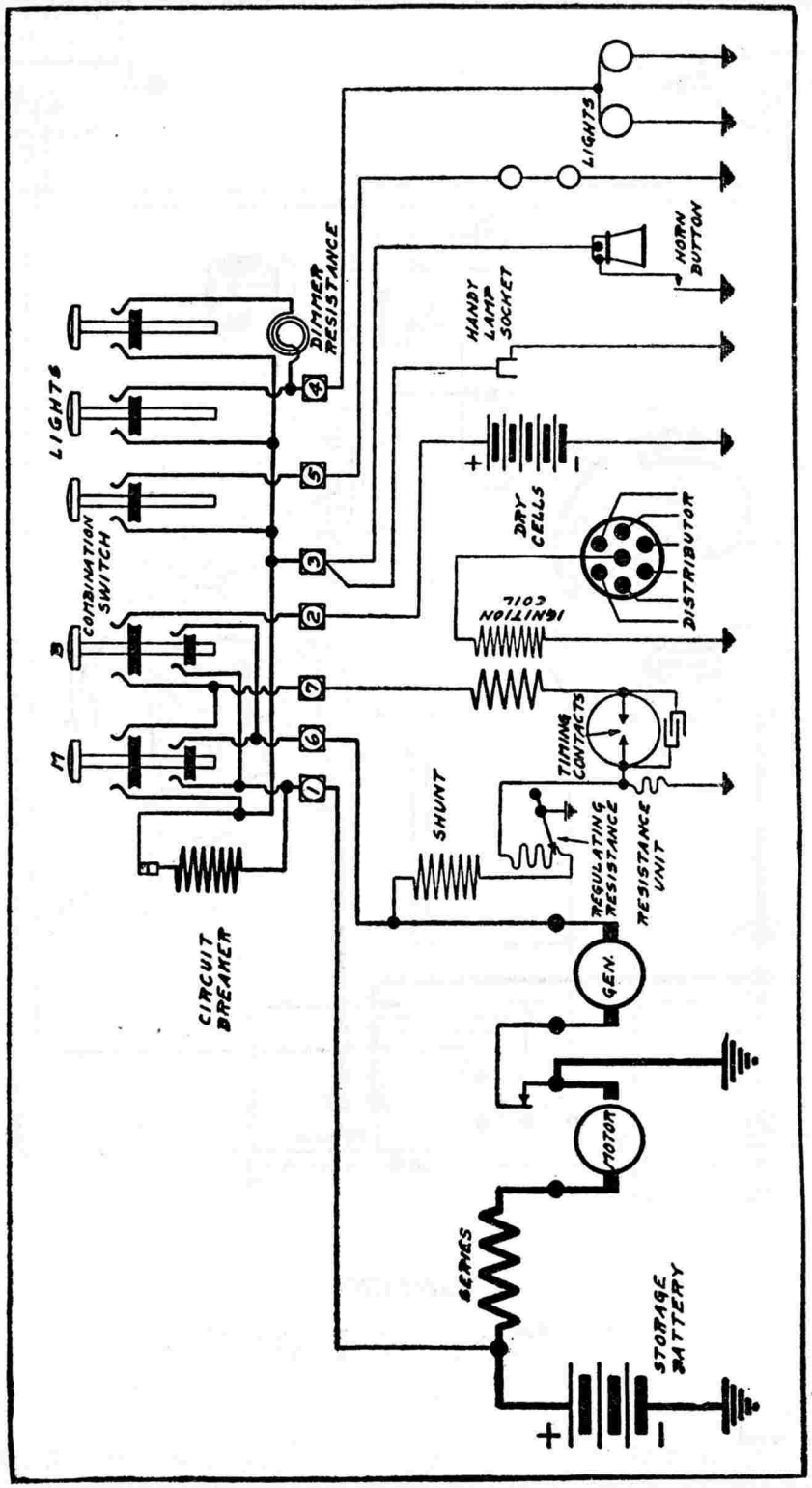
Amperes	R. P. M.
Neutral	350
6-11	500
16-20	900-1050
9-14	1500

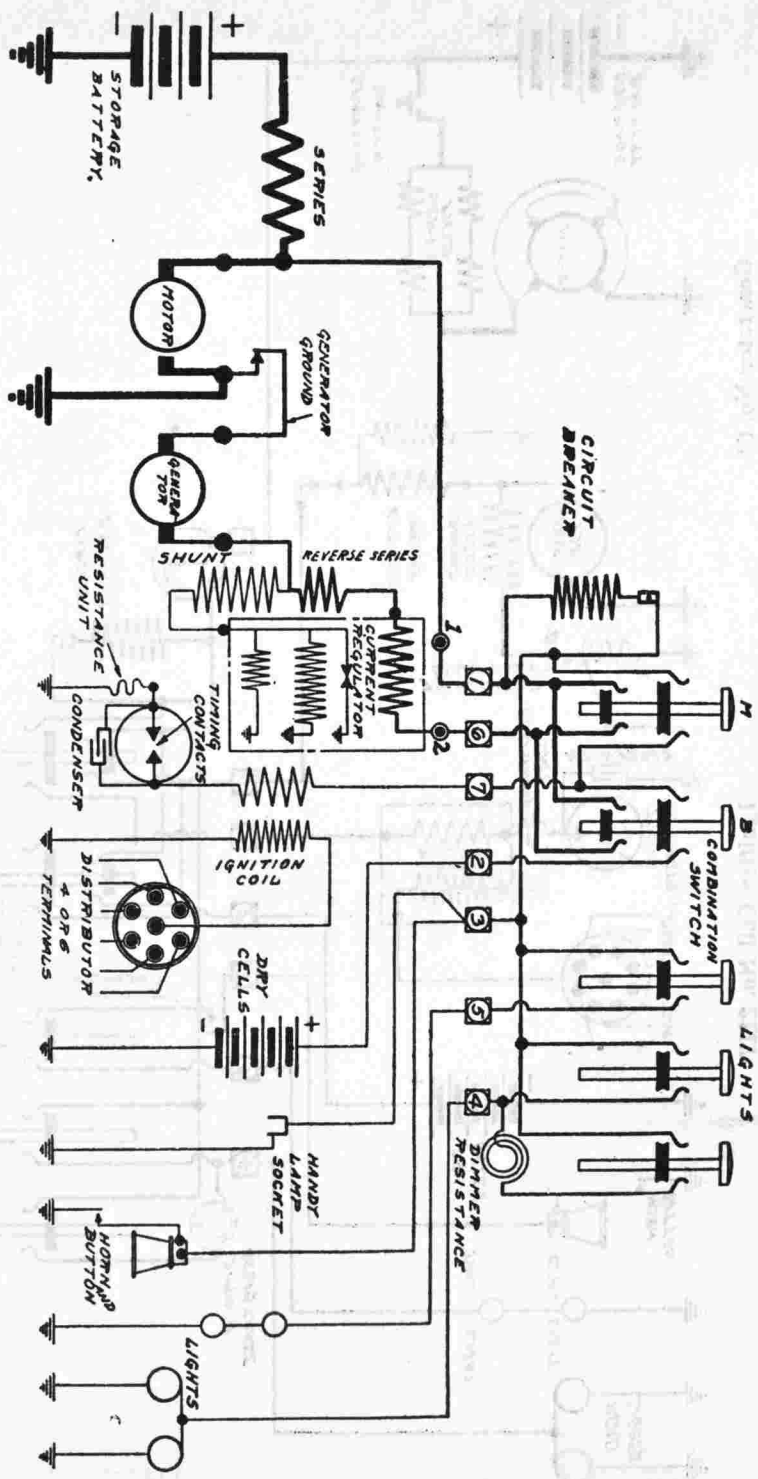
Charging rate is varied by changing the regulating resistance spool. There are six different spools available namely, No. 633, 703, 702, 701, 817 and 955. No. 633 is wound with the largest wire, the sizes reducing in the order named. Installing a spool of larger wire increases the output. The spools have a wide brass cup at one end and a narrow cap at the other end. Minimum output with each spool is obtained when installed with the narrow cap at the bottom. The contact arm must bear on the resistance spool with a pressure of 6 ounces. A poor contact between the arm and spool will cause the generator to motor at excessive speed when the ignition switch is closed. Operating freely as a motor, clutch at driving end as the only retarding force, the current is 4.5 amperes.

Relay.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch. The overrunning clutch at driving end allows generator to operate as a motor when battery's pressure is above that of generator. If the engine is killed when stopping the noise made by the clutch serves to attract the operator's attention to open the ignition switch. The opening and closing of the generator-battery circuit by the operator takes the place of the relay.

Lamps.—Head lamps are 6-8 volt, 21 cp. Dash and tail lamps are in series. They are each 3-4 volt, 2 cp.

Circuit Breaker.—A vibrating circuit breaker takes the place of fuses. It takes 25 amperes to start this device vibrating. While vibrating, the current flow is 3-5 amperes





COLE

MODELS 4-40 (1915) AND 6-60, 6-66 (1916
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Exide, Type 3X-155-1, 6 volt, 100 ampere hour. The negative (—) terminal is grounded. Five dry cells, connected in series, are so arranged that they may be switched into the ignition circuit should other sources fail.

IGNITION.—Breaker contacts separate .010 to .012 inch. When contacts are closed, contact blade and clip separate .015 inch. See that pigtail conducting current to the contact blade is not disconnected. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 4 or 5 drops of light engine oil in timer unit bearings every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate w[illegible]n entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order of the 6 cylinder cars is 1, 5, 3, 6, 2, 4. The firing order of the 4 cylinder cars is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER-GENERATOR.—Model No. 65 or 77. Starter and generator are combined into one unit but are electrically separate. Two overrunning clutches are provided. In connection with the ignition switch, a circuit is closed, allowing a current to flow through the generator windings causing the armature to revolve slowly, aiding the meshing of the reduction gears. One clutch permits this rotation, and also permits a relatively high speed of the armature, necessary when operating as a starter. The second overrunning clutch prevents the engine from driving the armature through the reduction gears. Depressing the starting pedal meshes the reduction gears, opens the generator circuit, and allows the motor brushes to come in contact with the commutator, closing the starter circuit and cranking the engine. When the pedal is released, a spring reverses these operations.

GENERATOR.—Generator current regulation is by reverse series field and vibrating regulator. Maximum current output is 15 amperes, reached at 600-700 R.P.M. of armature, or 18-20 miles per hour.

OILING.—Put 5 or 6 drops of light engine oil in each of starter-generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles. Refill the grease cup on the intermediate shaft and turn down two turns every month.

RELAY.—There is relay. The circuit between the generator and the battery is controlled by the ignition switch.

REGULATOR.—Regulator is mounted on top of generator frame. To adjust regulator connect an ammeter in the circuit between terminal "6" of the combination switch and terminal "2" of the generator. Adjust spring tension on regulator armature to limit the maximum current output to 15 amperes at all speeds above 700 R.P.M. Contacts are made of tungsten and require no attention.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dash and tail lamps are connected in series and are each 3-4 volt, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires a current of 25 amperes to start this device vibrating. While vibrating, the current flow is 3-5 amperes.

Cole

Model 850 (1916) (Serial Nos. 27001-30000)
Delco Generating, Starting and Lighting System
Delco Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded There is a set of 5 dry cells so connected that they may be switched into the ignition circuit should other pressure sources fail.

Ignition.—Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Put several drops of light engine oil in the distributor bearing every two weeks. If the car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Timing.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1R, 4L, 2R, 3L, 4R, 1L, 3R, 2L.

Spark Plug Gaps.—Spark plug gaps are .028 to .030 inch.

Starter.—Starter is connected to the engine through a Bendix drive.

Oiling.—Starter bearings are of the oilless type.

Generator.—Generator voltage regulation is by automatic field rheostat operated from a governor on distributor shaft.

Amperes	Generator Data, No. 62	R. P. M.
8		1000
13		1500
11		1800

Charging rate is varied by changing the regulating resistance spool. There are six different spools available namely, Nos. 633, 703, 702, 701, 817 and 955. No. 633 is wound with the largest wire, the sizes reducing in the order named. Installing a spool of larger wire increases the output. The spools have a wide brass cap at one end and a narrow cap at the other end. Minimum output with each spool is obtained when installed with the narrow cap at the bottom. The contact arm must bear on the resistance spool with a pressure of 6 ounces. A poor contact between the arm and spool will cause the generator to motor at excessive speed when the ignition switch is closed.

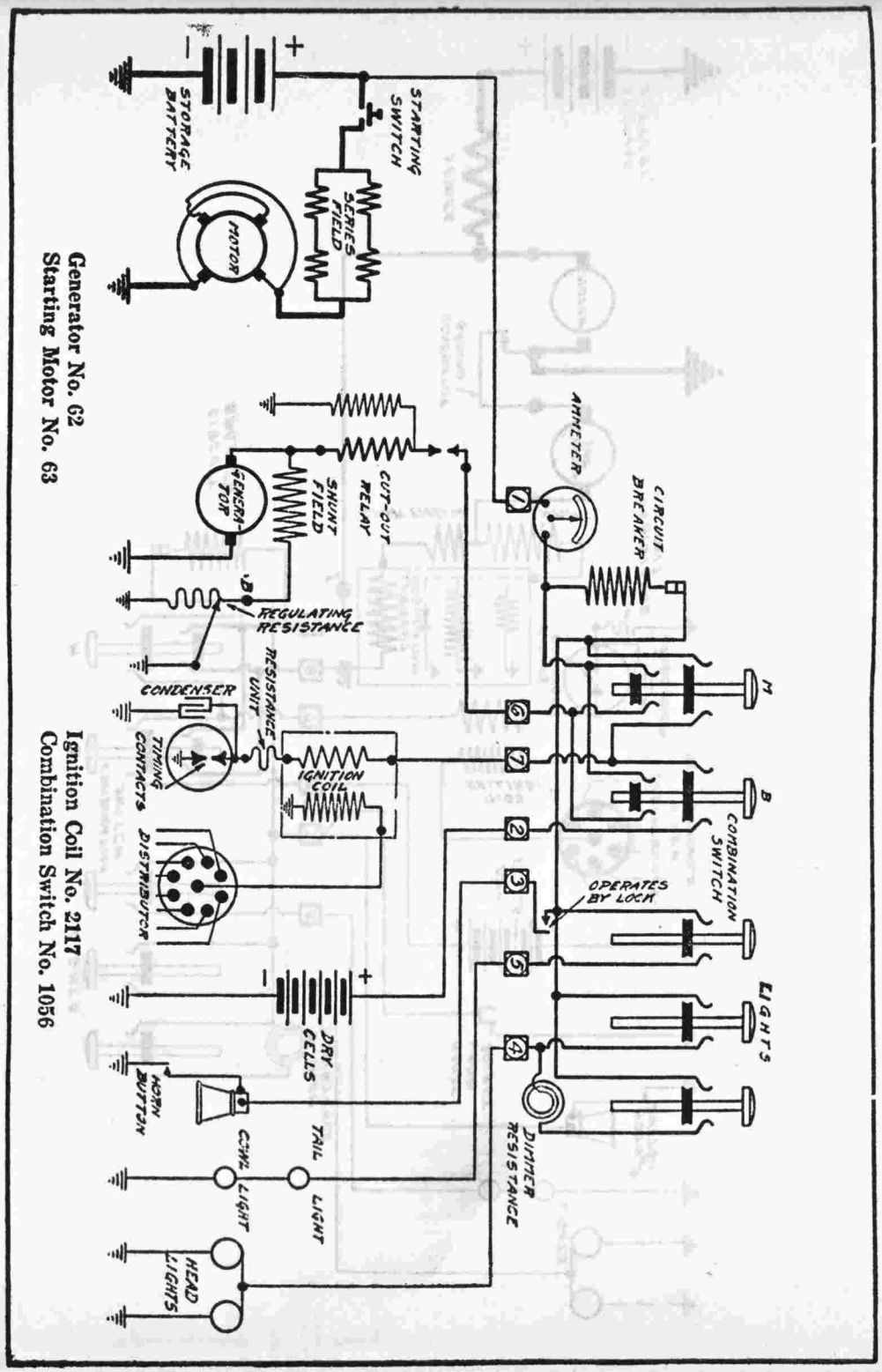
Oiling.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

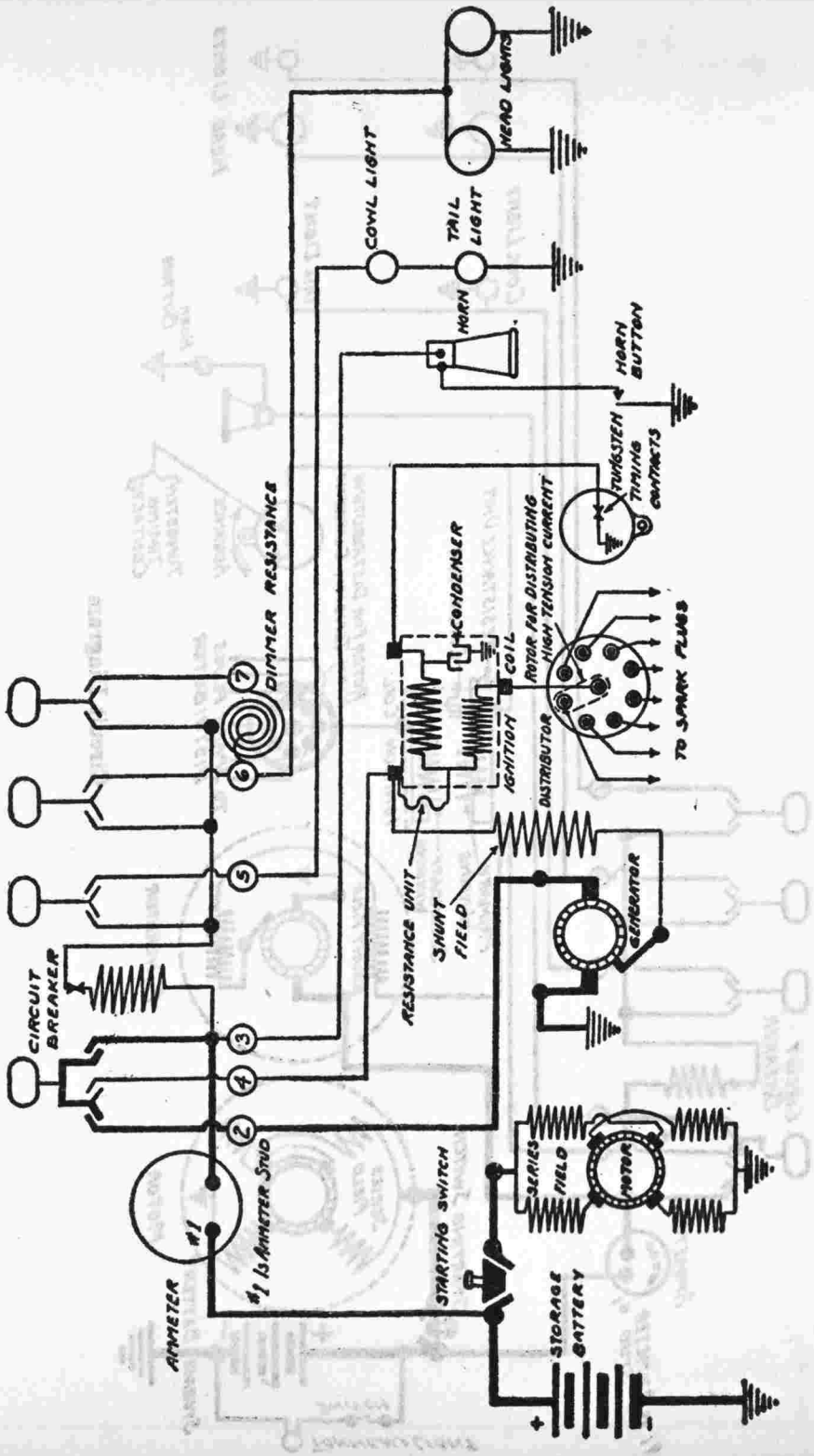
Relay.—Relay closes at 7-10 miles per hour and opens at 5-8 miles per hour. Charging current is 1 to 3 amperes at closing and discharge current 0 to 1 ampere at opening of relay contacts. With contacts closed air gap between relay armature (moving member) and coil core is .032 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 24 cp. Dash and tail lamps are in series and are each 3-4 volt, 2 cp.

Circuit Breaker.—There is a vibrating circuit breaker on the back of the lighting switch which takes the place of fuses in the lighting circuits. It requires a current of 25 amperes to start this device vibrating, but when vibrating 3 to 5 amperes will cause it to continue.

Model Numbers.—Starter is No. 63. Generator is No. 62. Ignition coil is No. 2117. Combination switch is No. 1056.





Cole

Model 860 (1917) (Serial Nos. 40,000 to 50,000)
Delco Starting and Lighting System
Delco Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts should separate .018 inch. They are made of tungsten. They will operate properly even though very irregular, due to the fact that the rough surfaces fit each other perfectly. Their natural color is dark gray, not silver. Should they become badly burned or pitted, affecting the ignition, remove and resurface them by drawing across a piece of fine emery cloth laid on a flat surface, as on the bed of a drill press, finishing on a very hard oil stone. Clean all oil from contacts before again putting into service.

Timing.—Breaker contacts should separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in fully retarded position.

Firing Order.—The firing order is 1R, 4L, 2R, 3L, 4R, 1L, 3R, 2L.

Spark Plug Gaps.—Spark plug gaps should be .028 inch to .030 inch.

Oiling.—Put 4 or 5 drops of light engine oil in oil hole on side of distributor housing every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Starter.—Starter is model No. 72. It is connected to the engine through a Bendix drive. Running freely, starter should draw about 40 amperes. It should deliver 17.5 pound-feet lock torque, with a line voltage of 3.5-3.8 volts. Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current.

Oiling.—Starter bearings are of the oilless type and require no lubrication.

Generator.—Generator current regulation is by third brush method.

GENERATOR DATA, MODEL NO. 91

Cold-Amperes	R. P. M.	Warm-Amperes	R. P. M.
Neutral	625	Neutral	650
5.0-7	800	4.0-6	800
9.5-13	1000	8.5-11	1000
15.0-19	1600	14.0-18	1600
17.0-21	1800	14.0-20	1800
16.0-21	2000	16.0-20	2000

To adjust charging rate, loosen the two screws which hold third brush arm. Move to the right to increase charging rate and to the left to decrease. Maximum output should not exceed 20 amperes at 20-25 miles per hour.

Oiling.—Put 6 or 8 drops of light engine oil in the oil hole at forward end of generator and in oil cup at commutator end every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

Lamps.—Head lamps are 6-8 volt, 17 cp. Dash and tail lamps are in series and are each 3-4 volt, 2 cp.

Circuit Breaker.—There is a vibrating circuit breaker in the lighting circuit to take the place of fuses. It requires a current of 25 amperes to start this device vibrating, but a current of 3 to 5 amperes will cause it to continue.

Model Numbers.—Starter is No. 72. Generator is No. 91. Starting switch is No. 1963. Distributor is No. 5153. Ignition coil is No. 2123. Combination switch is No. 1067.

COLE

MODEL 8-60 (1917)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

Battery.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts should separate .018 inch. They are made of tungsten. They will operate properly even though very irregular, due to the fact that the rough surfaces fit each other perfectly. Their natural color is dark gray, not silver. Should they become badly burned or pitted, affecting the ignition, remove and resurface them by drawing across a piece of fine emery cloth laid on a flat surface, as on the bed of a drill press, finishing on a very hard oil stone. Clean all oil from contacts before again putting into service.

Timing.—Breaker contacts should separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in fully retarded position.

Firing Order.—The firing order is 1R, 4L, 2R, 3L, 4R, 1L, 3R, 2L.

Spark Plug Gaps.—Spark plug gaps should be .028 to .030 inch.

Oiling.—Put 4 or 5 drops of light engine oil in oil hole on side of distributor housing every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Starter.—Starter is Model No. 72. It is connected to the engine through a Bendix drive Running freely, starter should draw 40 amperes or less. It should deliver 17.5 pound-feet lock torque, with a line voltage of 3.5-3.8 volts.

Oiling.—Starter bearings are of the oilless type and require no lubrication.

Generator.—Generator current regulation is by third brush method.

GENERATOR DATA, MODEL NO. 113

Cold-Amperes	R. P. M.	Warm-Amperes	R. P. M.
Neutral	500	Neutral	500
11.5-13.5	900	11-13	900
16.5-19.5	1400	16-18	1400
16.5-18.5	1800	15-18	1800
15.0-18	2000	14-16	2000

To adjust charging rate, loosen the two screws which hold third brush arm. Move to the right to increase charging rate and to the left to decrease. Maximum output should not exceed 20 amperes at 20-25 miles per hour.

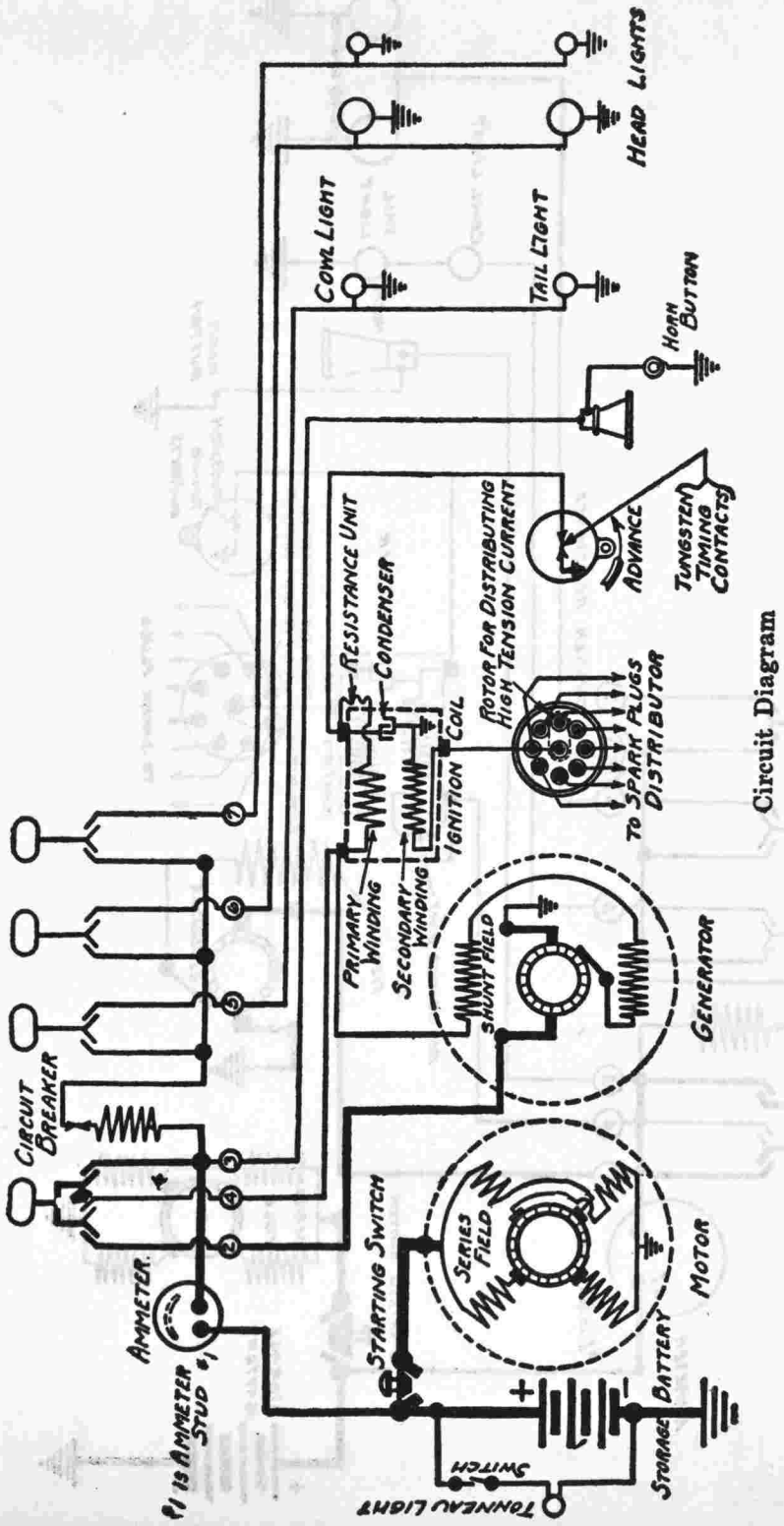
Oiling.—Put 6 or 8 drops of light engine oil in the oil hole at forward end of generator and in oil cup at commutator end, every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

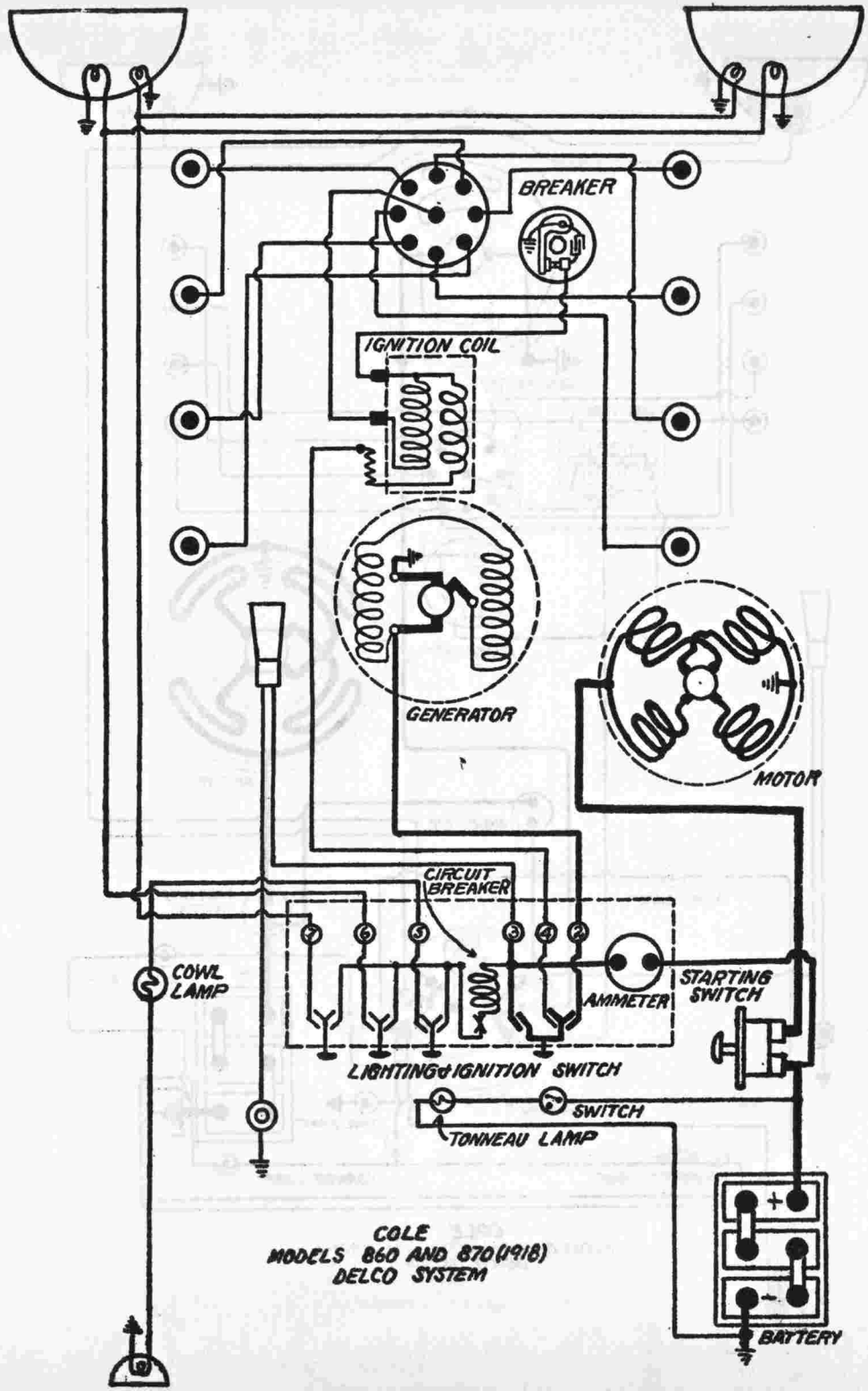
Lamps.—Head lamps are 6-8 volt, 20 cp. Side lamps are 6-8 volt, 2 cp. Dash and tail lamps are 6-8 volt, 2 cp.

Circuit Breaker.—There is a vibrating circuit breaker in the lighting circuit to take the place of fuses. It requires a current of 25 amperes to start this device vibrating, but a current of 3 to 5 amperes will cause it to continue.

Model Numbers.—Starter is No. 72. Generator is No. 113. Ignition coil is No. 2146. Distributor is No. 5158. Starter switch is No. 1963.



Circuit Diagram



Cole

Model 860 (1918) (Serial Nos. 42,986 to 43,772)
Model 870 (1918) (Serial Nos. 50,001 to 51,000)
Delco Starting and Lighting System
Delco Ignition

Battery.—Battery is 6 volt, 125 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts should separate .018 inch. They are made of tungsten. They will operate properly even though very irregular, due to the fact that the rough surfaces fit each other perfectly. Should they become badly burned or pitted, affecting the ignition, remove and resurface them by drawing across a piece of fine emery cloth laid on a flat surface, as on the bed of a drill press, finishing on a very hard oil stone. Clean all oil from contacts before again putting into service.

Timing.—Breaker contacts should separate when piston entering power stroke in on top dead center, spark control lever and breaker assembly in fully retarded position.

Firing Order.—The firing order is 1R, 4L, 2R, 3L, 4R, 1L, 3R, 2L.

Spark Plug Gaps.—The spark plug gaps should be .028 inch to .030 inch.

Oiling.—Put 4 or 5 drops of light engine oil in oil hole on side of distributor housing every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Starter.—Starter is Model 72. It is connected to the engine through a Bendix drive Running freely, starter should draw 40 amperes. It should deliver 17.5 pound-feet lock torque, with a line voltage of 3.5-3.8 volts. Cold engine, heavy oil, tight bearings or other obstructions or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current..

Oiling.—Starter bearings are of the oilless type and require no lubrication.

Generator.—Generator current regulation is by third brush method. Generator No. 131 is used on the Model 860 cars, and No. 138 on the Model 870 cars.

GENERATOR DATA

Generator No. 131		Generator No. 138	
Amperes	R. P. M.	Amperes	R. P. M.
Neutral	500	Neutral	500
10-12	900	10-12	900
16-18	1400	14-16	1400
14-16	2000	11-13	2000

To adjust charging rate, loosen the two screws which hold third brush arm. Move to the right to increase charging rate and to the left to decrease. Maximum output should not exceed 18 amperes at 20-25 miles per hour.

Oiling.—Put 6 or 8 drops of light machine oil in the oil hole at forward end of generator and in oil hole at commutator end every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

Lamps.—Head lamps are 6-8 volt, 17 cp. Dash and tail lamps are in series, and are each 3-4 volt, 2 cp.

Circuit Breaker.—There is a vibrating circuit breaker in the lighting circuit to take the place of fuses. It requires a current of 25 amperes to start this device vibrating, but a current of 3 to 5 amperes will cause it to continue.

Model Numbers.—Both models use starter No. 72 and ignition coil No. 2162. Model 860 uses generator No. 131, distributor No. 5159, combination switch No. 1087 and starter switch No. 1963. Model 870 uses generator No. 138, distributor No. 5192, combination switch No. 1107 and starter switch No. 1966.

COLE

MODEL 870 (1919) (SERIAL NOS. 51001 TO 54000)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Battery is 6 volt, 125 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2162. Breaker contacts separate .018. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 4 or 5 drops of light engine oil in each of distributor shaft bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when piston on compression stroke is 1½ inches from top dead center, spark control lever and breaker assembly in the fully advanced position.

FIRING ORDER.—The firing order is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model No. 72. Starter is connected to the engine through a Bendix drive. Lock torque is 17.5 pound-feet, at 3.5-3.8 volts. Running freely, starter current is 40 amperes.

OILING.—Starter bearings are of the oilless type.

GENERATOR.—Model No. 138. Generator current regulation is by third brush system. Generator begins to supply current at 7 miles per hour or 500 R.P.M. of armature and reaches its maximum current output of 14-16 amperes at 18-25 miles per hour or 1400 R.P.M. of armature.

Generator Data

Amperes	R.P.M.
Neutral	500
10-12	900
14-16	1400
11-13	2000

To increase the charging rate loosen the two screws holding third brush arm, and move third brush in a counter-clockwise direction (looking at commutator end). To decrease charging rate, move third brush in a clockwise direction. Brush must be reseated after adjusting position.

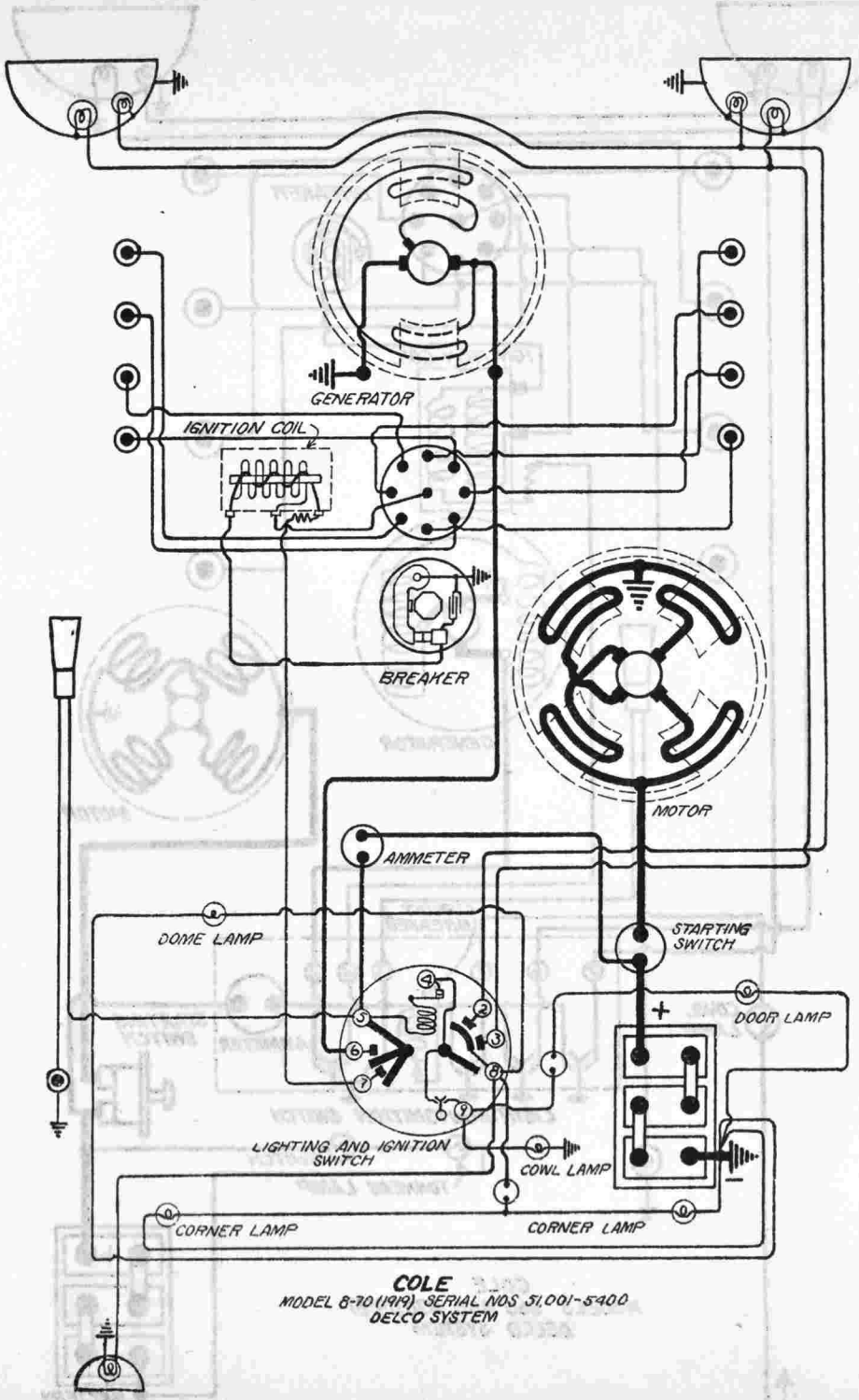
OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

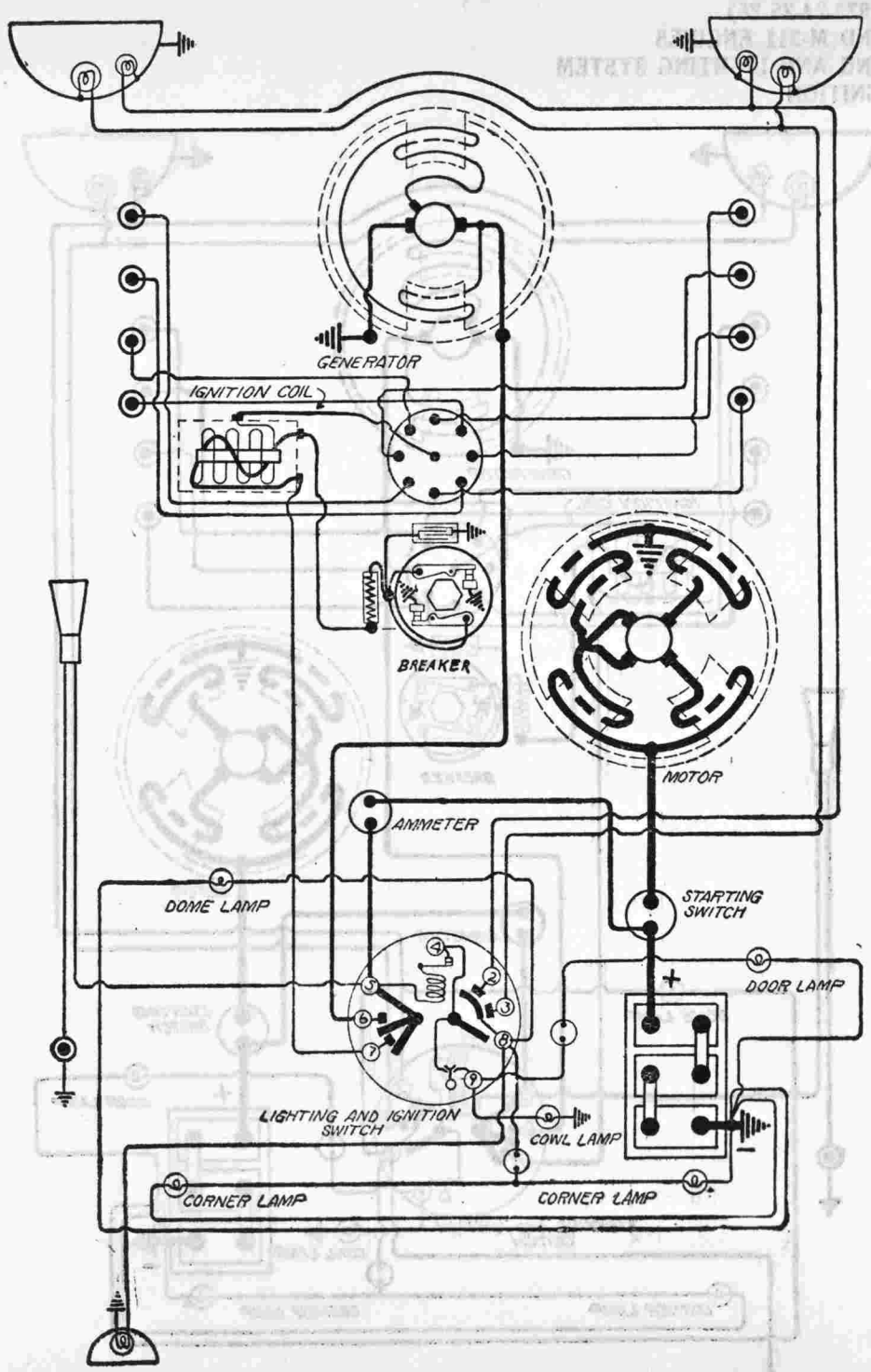
LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are each 6-8 volt, 4 cp. Dome lamp is 6-8 volt, 4 cp. Corner lamps are 6-8 volt, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start this device vibrating. While vibrating, the current is 3-5 amperes.

COMBINATION SWITCH.—Model No. 1132.



COLE
MODEL 8-70 (1919) SERIAL NOS 51,001-54,00
DELCO SYSTEM



COLE

MODEL 8-70 (1920-21-22)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Willard, Type SJRN-5, 6 volt, 125 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2127. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 4 or 5 drops of light engine oil in each of distributor shaft bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when piston on compression stroke is 1½ inches from top dead center, spark control lever and breaker assembly in the fully advanced position.

FIRING ORDER.—The firing order is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model No. 72. Starter is connected to the engine through a Bendix drive. Lock torque is 17.5 pound-feet at 3.5-3.8 volts. Running freely, starter current is 40 amperes.

OILING.—Starter bearings are of the oilless type.

GENERATOR.—Model No. 153. Generator current regulation is by third brush system. Generator begins to supply current at 7 miles per hour or 500 R.P.M. of armature and reaches its maximum current output of 14-16 amperes at 18-25 miles per hour or 1400 R.P.M. of armature.

Amperes	Generator Data	R.P.M.
Neutral		500
10-12		900
14-16		1400
11-13		2000

To increase the charging rate loosen the two screws holding third brush arm, and move third brush in a counter-clockwise direction (looking at commutator end). To decrease charging rate, move third brush in a clockwise direction. Brush must be reseated after adjusting position.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

LAMPS.—Head lamps ar 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are each 6-8 volt, 4 cp. Dome lamp is 6-8 volt, 4 cp. Corner lamps are 6-8 volt, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start this device vibrating. While vibrating, the current is 3-5 amperes.

COMBINATION SWITCH.—Model No. 1154.

COLE

MODEL 8-90 (1923-24-25-26)
NORTHWAY M-309 AND M-311 ENGINES
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SJRN-5, 140 ampere-hour. **The negative (—) terminal is** grounded.

IGNITION:—Coil Model No. 2127. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with a fine, flat jeweler's file or on a medium hard oilstone. The tension of the contact arm spring should be 16-20 ounces. Automatic advance begins at 600 R.P.M. and reaches a maximum of 14° at 1600 R.P.M. The manual advance is 22°.

Mounting.—Distributor is mounted on a bracket at the rear of the generator, but is driven through a vertical shaft by a pinion and worm on the cam shaft. To remove distributor, loosen the manual advance stop screw and lift the unit from its place.

Oiling.—Put 8 or 10 drops of light engine oil into the distributor oilers **every two** weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles. Apply a small amount of vaseline to the rotor track occasionally during the first 2000 miles. After this, it is only necessary to keep the rotor track wiped clean with a clean cloth moistened with gasoline. Be sure to wipe it dry before placing rotor track into operation. Repack distributor with medium soft cup grease up to the advance ring and yoke once each season.

Timing.—Breaker contacts begin to separate when piston No. 1 on compression stroke is 1½ inches before top dead center, measured on flywheel, spark control lever and breaker assembly in the fully advanced position.

Firing Order.—The firing order is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

Spark Plug Gaps.—Spark plug gaps are .030 inch.

STARTER.—Model No. 72 (M-309 engine), 259 (M-311 engine). The starter is connected to the engine by a Bendix drive. The direction of rotation is clockwise, looking at commutator end. Starter cranks the engine at 125 R.P.M., taking 40 amperes. The brush spring tension should be 2¼-2¾ pounds each.

Starter Test Data.

Torque	R.P.M.	Amperes	Volts
0 (Running free)	4500	40	6.0
17.5 lb. ft.	0 (Lock)	450-500	3.5

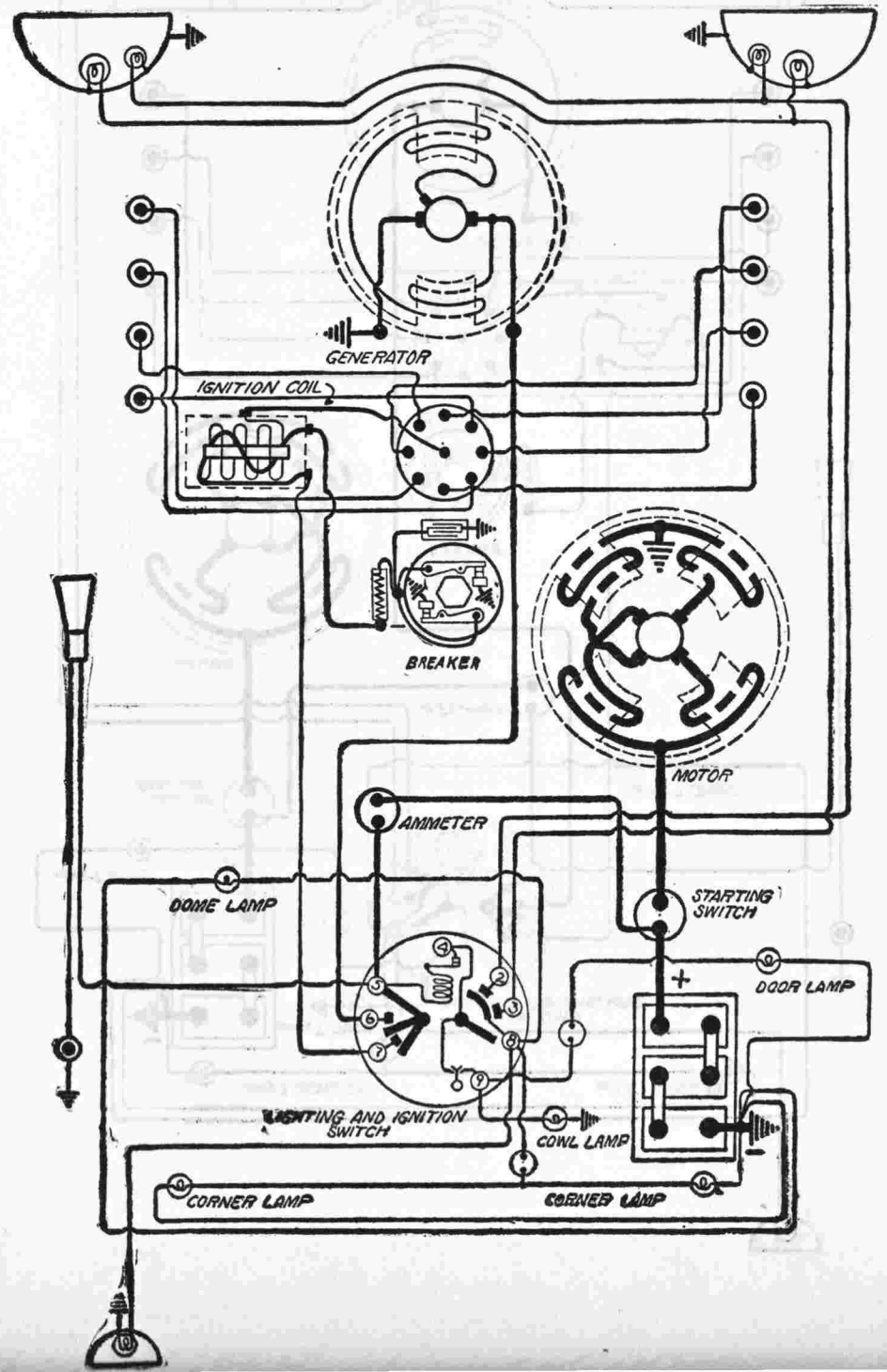
Mounting.—Starter is mounted at the right of the transmission case behind the flywheel. To remove, remove the large pilot screw and four hold-down screws and lift starter from its position.

Oiling.—Oilless bearings are used. They require no attention. On the Model 259 starting motor saturate the wick in the oiler on the Bendix gear end of the motor with light engine oil once each year.

GENERATOR:—Model No. 153. The direction of rotation is counter-clockwise looking at commutator end. The generator begins to supply current at 7 miles per hour or 500 R. P. M. of armature and reaches its maximum current out-put of 14-16 amperes at 1400 R.P.M. of the armature or 18-25 M.P.H., car speed in high gear. Generator brush tension should be 1¼-1¾ pounds each.

Generator Test Data

Amperes	R. P. M.
Neutral	500
10-12	900
14-16 (Max)	1400
11-13	2000



COLE

MODEL 8-90 (1923-24-25-26)
NORTHWAY M-309 AND M-311 ENGINES
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

To increase the charging rate loosen the two screws holding third brush arm, and move third brush in a counter-clockwise direction (looking at commutator end). To decrease charging rate, move third brush in a clockwise direction. Brush must be reseated after adjusting position.

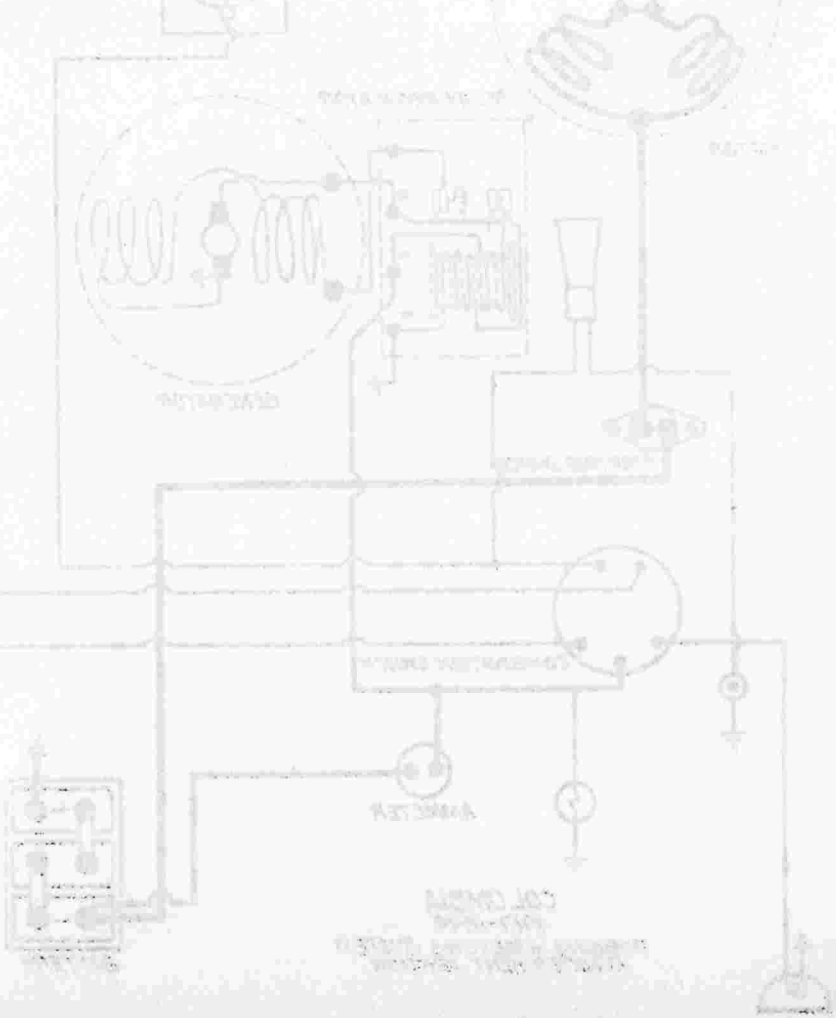
Mounting.—Generator is mounted on a bracket at the front of the engine between the cylinder banks. It is belt driven and carries the fan on its forward end. Fan belt should not be so tight as to crowd the generator bearings nor too loose. If the generator turns even a part of a revolution when the ignition switch is turned on, the belt is too loose. To remove generator, loosen the large nut on the mounting post and lift the generator and distributor from the bracket.

Oiling:—Put 5 or 6 drops of light engine oil into each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

LIGHTING.—Combination Switch Model No. 1154 is used. Head lights are each 6-8 volts, 21 cp. Auxiliary lights are each 6-8 volts, 4 cp. Dash, dome, corner, and tail lights are each 6-8 volts, 4 cp.

CIRCUIT BREAKER:—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start this devoice vibrating. While vibrating, the current is 3-5 amperes.



Columbia

Models C and D (1917-18-19)
Robbins-Meyers Generating, Starting and Lighting System
Atwater Kent Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Contacts should separate .005 inch to .008 inch. They are made of tungsten and will operate properly even though quite rough. Their natural color is dark gray, not silver. If badly burned or corroded, affecting the ignition, remove and clean by drawing across a piece of very fine emery cloth laid on a flat surface, as on the bed of a drill press, finishing on a very hard oil stone.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly is the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be .023 inch.

Oiling.—Put several drops of light engine oil in the oil hole, exposed when distributor cap is removed, every two weeks. At the same time put a very small amount of vaseline on the cam, applying with a toothpick. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Starter—Starter is connected to the engine through a Bendix drive. It should crank the normal engine at 85 R. P. M., taking 450 amperes. Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current. When operating freely, starter takes 40 amperes, armature revolving at 3500 R. P. M. Pressure of brushes on commutator should be 8 ounces.

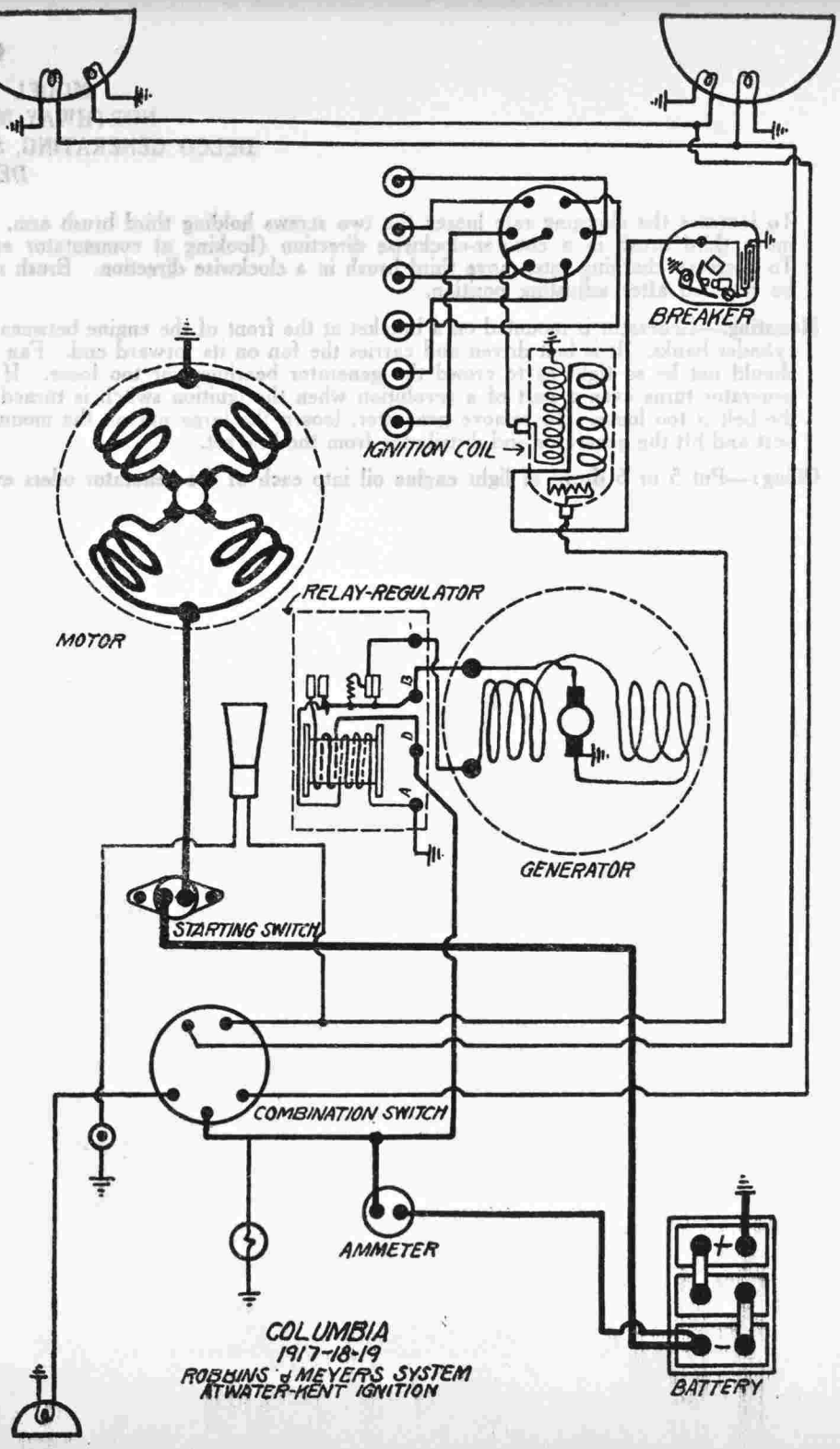
Oiling.—Starter bearings are packed with soft cup grease. Clean out and repack every six months.

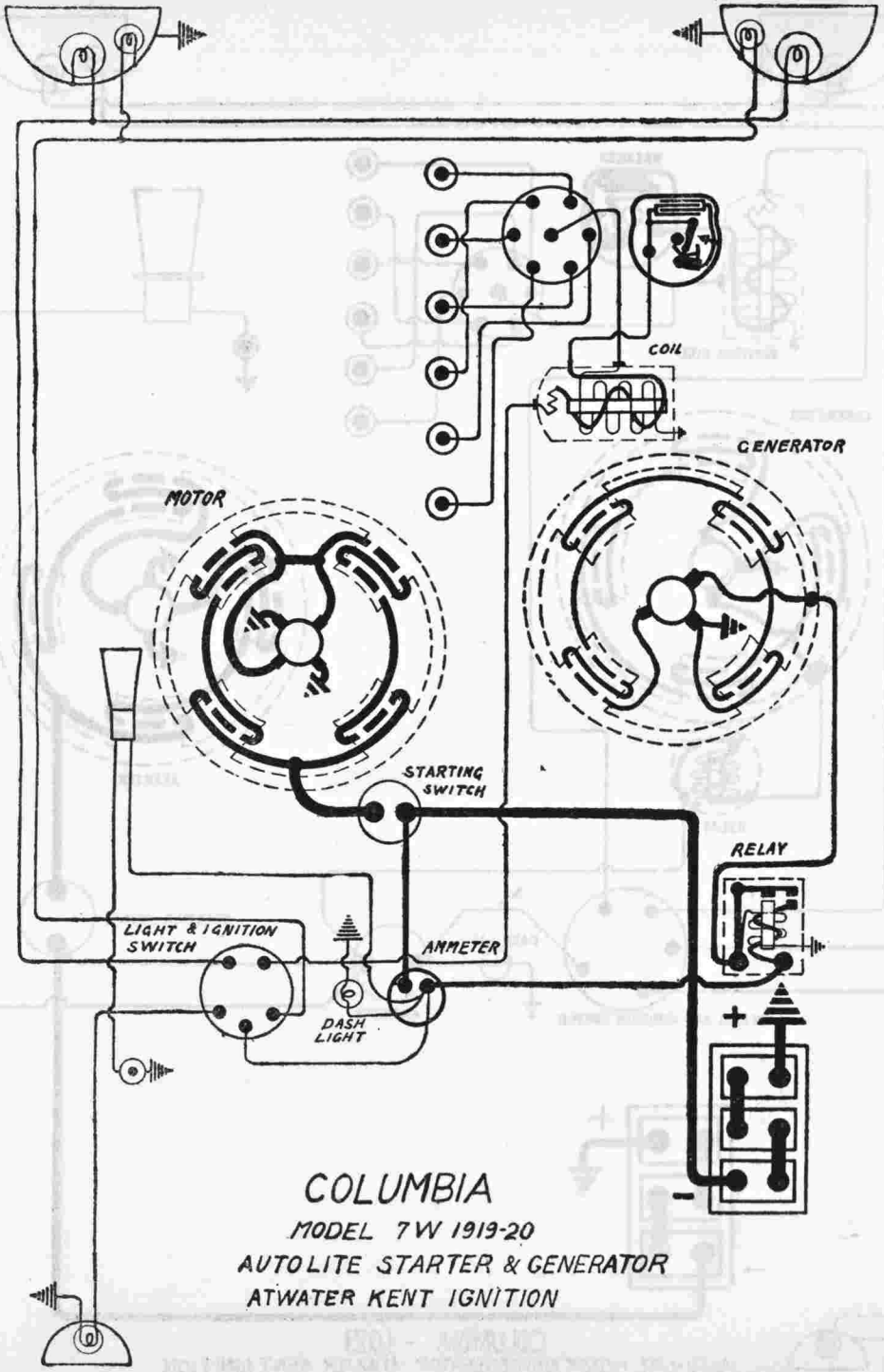
Generator.—Generator current regulation is by a Ward-Leonard vibrating regulator. Generator current should be 10 amperes, at 950 R. P. M. When operating freely as a motor, generator should take 30 amperes at 6 volts, armature revolving at 150 R. P. M. Much higher speed indicates damp, grounded or short circuited field coils. Greater current or lower speed indicates tight bearings or damp, grounded or short circuited armature windings or commutator. Shunt field should take 3 amperes. Pressure of generator brushes on commutator should be 9 ounces.

Oiling.—Thoroughly clean out and repack generator bearings with soft cup grease every six months.

Relay-Regulator—Relay and regulator are combined into one unit. Relay should close at 450 R. P. M., or 8-10 miles per hour. Relay should open at 425 R. P. M., or 6-8 miles per hour. Charging current should be 1 to 3 amperes at closing and the discharge current 0 to 1 ampere at opening of relay contacts. Clean relay and regulator contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a strip of well worn No. 00 sand paper, and then draw a piece of unglazed paper between them to remove all grit. Adjust before again putting into service. Relay and regulator contacts should separate .014 inch to .017 inch.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.





COLUMBIA

MODEL 7W 1919-20

AUTOLITE STARTER & GENERATOR

ATWATER KENT IGNITION

COLUMBIA

(1919-20) 7-W CONTINENTAL ENGINE
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY.—Prest-O-Lite, Type RHN-611, 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type CC. Breaker contacts separate .005 to .008 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Every two weeks remove the distributor head and put several drops of light engine oil in the oil hole exposed. Put a very small amount of vaseline on the cam, applying with a toothpick. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model MG.-1016. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes
2 lb. ft.	1300	160
4 lb. ft.	900	200
6 lb. ft.	600	275
8 lb. ft.	400	340
10 lb. ft.	175	400
12 lb. ft.	Lock	450

OILING.—Put 4 or 5 drops of light engine oil in each of starter bearing oilers every month.

GENERATOR.—Model GJ-1025A. Generator current regulation is by the third brush system.

Generator Data

Charging battery of 1300 Spec. Gravity.

Cold Test		Hot Test	
Generator Temperature 77°F.		Generator Temperature 165°F.	
Amperes	R.P.M.	Amperes	R.P.M.
0.0	500	0.0	550
4.0	600	4.0	730
8.0	750	6.0	850
12.0	950	8.0	950
16.0	1400	12.0	1350
16.5	1600	12.6	1700
15.0	2400	11.6	2400
13.0	3000	10.6	3000

Maximum charging rate is reached at 20-25 miles per hour or 1600-1700 R.P.M. of the armature.

OILING.—Put 4 or 5 drops of light engine oil in each of generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks the oiling must be done every 500 miles.

RELAY.—Relay closes at 6-9 miles per hour and opens at 4-7 miles per hour. Charging current is 1-3 amperes at closing, and discharge current .5 to 1.5 amperes at opening of relay contacts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volts, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

COLUMBIA

MODELS E & F (1921-22)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

ATWATER KENT IGNITION

BATTERY.—Prest-O-Lite, Type RHN-611, 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type CC. Breaker contacts separate .005 to .008 inch. They are made of tungsten. When the conditino of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Every two weeks, remove the distributor head and put several drops of light engine oil in the oil hole exposed. Put a very small amount of vaseline on the cam, applying with a toothpick. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .030 inch.

STARTER.—Model MH-1019. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes
2 lb. ft.	1160	110
4 lb. ft.	880	170
6 lb. ft.	700	225
8 lb. ft.	580	275
10 lb. ft.	460	325
12 lb. ft.	375	365
17.5 lb. ft.	Lock	600

Oiling.—Put 4 or 5 drops of light engine oil in each of starter bearing oilers every month.

GENERATOR.—Model GJ-1025V. Generatoh current regulation is by the third brush system.

Generator Data

Charging battery of 1300 Spec. Gravity

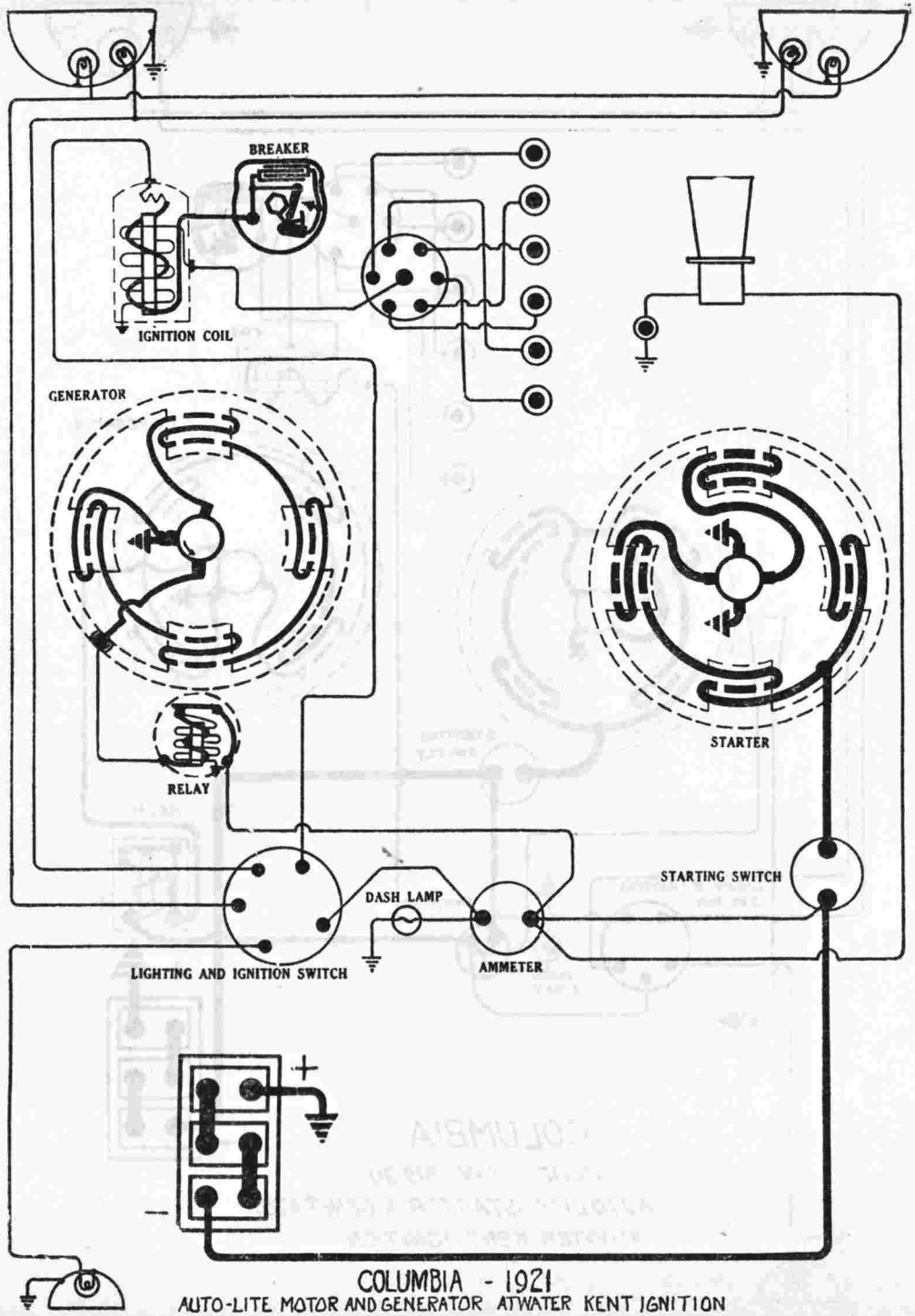
Generator Temperature 77°F. Cold Test		Generator Temperature 165°F. Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
0.0	500	0.0	550
4.0	600	4.0	730
8.0	750	6.0	850
12.0	950	8.0	950
16.0	1400	12.0	1350
16.5	1600	12.6	1700
15.0	2400	11.6	2400
13.0	3000	10.6	3000

Maximum charging rate is reached at 20-25 miles per hour or 1600-1700 R.P.M. of the armature,

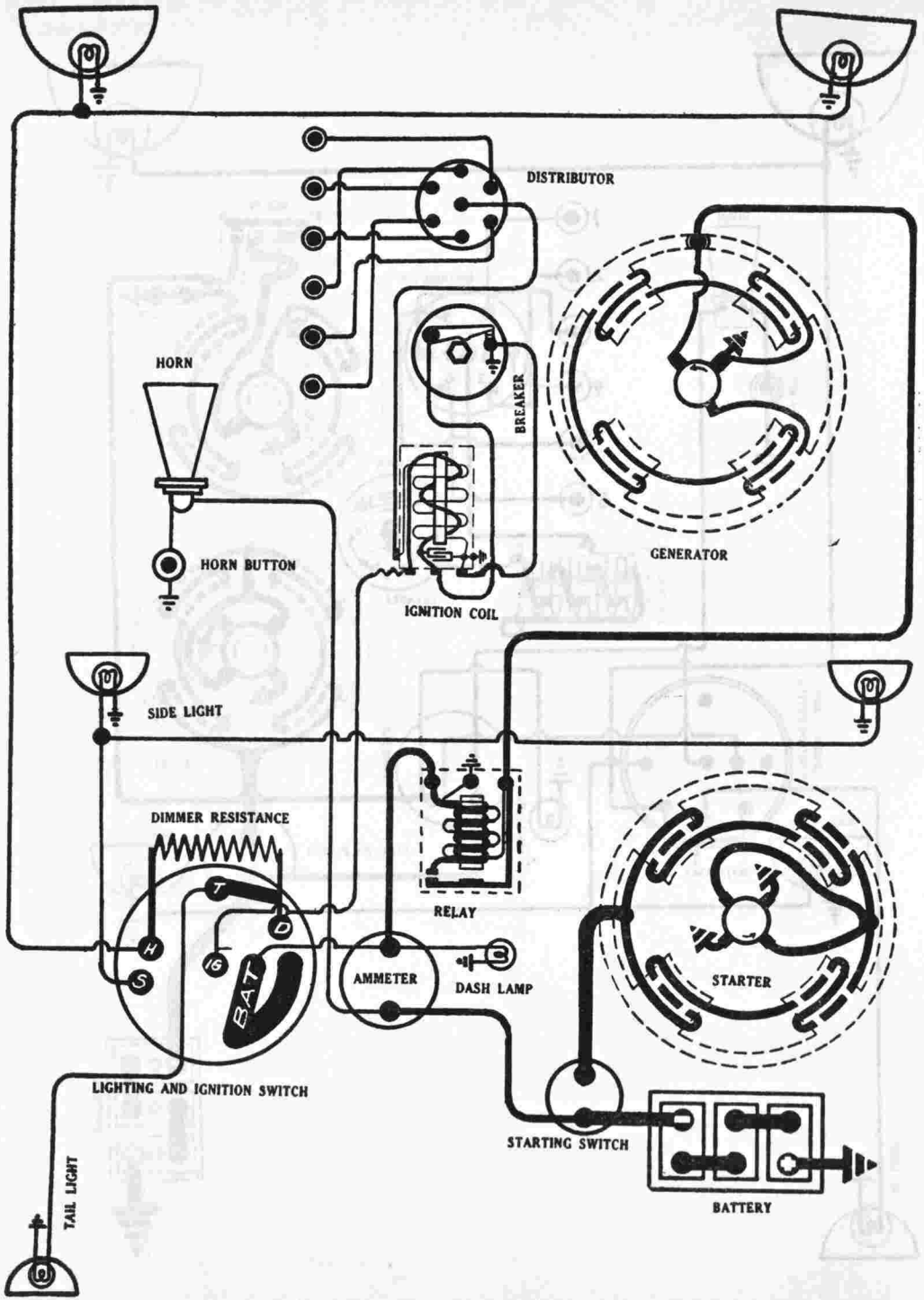
Oiling.—Put 4 or 5 drops of light engine oil in each of generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 6-9 miles per hour and opens at 4-7 miles per hour. Charging current is 1-3 amperes at closing, and discharge current .5 to 1.5 amperes at opening of relay contacts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.



COLUMBIA - 1921
AUTO-LITE MOTOR AND GENERATOR ATWATER KENT IGNITION



COLUMBIA

LIGHT SIX MODEL (1923-24)
CONTINENTAL 7-W ENGINE
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U. S. L. Type CDX-311-X. 6 volt. The positive (+) terminal is gronded. Starting capacity (20 minute rate) is 95 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours.

IGNITION:—Coil Models IG-4001, IG-4035. Distributor Models IG-4005A, IG-4034A. Breaker contacts separate .020-.024 inch. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone.

Oiling:—Put 4 or 5 drops of light oil in the oiler on the side of the distributor housing every month or each 1000 miles. Every 5000 miles put 1 or 2 drops of oil on the breaker arm pivot pin.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever and the breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are S.A.E. 7/8-18. Gaps are .030 inch.

STARTER:—Model MG-4003. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise looking at the commutator end. Starter cranks the engine at 125 R.P.M., drawing 150 amperes at 5 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft	4000	6	40-60
1.0 "	2300	5.5	100
3.0 "	1200	5.0	200
5.9 "	650	4.5	300
8.7 "	150	4.0	400
18.0 "	Lock	5.0	650

Oiling:—Put 4 or 5 drops of light oil in the starter bearing oilers every two weeks or each 500 miles.

GENERATOR:—Models GP-4004, 4004A, 4005. The direction of rotation is counter-clockwise looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and loosen the nut holding the third brush. Then move the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the nut after making the adjustment. The maximum charging rate is 16 amperes reached at 1600 R.P.M.

Generator Data

	Cold Test			Hot Test	
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	375	0	7.0	475
4	6.6	500	4	7.4	640
8	7.0	650	7	7.6	800
12	7.4	875	10	7.9	1200
15	7.6	1225	10.6	8.0	1540
16	7.8	1600	8.2	7.8	2400
13	7.7	2400			

Motoring generator draws 5 amperes at 6 volts. Shunt field current is 2.2 amperes at 6 volts.

Oiling:—Put 4 or 5 drops of light oil in the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Relay is mounted on the dash. Relay contacts close when the voltage of the generator reaches 6.5-7 volts and open with a discharge current of 0-2 amperes. Charging current at closing of contacts is 2 amperes. Contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Briggs and Stratton Switch Model 36800. Head lights are each 6-8 volt, 21 cp. S.C. Side lights are 6-8 volt, 4 cp. S.C. Dash and tail lights are 6-8 volt, 2 cp. D.C. and S.C.

FUSES:—Lighting fuse on switch is 20 amperes.

COLUMBIA

LIGHT SIX MODEL (1924-25)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

BATTERY.—U. S. L., Type CDX-311-X, 6 volt, 120 ampere-hour. Starting capacity is 95 amperes for 20 minutes. The lighting capacity is 5 amperes for 17 hours. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .018-.020 inch. The contact points are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone.

Oiling.—Fill the oiler at the side of the distributor housing with light engine oil once a month, or every 1000 miles. Put a few drops of oil on the breaker arm bearing every 3000 miles.

Timing.—Breaker contacts begin to separate when piston No. 1 entering power stroke is at top dead center, spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .030 inch.

STARTER:—Model MG-4007. Starter is connected to engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at commutator end. Starter running free at 4000 R P.M., takes a current of 40-60 amperes at 6 volts. Cranking the engine at 125 R.P.M., takes a current of 150 amperes, 5 volts. Lock torque is 18 pound-feet, current being 600-650 amperes, 3-4 volts.

Starter Test Data

Torque	R.P.M.	Amperes
2 lbs. ft.	1160	110
4 lbs. ft.	880	170
6 lbs. ft.	700	225
8 lbs. ft.	580	275
10 lbs. ft.	460	325
12 lbs. ft.	375	365
17.5 lbs. ft.	Lock	600

Oiling.—Put 4 or 5 drops of light engine oil in each of starter bearings once in two weeks. If car is driven over 500 miles in two weeks, this attention must be given every 500 miles.

GENERATOR:—Model GJ-4012, 4031. The direction of rotation is counter-clockwise, looking at commutator end. Generator motoring freely at 6 volts, 4-5 amperes. Field test current being 2.2 amperes, 6 volts. Each coil separately, 8.8 amperes, 6 volts. The third brush system is used for current regulation. To increase generator output, move third brush in a counter-clockwise direction, to decrease, vice versa. The maximum charging rate is reached at 20-25 M.P.H., or 1600-1700 R.P.M. of armature.

Generator Test Data

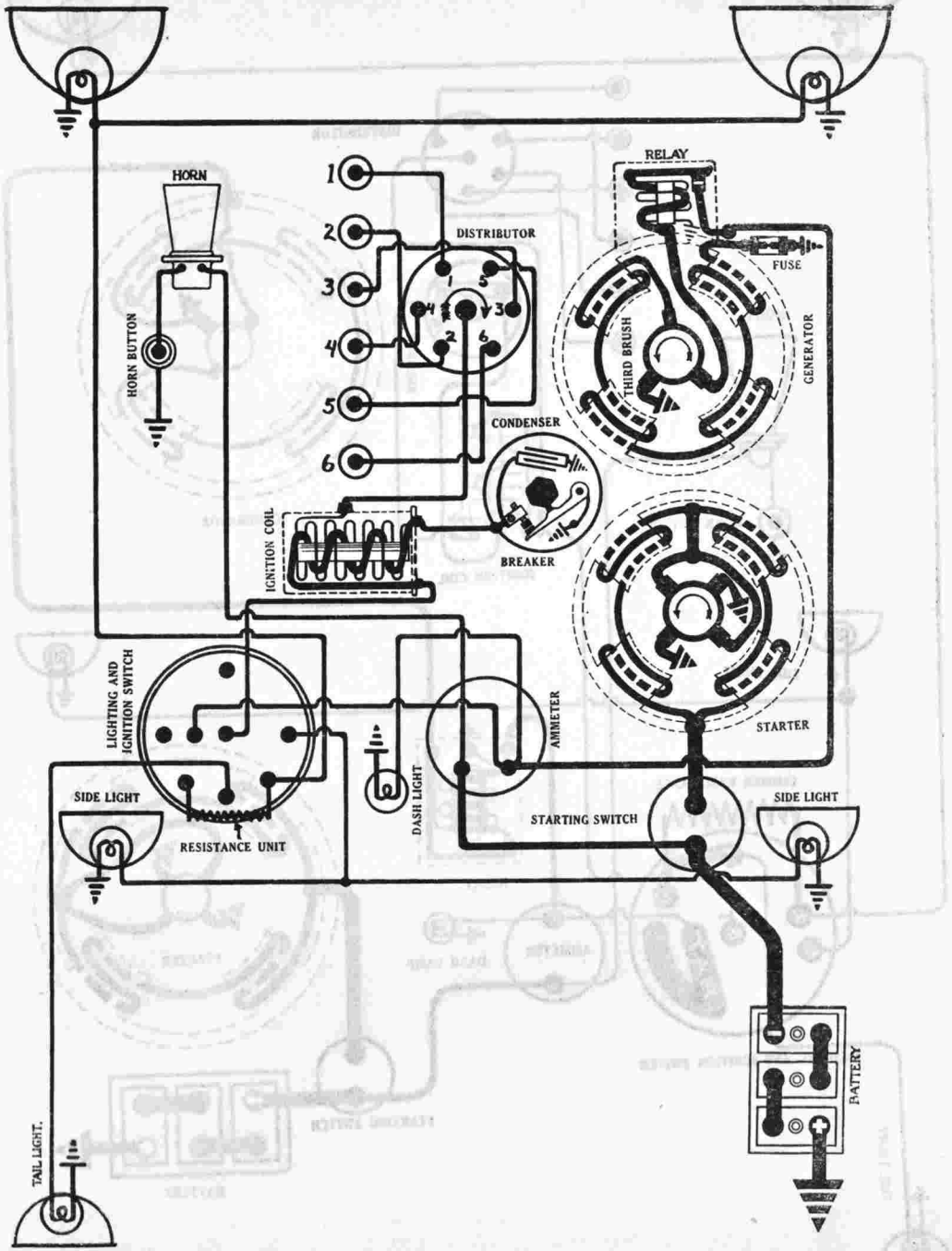
Amperes	Cold Test R.P.M.	Amperes	Hot Test R.P.M.
0.0	500	0.0	550
4.0	600	4.0	730
8.0	750	6.0	850
12.0	950	8.0	950
16.0	1400	12.0	1350
16.5	1600	12.6	1700
15.0	2400	11.6	2400
13.0	3000	10.6	3000

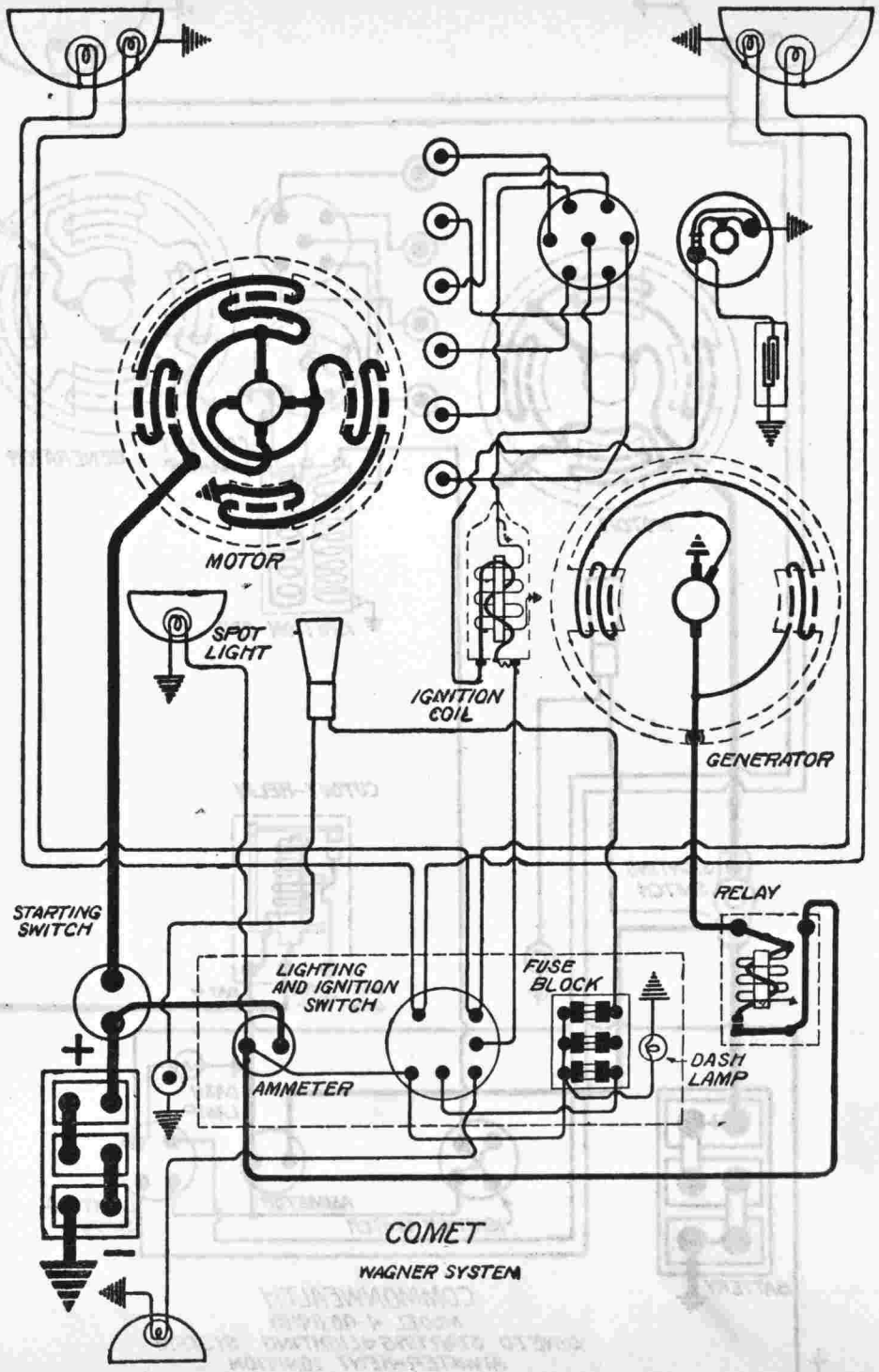
Oiling.—Put 4 or 5 drops of light engine oil in each of the generator oilers once every two weeks. If car is driven over 500 miles in two weeks, this attention must be given once to every 500 miles.

RELAY.—Relay closes at 500-550 R.P.M. of armature, or 7-9 M.P.H., at 6.5 volts, and opens at 450-500 R.P.M. or armature, or 5-7 M.P.H., or 0-1 ampere discharge. The contact gap is .025-.030 inch. The air gap between relay armature and coil core is .010-.015 inch, contacts closed.

LAMPS.—Head lamps are 6-8 volts, 21 cp. Side lamps are 6-8 volts, 4 cp. Tail lamp is 6-8 volts, 2 cp. All have single contact base, except dash lamp. Dash lamp is 6-8 volts, 2 cp., D.C.

COMBINATION SWITCH.—Briggs & Stratton Model No. 1927.





COMET

MODEL 52 (1919) 53 (1920-21-22)
WAGNER GENERATING, STARTING AND LIGHTING SYSTEM
WAGNER IGNITION

BATTERY:—Willard, SJRN-4, 6 volt, 100 ampere hour. The positive (+) terminal was grounded in 1919. In 1920,21 and 22 the negative (—) terminal was grounded.

IGNITION.—Breaker contacts separate .018 to .026 inch. When the condition of the points affects the ignition, renew the breaker lever and contact screw.

OILING.—Screw up the grease cup under the breaker head one-half turn every two weeks. If car is driven more than 500 miles in two weeks, this must be done every 500 miles. Put 3 or 4 drops of light engine oil on the wick in breaker lever spindle, every six months.

TIMING.—Breaker contacts begin to separate when the dead center mark on flywheel is ½ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER:—(1919-20) Model EM-291, Type 36T (1921-22) Model EM-348, Type 46-2-T. The starter is connected to the engine by a Bendix drive.

OILING.—Put 5 or 6 drops of light engine oil in each of starter oilers every month.

GENERATOR.—Model E.M.-276, Type 45-W. Generator current regulation is by third brush system. Rotation is counter-clockwise, viewed from the commutator end. Maximum current output of 18 amperes is reached at 1500 R.P.M. of armature, or 21 miles per hour.

Amperes	Generator Data	R.P.M.
7.0		700
13.0		1000
16.0		1300
18.0		1500
14.0		2000
10.5		2500

OILING.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour and opens at 6-8 miles per hour. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamp is 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 4 cp. Tail lamp is 6-8 volt, 2 cp.

Commonwealth

Model 440 (1918)

Dyneto Generating, Starting and Lighting System
Atwater Kent Ignition

Battery.—Battery is 6 volt, 83 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts separate .010 to .012 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Put a drop of light engine oil on each of the wearing parts of breaker, and put 4 or 5 drops of light machine oil in the oil hole beside the notched shaft, every two weeks. Put a very small amount of vaseline on the notched shaft, applying with a toothpick. If car is driven more than 500 miles in two weeks, these attentions must be given every 500. miles.

Timing.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps are .025 to .031 inch.

Starter.—Starter is connected to engine through a Bendix drive.

Oiling.—Put several drops of light engine oil in each of starter bearings every three months.

Generator.—Generator current regulation is by third brush system.

GENERATOR DATA, MODEL CA

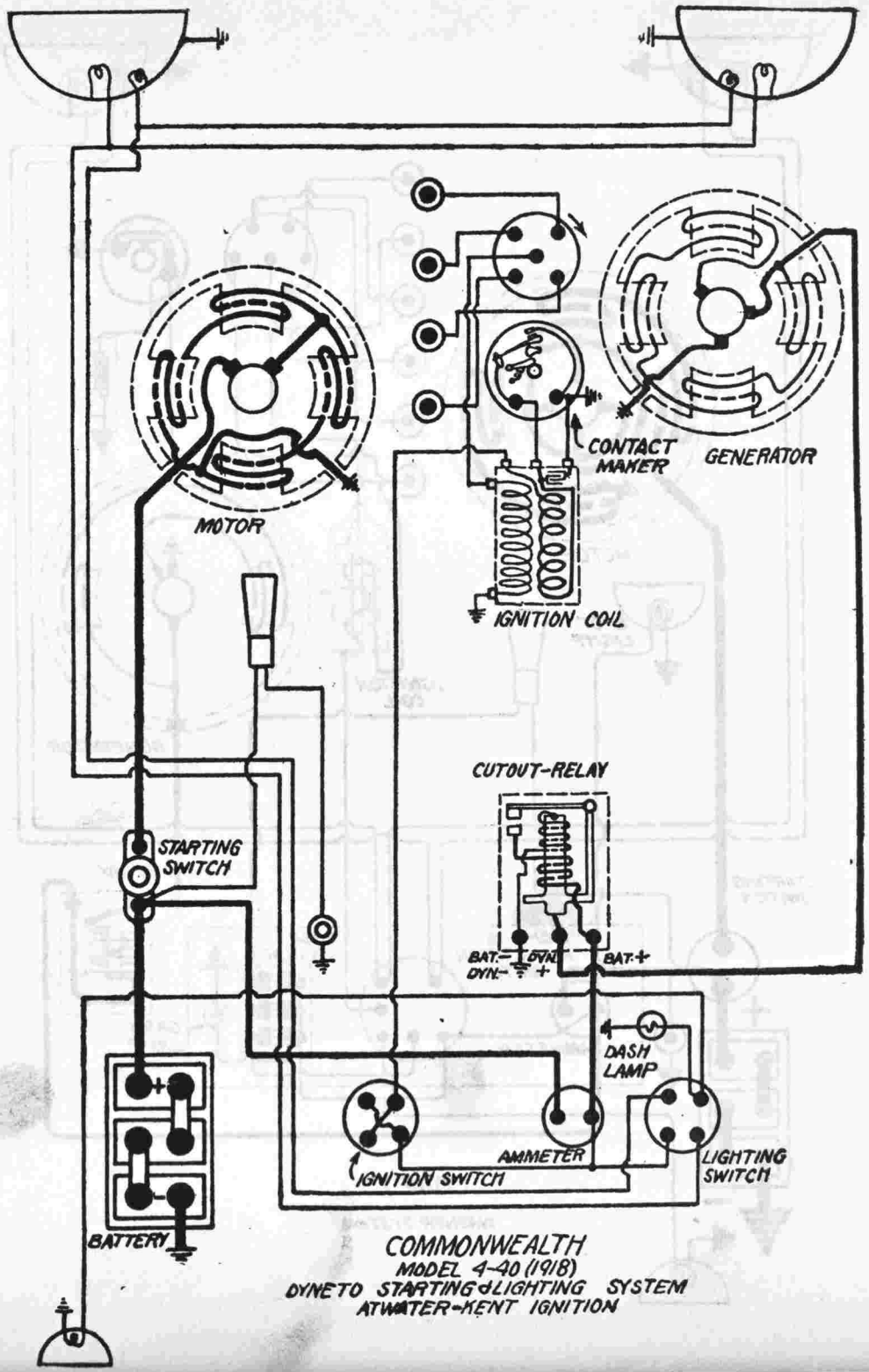
Amperes	M. P. H.	Volts
0	7	6.4
5	9	6.5
10	12.5	6.8
12.5	18	7.0
10	35	6.5

Oiling.—Put several drops of light engine oil in each of generator oilers every month. If car is driven more than 1000 miles in a month, oiling must be done every 1000 miles.

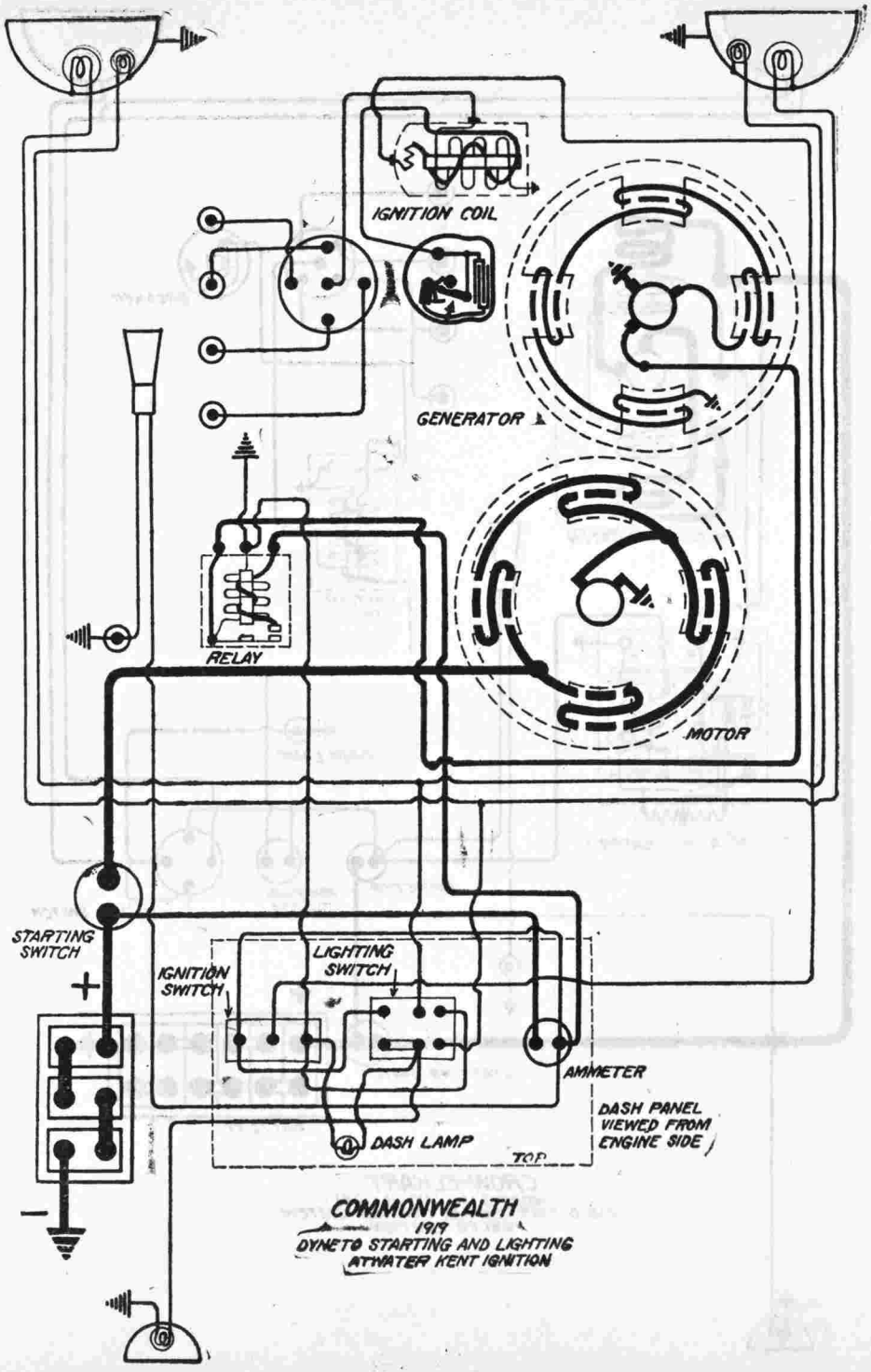
Relay.—Relay closes at 7-9 and opens at 5-7 miles per hour. Charging current is 1-3 amperes at closing, and the discharge current 0 to 1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 4 cp.

Fuses.—Fuses are 10 ampere.



COMMONWEALTH
MODEL 4-40 (1918)
DYNETO STARTING & LIGHTING SYSTEM
ATWATER-KENT IGNITION



COMMONWEALTH

MODEL 41 (1919) 42 (1920) 43 (1921)

DYNETO GENERATING, STARTING AND LIGHTING SYSTEM

ATWATER KENT IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Type CC. Breaker contacts separate .006 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Every two weeks remove the distributor cap and rotor and put 4 or 5 drops of light engine oil in the oil hole exposed. Put a small amount of vaseline on the cam, applying with a toothpick. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model DA. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes
0 lb. ft.	5600	25
5 lb . ft.	850	250
10 lb. ft.	250	420
14 lb. ft.	Lock	530

OILING.—Put 4 or 5 drops of light engine oil in rear starter bearing oiler every month. Every three months remove the cap at front end and saturate the felt packing with light engine oil.

GENERATOR.—Model CA. Generator current regulation is by third brush system. Maximum current output is 12-15 amperes, reached at 1200 R.P.M. of the armature or 24 miles per hour.

Generator Data

Cold Test Amperes	R.P.M.	Hot Test Ampere
6	600	5
13	900	10
15	1200	12
13.5	1600	11.5
11.5	2000	10

OILING.—Put 4 or 5 drops of light engine oil in each of generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour, or 450-500 R.P.M. of armature, and opens at 6-8 miles per hour or 400-450 R.P.M. of armature. Relay contacts separate 3/32 inch. Air gap between relay armature (moving member) and coil core is 1/8 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 20 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Fuse is 10 ampere.

CROW-ELKHART

MODELS 25 AND 30 (1916)

DISCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Battery is 12 volt, 35 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 3 or 4 drops of light engine oil in timer bearing every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever 1 inch from the fully retarded position. (First see that breaker assembly is fully retarded when control lever is in the fully retarded position.)

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

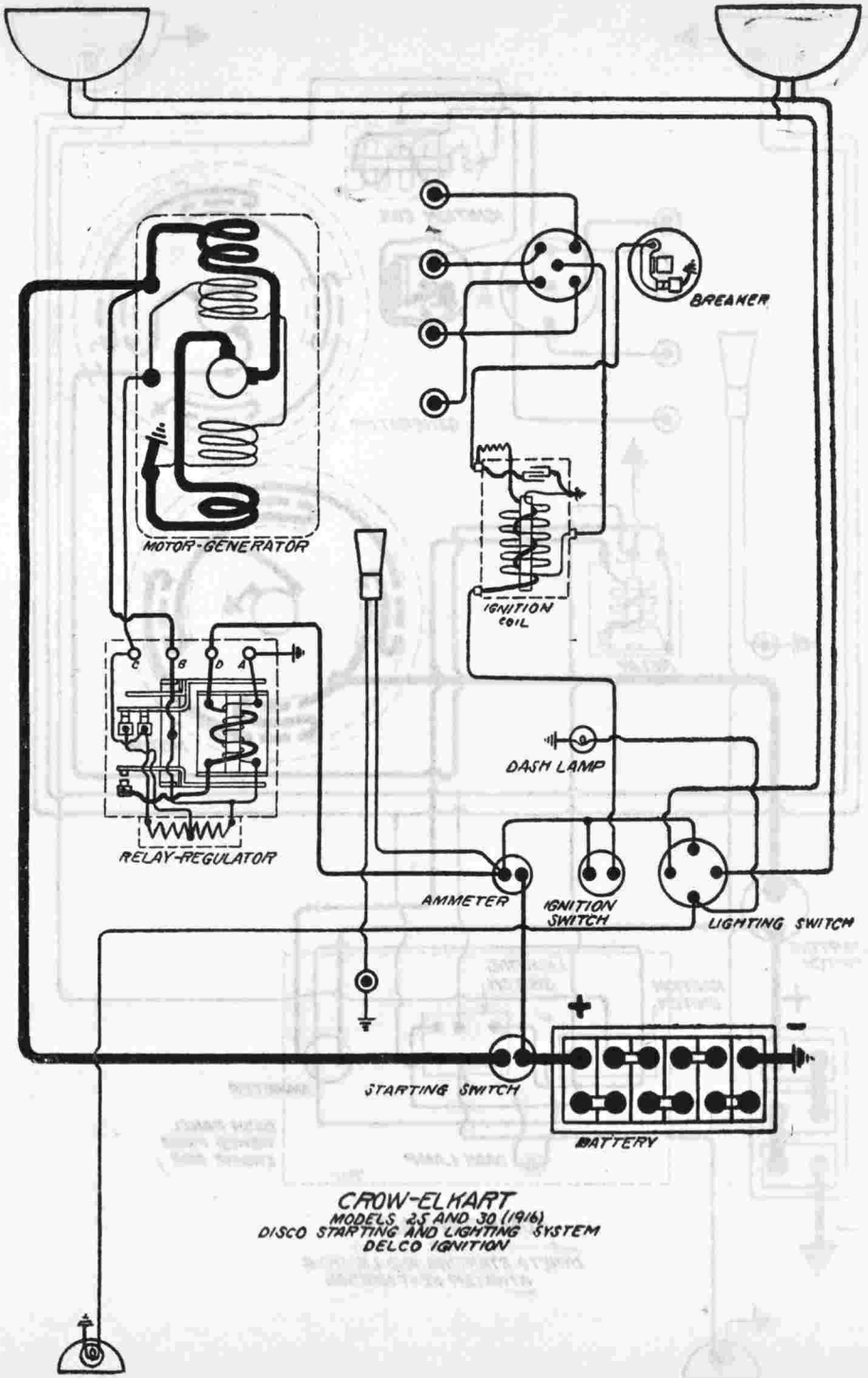
STARTER-GENERATOR.—Starter and generator are combined into one unit. Armature is chain connected to engine crank shaft.

GENERATOR.—Generator current regulation is by a vibrating regulator. Relay is combined with regulator. Maximum generator current is 10 amperes, reached at 15-20 miles per hour.

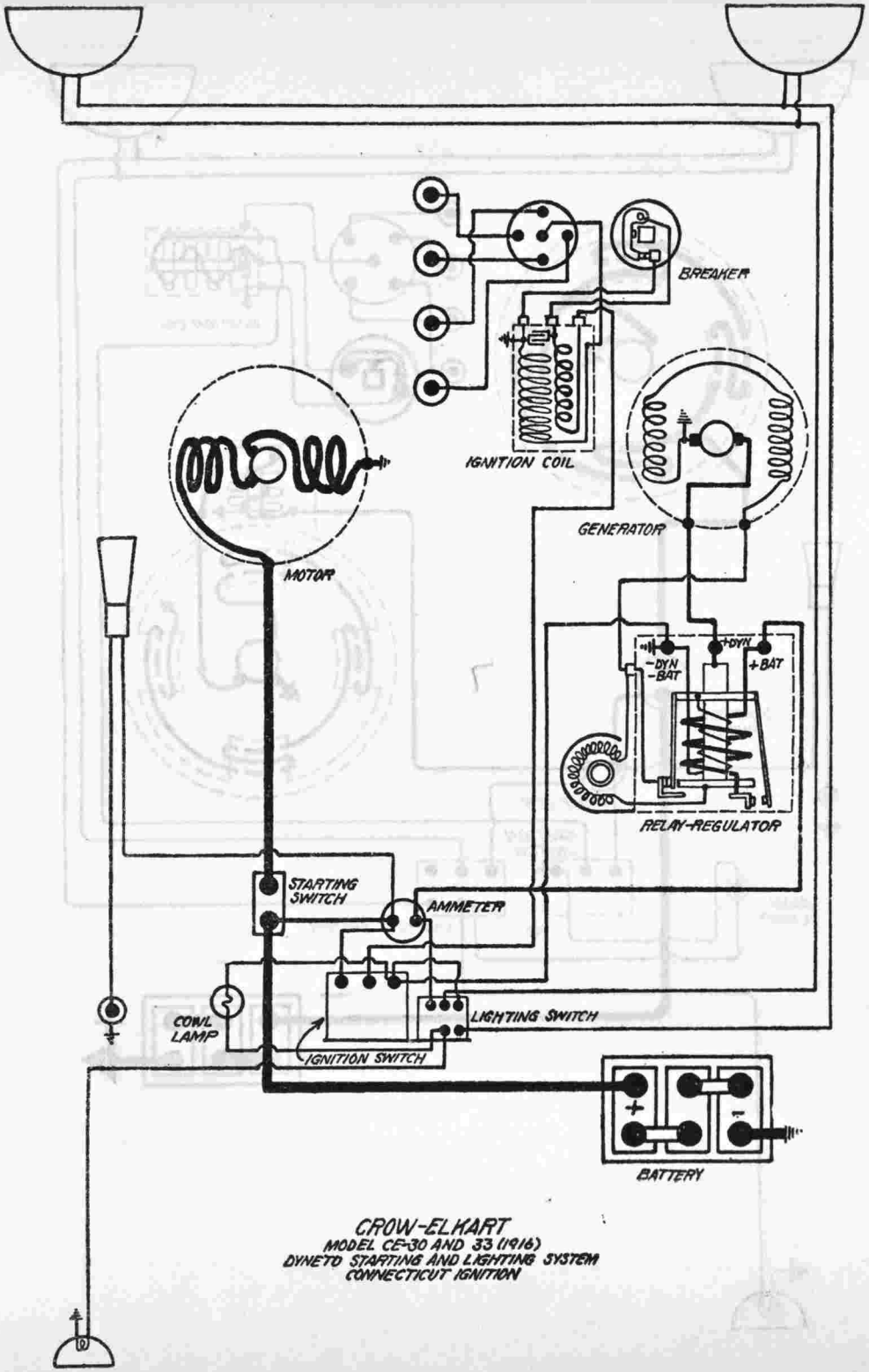
OILING.—Put 5 or 6 drops of light engine oil in each of starter-generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY-REGULATOR.—Relay and regulator are combined into one unit. Relay closes at 7-10 and opens at 5-7 miles per hour. Charging current is 1-3 amperes at closing and the discharge current 0-1 ampere at opening of relay. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 12-16 volt, 15 cp. Dash lamp is 12-16 volt, 3 cp. Tail lamp is 12-16 volt, 3 cp.



CROW-ELKHART
MODELS 25 AND 30 (1916)
DISCO STARTING AND LIGHTING SYSTEM
DELCO IGNITION



CROW-ELKHART
MODEL CE-30 AND 33 (1916)
DYNETO STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

Crow-Elkhart

MODELS CE-30 AND 33 (1916)
DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—Battery is 6 volt, 85 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .023 to .027 inch. They are made of tungsten. When the condition of the points affects the ignition, renew the inner breaker mechanism. For temporary service resurface contacts with fine emery cloth.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .018 to .023 inch.

STARTER.—Starter is connected to engine through a Bendix drive.

Starter Data. Type UA.

Torque	R.P.M.	Amperes	Volts
0.0 lb. ft.	3000	40	5.6
2.5 lb. ft.	1350	160	5.2
5.0 lb. ft.	650	280	4.7
7.5 lb. ft.	300	380	4.4
10.0 lb. ft.	Lock	490	4.0

OILING.—Saturate felt wick at drive end and felt washer under dust cap at other end with light engine oil every three months.

GENERATOR.—Generator current regulation is by a vibrating regulator. Maximum charging rate of 10-12 amperes is reached at 14-16 miles per hour.

Generator Data.—Type VA.

Amperes	M.P.H.
0	8
5	11
10	13
12	15
10	40

OILING.—Put several drops of light engine or machine oil on felt wick at driving end and saturate felt washer under dust cap at commutator end every month. If car is driven more than 1000 miles in a month, oiling must be done every 1000 miles.

RELAY-REGULATOR.—Relay and regulator are combined into one unit. Relay closes at 7-9 miles per hour and opens at 5-7 miles per hour. Charging current should be 1 to 3 amperes at closing and the discharge current 0 to 1 ampere at opening. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

CROW-ELKHART

MODELS CE-33, 35 (1917) K-34, 36 (1918)
MODELS 53 TO 56, SERIES H & I (1919-20-21-22-23-24)
DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY:—**(1919-20-21)** 6 volt, 80 ampere hour. **(1922) Prest-O-Lite,** 6 volt, 105 ampere hour. The positive (+) terminal is grounded.

IGNITION.—Connecticut, Model 15-T or 16-C. Breaker contacts separate .025 to .027 inch. They are made of tungsten. When the condition of the points affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

OILING.—Model 16-C Ignition. Refill the cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in amonth, this must be done every 1000 miles. Do not put grease or oil in the cup.

OILING.—Model 15-T Ignition. Once a month repack the distributor shaft ball bearing with soft cup grease. The bearing is accessible by removing the distributor cap and inner breaker mechanism.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in fully retarded position.

FIRING ORDER.—The firing order of the 4 cylinder "L" head Lycoming motor is 1, 3, 4, 2. The firing order of the 4 cylinder valve-in-head motor is 1, 4, 3, 2. The firing order of the 6 cylinder car is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model No. D190. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes	Volt
0.0 lb. ft.	5600	25	6.4
2.5 lb. ft.	1400	150	5.8
5.0 lb. ft.	850	250	5.3
10.0 lb. ft.	250	420	4.6
14.0 lb. ft.	Lock	530	4.0

OILING.—Put several drops of light engine oil in starter oilers every month.

GENERATOR.—Model No. C190. Generator current regulation is by the third brush system. Maximum current output is 12-15 amperes, reached at 1200 R.P.M. of the armature, or 20-25 miles per hour.

Generator Data

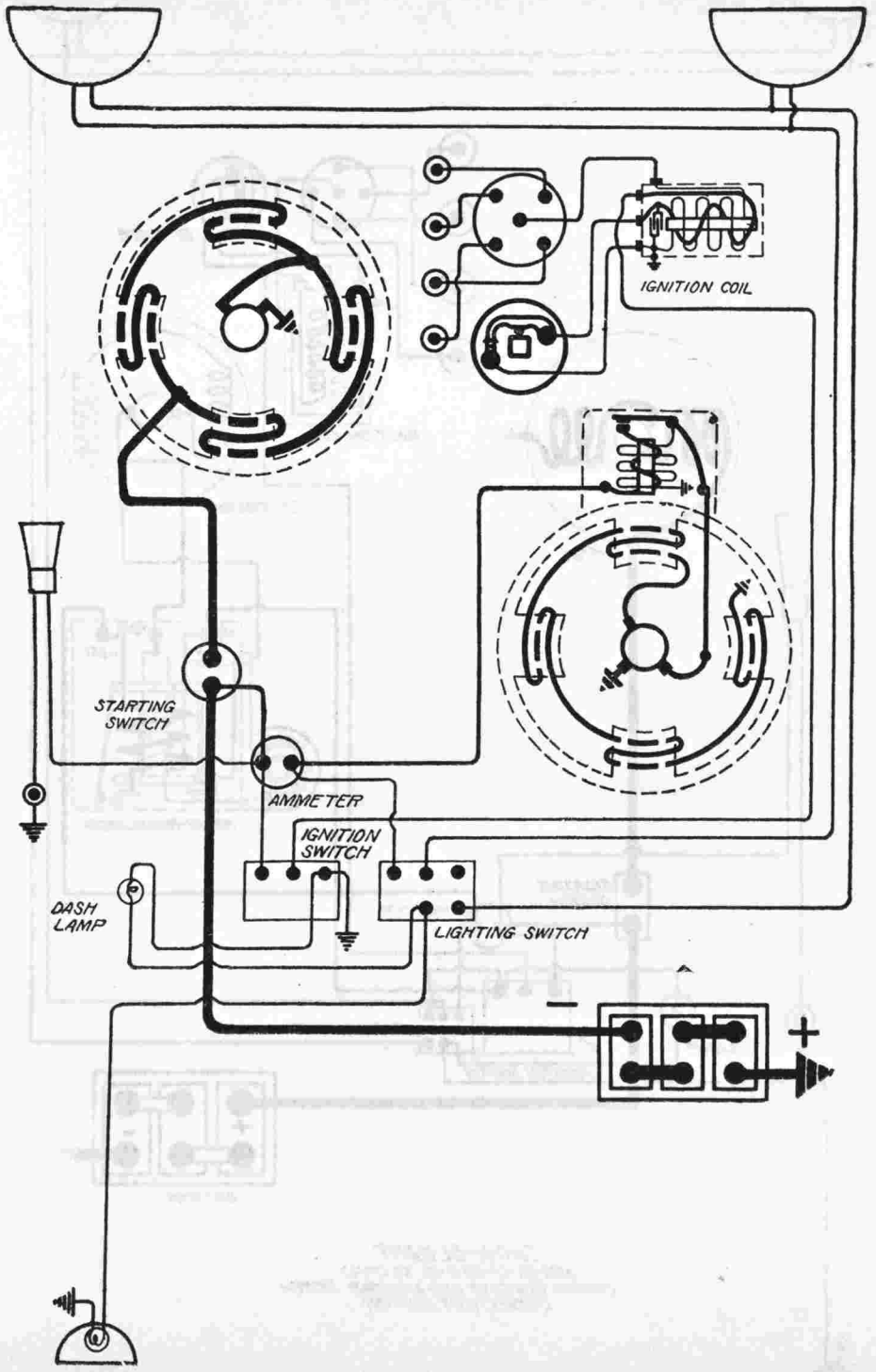
Amperes	Hot Test	R.P.M.	Amperes	Cold Test	R.P.M.
5.0		600	6		600
10		900	13		900
12		1200	15		1200
11.5		1600	13.5		1600
10.0		2000	11.5		2000

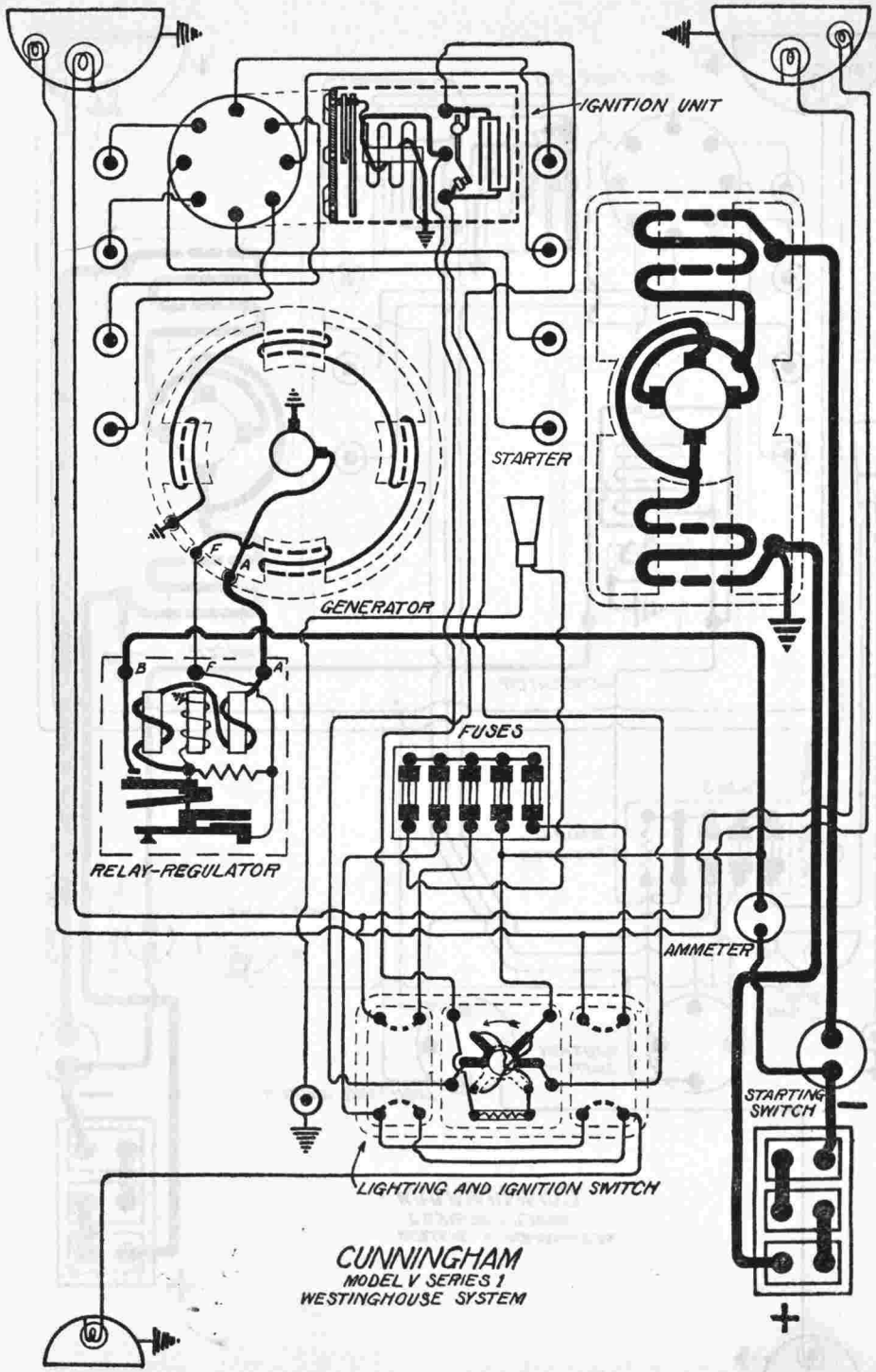
Charging rate is varied by adjusting the third brush setting. Remove the leather plug in the commutator end plate and loosen the exposed screw. Move the third brush in the direction of armature rotation to increase the charging rate, and in the opposite direction to decrease the charging rate. Replace the leather plug after the adjustment is made. Shunt field current is 3.5 amperes at 6.5 volts.

OILING.—Put 4 or 5 drops of light engine oil in each of generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 450-500 R.P.M. of armature, and opens at 6-8 miles per hour or 400-450 R.P.M. of armature. Relay contacts separate 3/32 inch. Air gap between relay armature (moving member) and coil core is 1/8 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are 6-8 volt, 2 cp.





CUNNINGHAM

MODEL V, SERIES 1 (1916)

SERIAL NOS. V-991 TO V-1297

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM

WESTINGHOUSE IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. The positive (+) terminal is grounded at the starting motor.

IGNITION.—Breaker contacts separate .008 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper. Adjust the distributor brush springs so that the brushes extend ¼ inch from their holders when the distributor cap is removed, but do not fall out. Brushes must move freely in their holders. See that the brushes on the top and bottom of the rotor are in place when installing rotor. Breaker lever arm spring tension should require a pull of 11.5 to 12.5 ounces applied to the contacts to open the contacts sufficiently to permit the cam to rotate freely.

OILING.—Put 2 or 3 drops of light engine oil in the oiler at the side of the ignition unit every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

BALLAST RESISTOR.—There is a ballast resistor in the ignition switch. A fuse must not be permanently substituted for this resistor. In case it is necessary to operate the car with the ballast defective, a 5 ampere fuse may be used temporarily, but the ballast must be replaced as soon as possible, as continued operation without it will result in serious burning of the breaker contacts. The resistor has a cold resistance of .43 to .47 ohm.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever 2 inches from the fully retarded position. (First see that the breaker assembly is fully retarded when the control lever is in the fully retarded position.) The breaker contacts are beginning to separate when the end of the distributor rotor is opposite the V notch on the rim of the case.

FIRING ORDER.—The firing order is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

SPARK PLUG GAPS.—Spark plug are .023 to .027 inch.

STARTER.—Frame 502. Starter is connected to the engine through a set of reduction gears meshed by the operator. Lock torque is 16 pound-feet, current being 550 amperes. Torque at 1500 R.P.M. is 2 pound-feet.

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR.—Frame 450-R. Generator voltage regulation is by vibrator regulator. Maximum output is 15 amperes at 6.8 volts, reached at 1200 R.P.M. of the armature or 20-25 miles per hour. Shunt field current is 2.75 to 3.5 amperes at 6 to 6.25 volts. Running freely as a motor, generator takes 4 to 5.5 amperes at 6 to 6.25 volts.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY-REGULATOR.—Relay and regulator are combined to form a single unit. Relay closes at 550-600 R.P.M. of the armature or 10-12 miles per hour and opens at 500-550 R.P.M. of the armature or 8-10 miles per hour. Relay closes when the voltage of the generator reaches 6.6 to 7 volts, and opens with a discharge current of 1 to 3 amperes. Regulator must be adjusted to limit the voltage to 6.5 volts with a 15 ampere resistance load at 1200 R.P.M. of the generator armature. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 24 cp. Side lamps are 6-8 volt, 5 cp. Dash and tail lamps are 6-8 volt, 2 cp. Dome and pillar lamps are 6-8 volt, 5 cp.

CUNNINGHAM

MODEL V, SERIES 2 (1917)

SERIAL NOS. V/2-1298 TO V/2-1597

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM

WESTINGHOUSE IGNITION

BATTERY.—Battery is 6 volt, 115 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .006 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper. Adjust the distributor brush springs so that the brushes extend ¼ inch from their holders when the distributor cap is removed but do not fall out. Brushes must move freely in their holders. See that the brushes on the top and bottom of the rotor are in place when installing the rotor.

OILING.—Put 3 or 4 drops of light engine oil in the oiler at the side of the ignition unit every month. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

BALLAST-RESISTOR.—There is a ballast resistor in the fuse box. A fuse must not be permanently substituted for this resistor. In case it is necessary to operate the car with the ballast defective, a 5 ampere fuse may be used temporarily, but the ballast must be replaced as soon as possible, as continued operation without it will result in serious burning of the breaker contacts. The resistor has a cold resistance of .43 to .47 ohms.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever 2 inches from the fully retarded position. (First see that the breaker assembly is fully retarded when the control lever is in the fully retarded position. The breaker contacts are beginning to separate whne the end of the distributor rotor is directly opposite the V notch on the rim of the case.)

FIRING ORDER.—The firing order is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

SPARK PLUG GAPS.—Spark plug gaps are .023 to .027 inch.

STARTER.—Frame No. 502. Starter is connected to the engine through a set of reduction gears meshed by the operator. Lock torque is 16 pound-feet, current being 550 amperes. Torque at 1500 R.P.M. is 2 pound-feet.

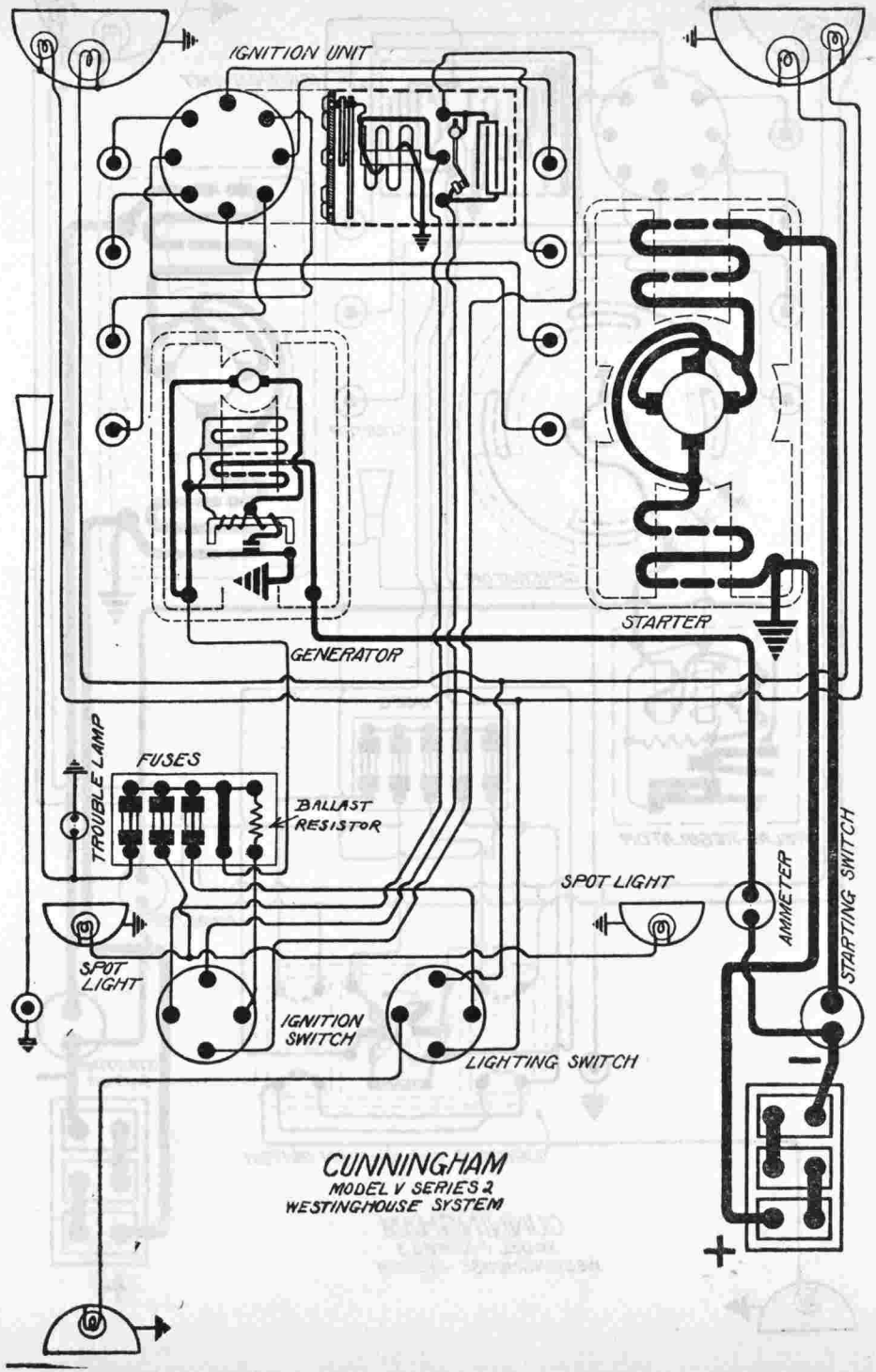
OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

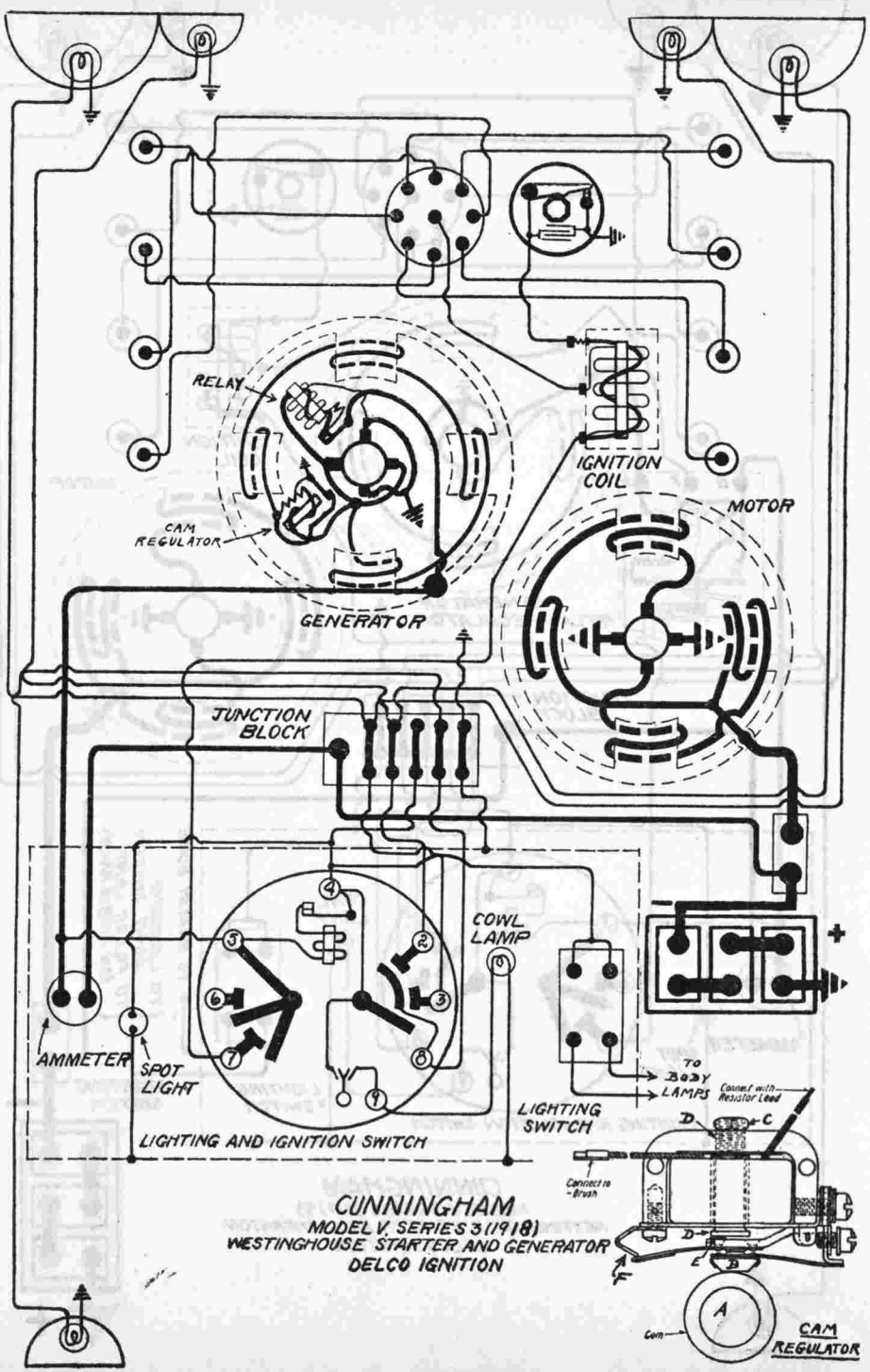
GENERATOR.—Frame No. 256. Generator current regulation is by reverse series field. Maximum current output is 12-15 amperes, reached at 1500 R.P.M. of the armature or 20-25 miles per hour. Shunt field winding takes 1.5 to 2.5 amperes at 6 to 6.3 volts. Running freely as a motor, generator takes 2.5 to 3.5 amperes at 6.0 to 6.3 volts.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 380-430 R.P.M. of the armature or 7-9 miles per hour and opens at 330-380 R.P.M. of the armature or 5-7 miles per hour. Relay opens with a discharge current of 0-2 amperes. Relay closes when the voltage of the generator reaches 7.5 to 7.8 volts, battery disconnected.

LAMPS:—Head lamps are 6-8 volt, 21 cp. Fender lamps are 6-8 volt, 5 cp. Dome and pillar lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 3 cp. Tail lamp is 6-8 volt, 2 cp.





CUNNINGHAM

MODEL V, SERIES 3 (1918-19)

SERIAL NOS. V/3,1601 TO V/3-2050

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Battery is 6 volt, 115 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Model No. 2162. Distributor Model No. 5178. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 4 or 5 drops of light engine oil in each of the ignition unit oilers every two weeks. If the track of the rotor button in he distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 50t miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever 2 inches from he fully retarded position. (First see that the breaker assembly is fully retarded when the control lever is in the duly retarded position. The breaker contacts are beginning to separate when the distributor rotor is directly opposite the V notch on the rim of the case.

FIRING ORDER.—The firing order is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

SPARK PLUG GAPS.—Spark plug gaps are .023 to .027 inch.

STARTER.—Frame No. 751. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes
2.5 lb. ft.	1450	140
5.0 lb. ft.	1150	200
10.0 lb. ft.	750	340
15.0 lb. ft.	560	460
17.5 lb. ft.	500	530
21.0 lb. ft.	Lock	650

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Frame No. 780-R. Generator voltage regulation is by combined magnetic and mechanical cam regulator. Maximum output of generator is 15 amperes at 6.5-7 volts, reached at 1800 R.P.M. of the armature or 25 miles per hour. On open circuit, generator voltage is 8.0 at 1800 R.P.M. To adjust the cam regulator, loosen the nut C and turn the screw D until the air gap between D and E is .003 inch, when the rider B is on the highest point of the cam A. Further adjustment to obtain the specified action is made by bending the stop F. Resistance of regulator windng is 10 ohms. Resistance of the part of the resistor which is in series with the regulator coil in 10 ohms. Resistance of the part of the resistor connected across the contacts is 30 ohms.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in the generator frame. Relay closes at 400-450 R.P.M. of the armature or 6-8 miles per hour, and opens at 350-400 R.P.M. of the armature or 5-7 miles per hour. Adjust the armature stop so that relay contacts open when the discharge current is 0-3 amperes. Adjust spring tension so that relay closes when the voltage of the generator reaches 5.8 to 6.1 volts, battery disconnected. Air gap between relay armature and coil core is .005 inch, contacts closed. Contacts separate .012 to .18 inch. Resistance of the shunt coil with resistor is 56.5 ohms. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Fender lamps are 6-8 volt, 5 cp. Dome and pillar lamps. are 6 -8volt, 4 cp. Dash lamp is 6-8 volt, 3 cp. Tail lamp is 6-volt, 2 cp.

CIRCUIT BREAKER:—The vibrating circuit breaker on the back of the switch begins to operate at 25-30 amperes, limiting the current to 10-15 amperes.

CUNNINGHAM

MODEL V, THIRD SERIES (1919)
SERIAL NOS. V-1601 TO V-2300
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SJR-5, 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model No. 2162. Distributor Model No. 5178. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oilstone.

OILING.—Put 4 or 5 drops of light engine oil in each of the ignition unit oilers every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever 2 inches from the fully retarded position. (First see that the breaker assembly is fully retarded when the control lever is in the fully retarded position.

FIRING ORDER.—The firing order is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Frame 751. Starter is connected to the engine through a set of reduction gears meshed by the operator. Starter cranks the engine at 85-90 R.P.M.

Starter Data

Torque	R.P.M.	Amperes
2.5 lb. ft.	1450	140
5.0 lb. ft.	1150	200
10.0 lb. ft.	750	340
15.0 lb. ft.	560	460
21.0 lb. ft.	Lock	650

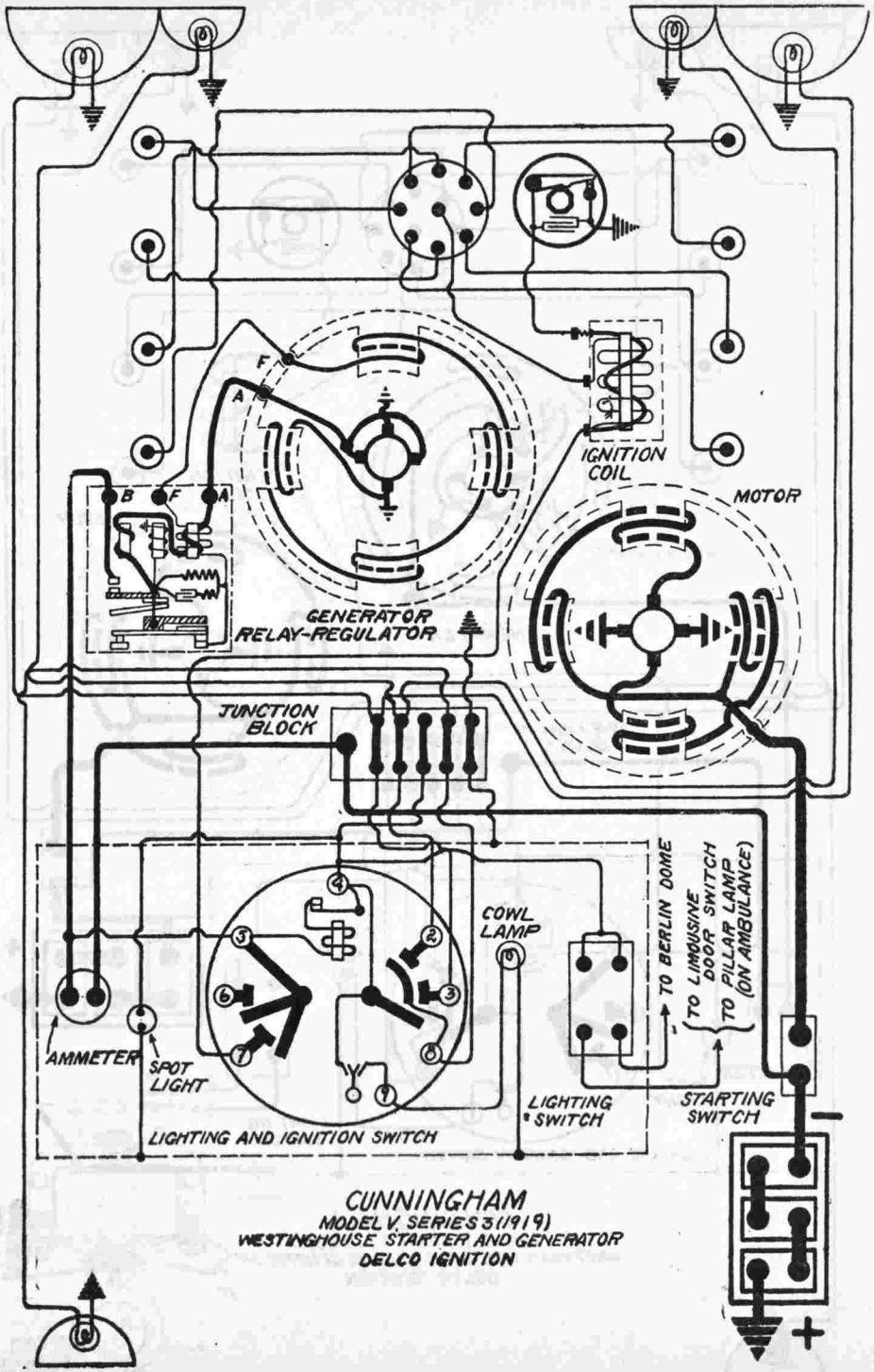
OILING.—Put 4 or 5 drops of light engine oil in the starter oilers every month.

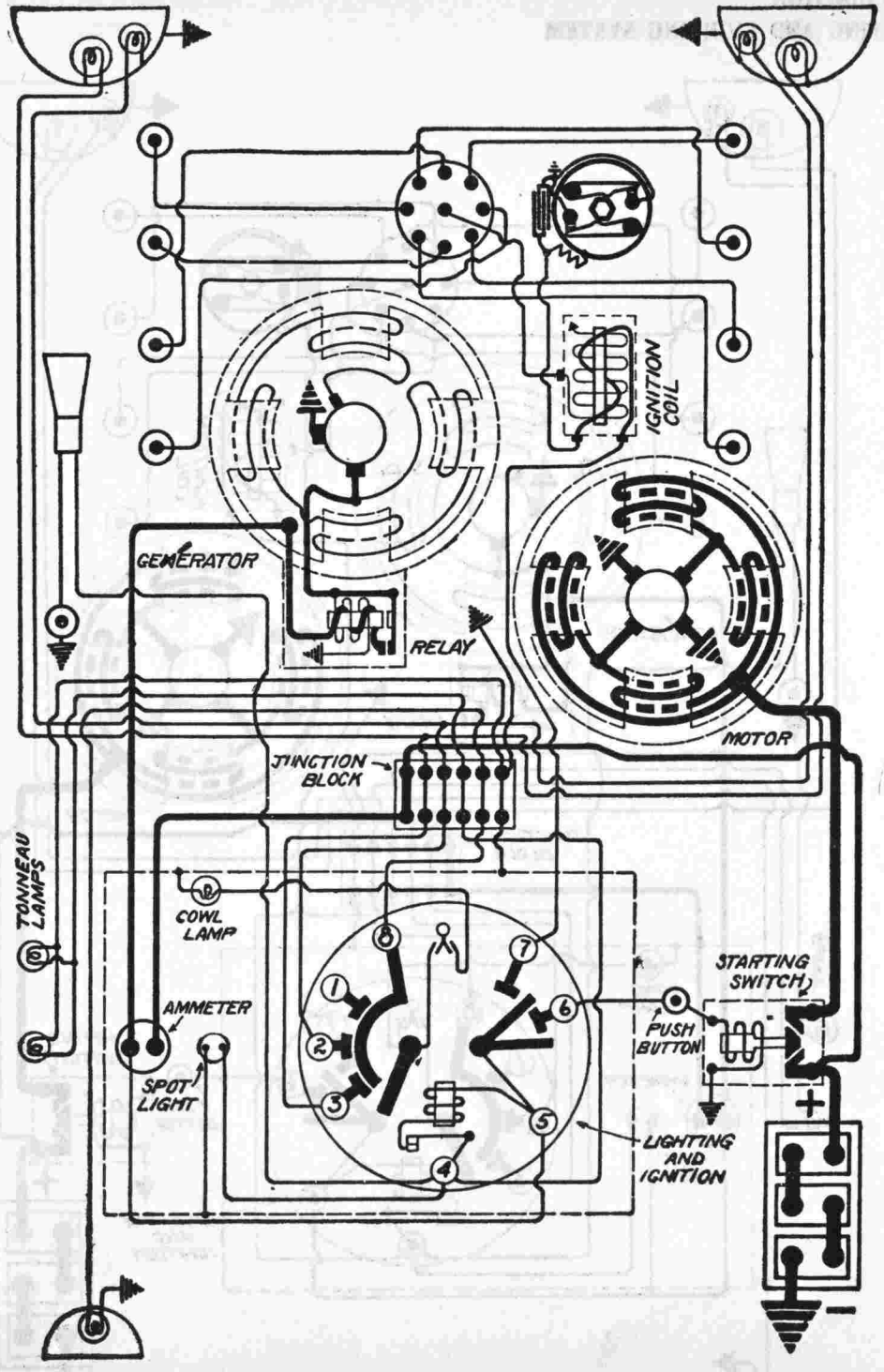
GENERATOR.—Frame 782-R. Generator current regulation is by vibrator regulator. Maximum current output is 20 amperes at 6.5 volts, reached at 725 R.P.M. of the armature or 25 miles per hour. Shunt field takes 1.25 to 1.75 amperes at 6 to 6.3 volts. Running freely as a motor, generator takes 5 amperes at 6 to 6.3 volts.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY-REGULATOR.—Relay and regulator are combined to form a single unit. Relay closes at 10-12 miles per hour or 375-425 R.P.M. of the armature, and opens at 8-10 miles per hour or 325-375 R.P.M. of the armature. To adjust relay, regulate the spring tension until the relay opens with a discharge current of 1-2 amperes. Adjust the stop which determines the air gap between the armature and coil core until the relay closes with a generator voltage of 6.5 to 7 volts, battery disconnected. This air gap is .055 to .060 inch. To adjust the regulator, drive the generator at 1200 R.P.M. With a 20-ampere resistance load, the voltage must not exceed 6.5 volts. With no load, the voltage should be 8.5 volts. Adjust the regulator air gaps and spring tension until this action is obtained. Air gap between regulator armature and coil core is .045 to .055 inch. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Fender lamps are 6-8 volt, 5 cp. Dome and





CUNNINGHAM

MODEL V, SERIES 4 (1920). SERIAL NOS. 2451 TO 3000
MODEL V-4-2 SERIES (1921-22)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Willard, SJRN-5, 6 volt, 120 ampere hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2162. Distributor Model No. 5178. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of of an emery wheel, finishing on a hard oilstone.

Oiling:—Put 5 or 6 drops of light engine oil in the ignition unit oiler every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. Once each year remove the grease plug on the side of the distributor housing and repack the housing with medium heavy cup grease.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever two inches from the lowest position on the sector. (First see that breaker assembly is fully retarded when the control lever is in the fully retarded position.)

Firing Order:—The firing order is 1R-4L-3R-2L-4R-1L-2R-3L.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .030 inch.

STARTER:—Model No. 183. Starter is connected to the engine through a Bendix drive. Lock torque is 14 pound-feet. Starting switch is of the magnetic type, operated by a push button on the dash.

Oiling:—Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every 1000 miles or each month.

GENERATOR:—Model No. 182. Generator current regulation is by the third brush system. Maximum current output is 18 amperes, reached at 24 miles per hour or 1000 R.P.M. of the armature. Charging rate decreases to 10 amperes at 2000 R.P.M. of the armature or 48 miles per hour. To vary the charging rate first loosen the clamp nut on the front end of the generator one or two turns. Then turn the third brush adjusting screw in a clockwise direction to increase the charging rate and in a counter-clockwise direction to decrease the charging rate. Tighten the clamp nut and reseat the brush after adjusting position.

Oiling:—Put 5 or 6 drops of light engine oil in the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY:—Relay closes at 10 miles per hour or 400 R.P.M. of the armature, and opens at 8 miles per hour or 320 R.P.M. of the armature. Relay contacts separate .046 to .062 inch. Air gap between relay armature (moving member) and coil core is .025 to .035 inch, contacts closed. To adjust relay, connect a voltmeter between the positive (+) generator brush and ground. Then slowly speed up the generator and adjust the relay spring tension until the relay contacts close when the voltage of the generator reaches 7.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

CIRCUIT BREAKER:—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start the vibrator. While vibrating the current is 3-5 amperes.

CUNNINGHAM

MODEL V, SERIES 4 (1923-24)

DELCO IGNITION

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

BATTERY.—Willard, SJRN-5, 6 volt, 120 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2135. ..Distributor Model No. 5218. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone. Breaker has two sets of contacts on an eight sided cam. Contacts must be synchronized so as to open at the same instant. This is important. See Timing. Distributor is semi-automatic. Maximum manual advance is 25-30 degrees. Automatic advance begins at 800 R.P.M. Maximum automatic advance is 12.5-14.5 degrees at 2100 R.P.M. Breaker arm spring tension is 16-20 ounces.

Mounting:—Distributor is mounted between cylinder banks at forward end of engine. To remove distributor disconnect manual advance rod and primary lead and remove head with cables attached. Then remove two hold-down screws and lift distributor from place.

OILING.—Put 5 or 6 drops of light engine oil in the ignition unit oiler every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. Once each year remove the grease plug on the side of the distributor housing and repack the housing with medium heavy cup grease.

TIMING:—Synchronization of Contacts. To synchronize contacts, connect a 6 volt lamp across each set of contacts and crank engine slowly. Lamps will light as contacts open. If the two lamps do not light simultaneously loosen the three mounting screws on breaker plate and shift the plate until correct synchronization is secured.

Timing Distributor to Engine:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 5 degrees after top dead center (measured on the flywheel) with spark lever and breaker assembly fully retarded. To set timing, crank engine until piston No. 1 reaches firing position. Fully retard spark lever and loosen lockscrew in center of breaker cam. Rotate the cam until the contacts begin to separate. Tighten the lockscrew and make certain that the segment opposite the rotor is connected to the spark plug in cylinder No. 1.

FIRING ORDER.—The firing order is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

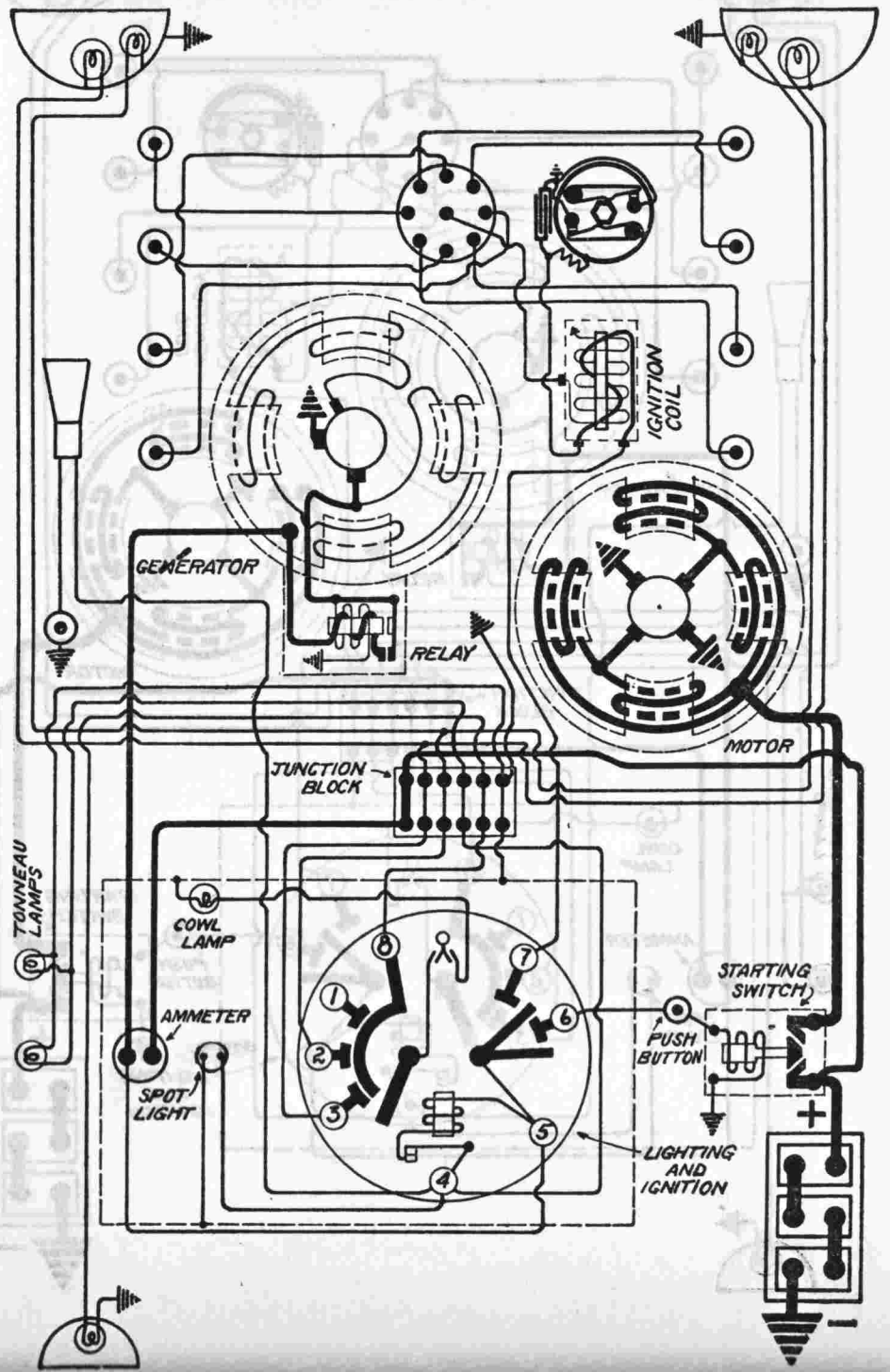
Spark Plugs:—Spark plug gaps are ⅞ inch. Gaps are .030 inch.

STARTER.—Model No. 183. The direction of rotation is counter-clockwise, looking at commutator end. The starter is connected to engine by a Bendix drive. Starter running free at 4000 R.P.M. takes a current of 60-70 amperes, 5.5 volts. Cranking the engine at 150 R.P.M. requires a current of 125-200 amperes, 5 volts. Lock torque is 24 lb. ft., current being 450-550 amperes at 2.75 volts. The starter brush tension should be 2¼ to 2¾ pounds each.

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove three flange mounting screws. Pull starter forward, and lift out from underneath.

OILING: — Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every 1000 miles or each month.

GENERATOR: — Model No. 182. The direction of rotation is clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the charging rate, remove the cover band and loosen the lock nut on the end of the generator. Then turn the third brush plate adjusting screw in a clockwise direction amperes at 6 volts.
to increase the charging rate and in the opposite direction to decrease the charging



rate. Tighten the lock nut after making the adjustment. The maximum charging rate is 18 amperes, reached at 1000 R.P.M. of the armature or 24 miles per hour. Generator motoring freely takes 3-5 amperes at 6 volts. Field current is 2

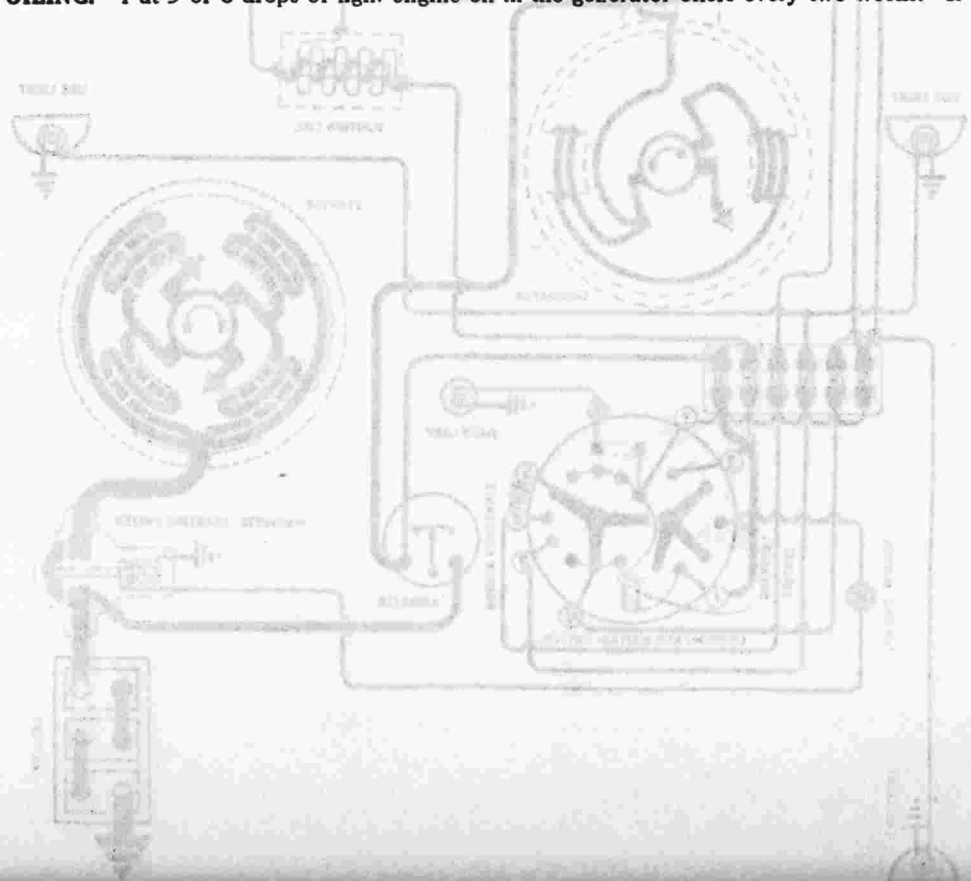
Generator Test Data
(Hot Test)

Amperes	R.P.M.	M.P.H.
0	450	——
10	800	——
18	1000	24
10-14	1450	——
13	1800	——

The tension of each of the generator brushes should be from 1¼ to 1½ pounds.

Mounting:—Generator is cradle mounted at front of engine. To remove generator, disconnect lead and remove bolts from hold-down clamp. Disengage coupling and lift generator from place.

OILING.—Put 5 or 6 drops of light engine oil in the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.



RELAY.—Relay closes at 10 miles per hour or 400 R.P.M. of the armature, and opens at 8 miles per hour or 320 R.P.M. of the armature. Relay contacts separate .046 to .062 inch. Air gap between relay armature (moving member) and coil core is .020 to .035 inch, contacts closed. To adjust relay, connect a voltmeter between the positive (+) generator brush and ground. Then slowly speed up the generator and adjust the relay spring tension until the relay contacts close when the voltage of the generator reaches 7.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash lamps are each 6-8 volt, 4 cp. Tail lamp is 6-8 volt, 2 cp.

CIRCUIT BREAKER:—A circuit breaker mounted on the back of the switch takes the place of fuses. A current of 25-30 amperes will start this device vibrating. While vibrating, the current is 10-15 amperes.

CUNNINGHAM

MODEL V-4—FIRST 100 CARS—(1925)
MODEL V-6 (1925-26)
AFTER 1ST HUNDRED CARS IN 1925
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SJR-5. 6 volt, 135 ampere hour. The negative (—) terminal is grounded. Starting capacity is 145 amperes for 20 minutes. Lighting capacity is 5 amperes for 27 hours.

IGNITION:—Coil Model No. 2177. Distributor Model No. 5218. Breaker contacts separate .015-.020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file or on a medium hard oilstone. The breaker arm spring tension should be 16-20 ounces. Manual advance is 25-30°. Automatic advance begins at 800 R.P.M. and reaches a maximum of 12½-14½° at 2100 R.P.M.

Mounting.—Distributor is mounted at the forward end of the engine between the cylinder banks. To remove, disconnect manual advance rod and remove two hold-down screws. Then lift distributor from position.

Oiling:—Put 5 or 6 drops of light engine oil in the ignition unit oiler every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. Once each year remove the grease plug on the side of the distributor housing and repack the housing with medium heavy cup grease.

Timing:—Breaker contacts begin to separate when the piston entering power stroke is 5 degrees past top dead center (measured on the flywheel) with the spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1R-1L-4R-4L-2L-3R-3L-2R.

Spark Plugs:—Spark plug gaps are ⅞ inch. Gaps are .030 inch.

STARTER:—Model No. 183. The direction of rotation is counter-clockwise, looking at commutator end. The starter is connected to engine by a Bendix drive. Starter running free at 4000 R.P.M. takes a current of 60-70 amperes, 5.5 volts. Cranking the engine at 150 R.P.M. requires a current of 125-200 amperes, 5 volts. Lock torque is 24 pound-feet, current being 450-550 amperes at 2.75 volts. The starter brush tension should be 2¼ to 2¾ pounds each.

Mounting.—Starter is mounted at the right of the engine. To remove starter, remove three flange mounting screws and pull unit forward and out.

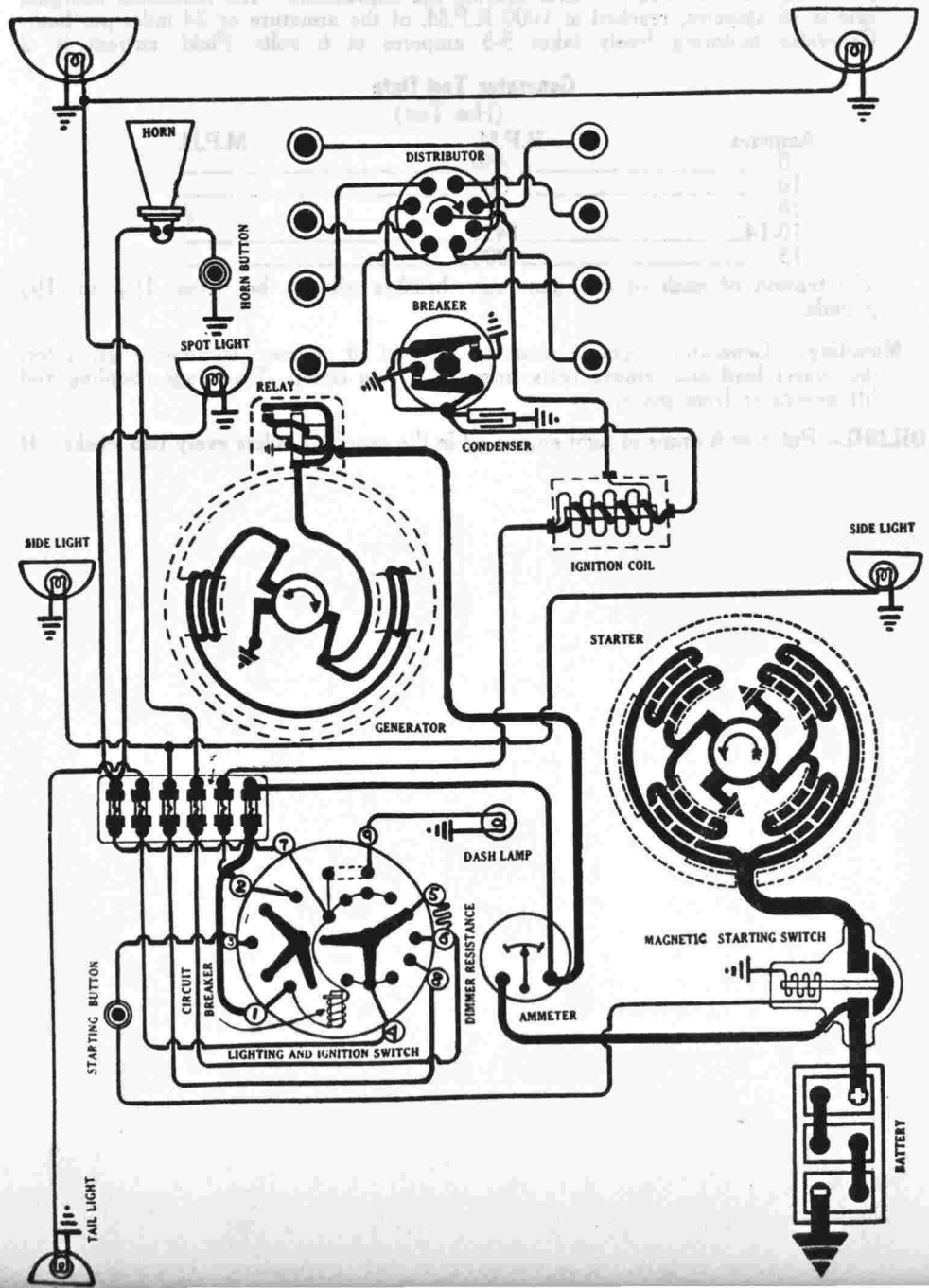
Oiling:—Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every 1000 miles or each month.

GENERATOR.—Model No. 182. The direction of rotation is clockwise looking at the commutator end. The third brush system is used for current regulation. To adjust the output, loosen the locknut on the generator end plate and shift the third brush mounting plate by means of the handle attached. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. Generator brush tension should be 1½-1¾ pounds each.

Generator Data

Amperes.	R.P.M.
4	800
18-20	1600

Mounting.—Generator is cradle mounted. To remove, remove hexagon-headed nuts from hold-down clamp and lift generator from place.



CUNNINGHAM

MODEL V-4 (1925) FIRST HUNDRED CARS
MODEL V-6 (1925-26)
AFTER FIRST 100 CARS IN 1925
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

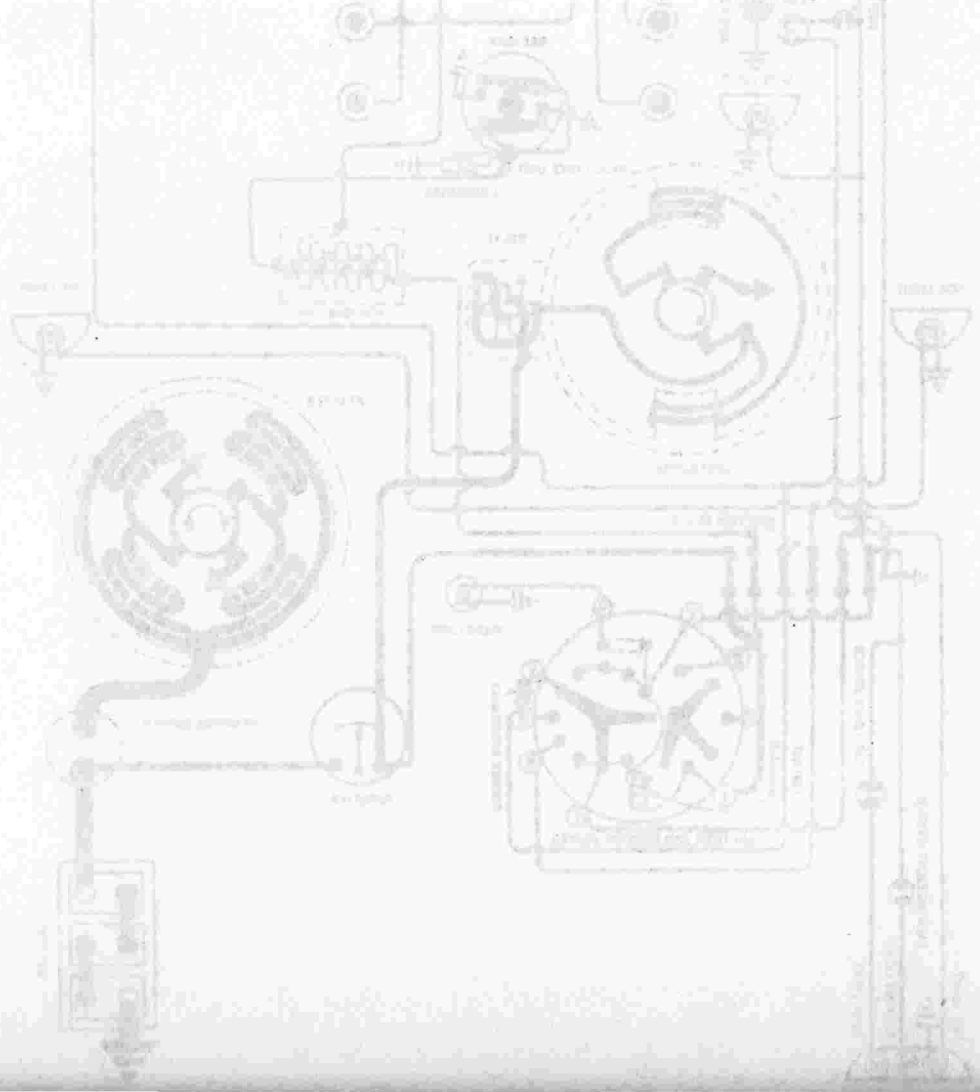
Oiling:—Put 5 or 6 drops of light engine oil in the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY:—Relay contacts close when the voltage of the gesnerator reaches 6.75-7.5 volts and open with a discharge current of 0-3 amperes. Relay contacts separate .015-.020 inch. Air gap between relay armature and coil core is .025-.035 inch, contacts closed.

LIGHTING.—Combination Switch Model 1173. Head, stop and backing lamps are each 6-8 volt, 21 cp.S.C. Dash and tail lamps are each 6-8 volt, 2 cp.S.C. Tonneau lamp is 6-8 volt, 2 cp.D.C. Dome lamp is 6-8 volt, 4 cp.D.C. Fender lamps are 6-8 volt, 4 cp.S.C.

CIRCUIT BREAKER:—A circuit breaker mounted on the back of the switch takes the place of fuses. A current of 25-30 amperes will start this device vibrating. While vibrating the current is 10-15 amperes.

NOTE:—The electro-magnetic starting switch was used only on the Model V-4 cars. Model V-6 cars used a manual switch and the wire from switch terminal No. 3 was not used.



CUNNINGHAM

SERIES V-7 (1927-28)
SERIAL NOS. 5011 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type SJRR-5, 6 volt. Starting capacity is 145 amperes for 20 minutes. Lighting capacity is 5 amperes for 27 hours. The negative (—) terminal is grounded. Battery is mounted on right side of chassis under the front floor board.

IGNITION:—Coil Model 2178. Distributor Model 5299. Breaker contacts separate .015-.020 inch. They are made of tungsten. Resurface contacts with a fine, flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 38° (engine). Automatic advance begins at 800 R.P.M. and reaches a maximum of 15° at 2100 R.P.M. Breaker has two sets of contacts on an eight sided cam. They must be synchronized to open at the same instant. Connect a six volt lamp in each primary circuit and shift breaker plate position until both lamps go out at the same instant. This will mean that contacts are correctly synchronized.

Mounting:—Distributor is mounted at the forward end of the engine between the cylinder banks. To remove distributor, disconnect manual advance rod and breaker lead and remove distributor head or disconnect high tension cables. **Then remove** One hold down screw in manual advance arm and lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every month or each 1000 miles.

Timing:—Breaker contacts begin to separate when piston No. 1 on compression stroke reaches top dead center with the manual spark control lever in the fully retarded position. At this point the flywheel marking "EX.C.IN.O." will be opposite the indicator on the flywheel case.

Valve Timing:—INLET VALVES: :—Head diameter, 1⅞ inches; stem diamter, .432 inch; stem length, 6⅛ inch; tappet clearance, .0015 inch; spring pressure, 75 pounds; valve lift, 11/32 inch; intake opens at 5° past top dead center and closes 51° past lower dead center.

EXHAUST VALVES:—Head diameter, 1⅞ inches; stem diameter, .432 inch; stem length, 6⅛ inches; tappet clearance, .003 inch; spring pressure, 75 pounds; valve lift, 11/32 inch; exhaust opens at 41° before bottom dead center and closes 5° past top dead center. Stem guides are removable. No oversize valve stems are made.

Firing Order:—The firing order is 1R, 1L, 4R, 4L, 2L, 3R, 3L, 2R.

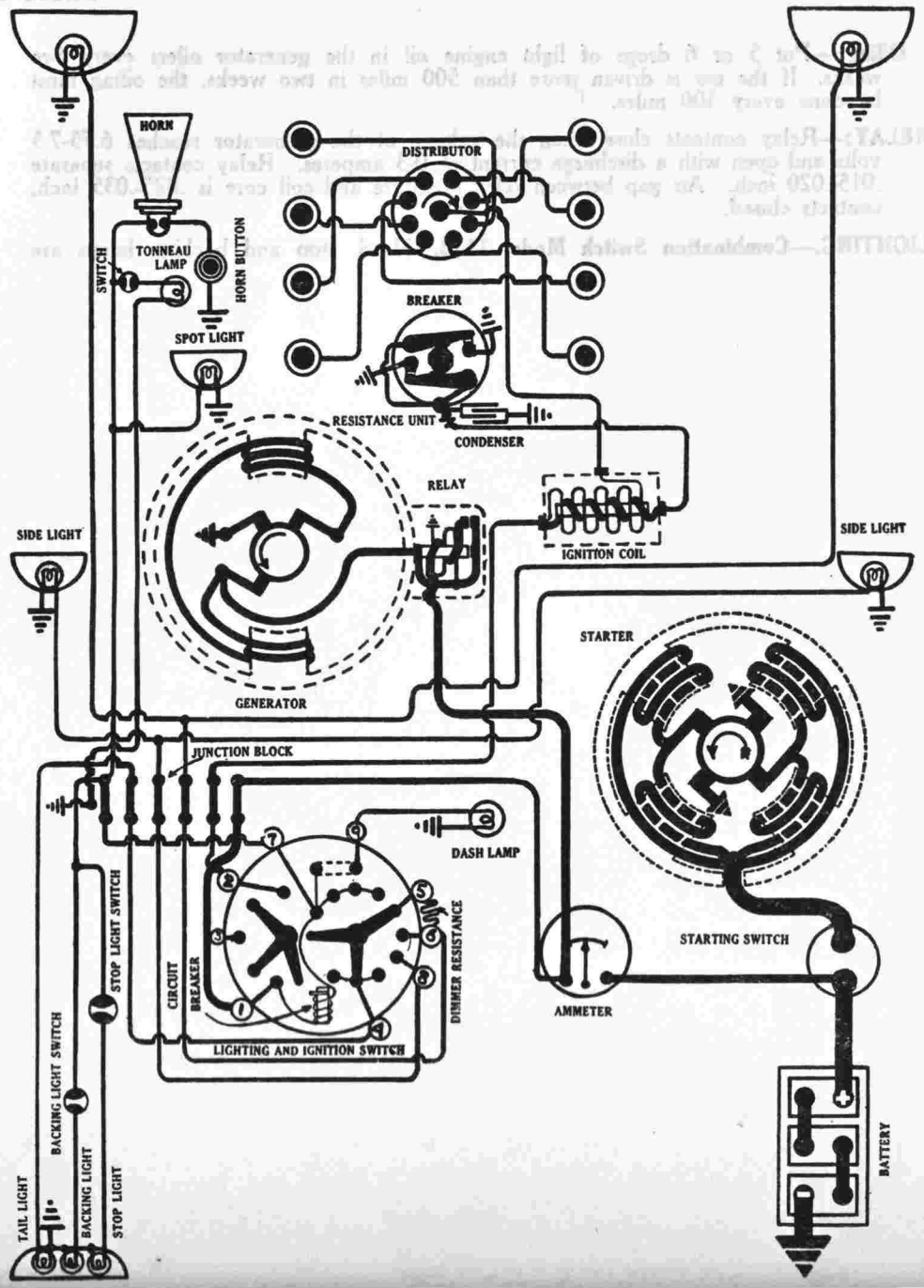
Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Gaps are .031 inch.

STARTER:—Model 350. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension is 2¼-2½ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	4	60
19 "	Lock	3	500

Mounting:—Starter is flange mounted at right of engine. To remove starter, disconnect starter cable and remove three flange mounting screws. Then slide starter from place.



CUNNINGHAM

SERIES V-7 (1927-28)
SERIAL NOS. 5011 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

Oiling:—Self-lubricating bearings are used. They require no attention.

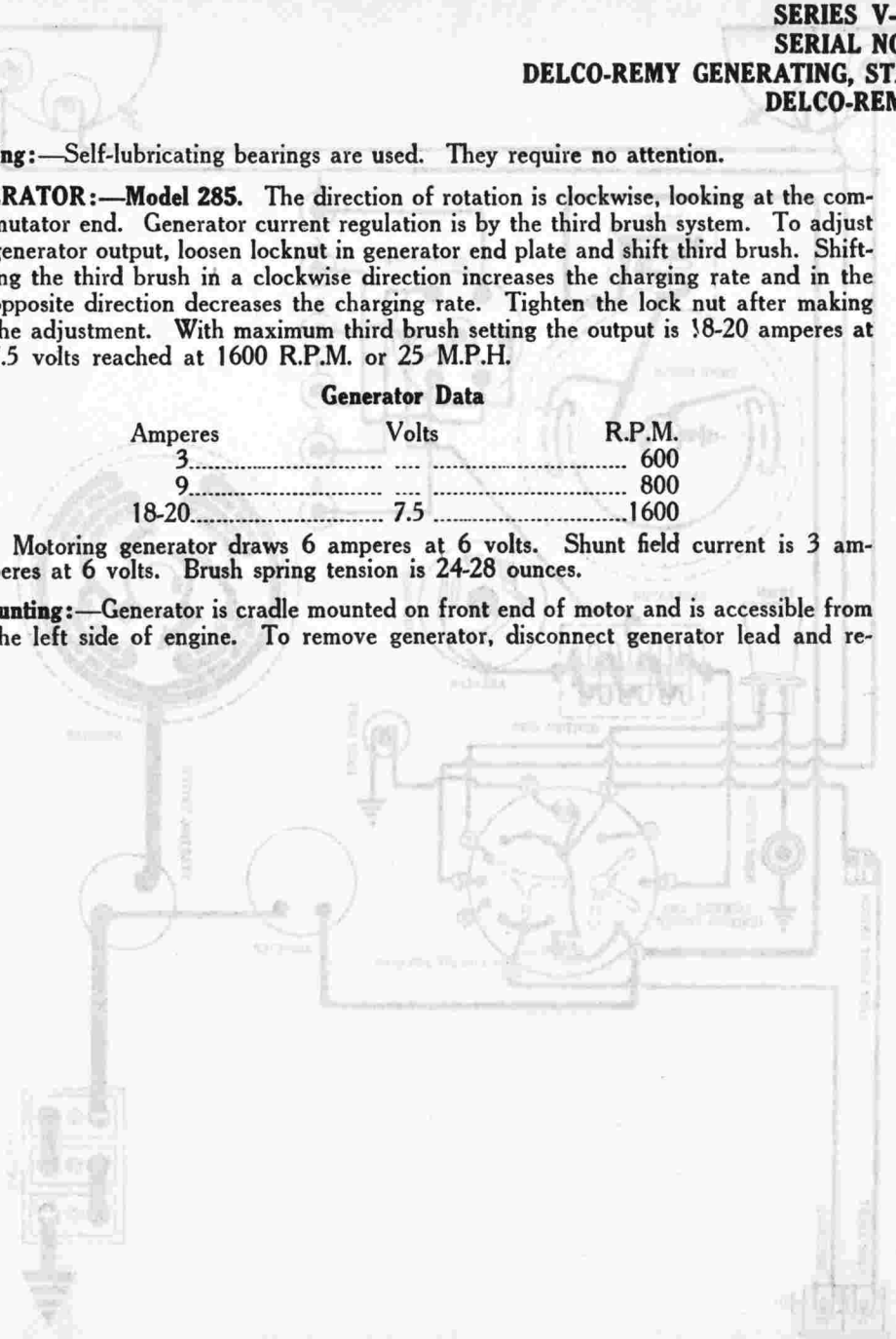
GENERATOR:—Model 285. The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, loosen locknut in generator end plate and shift third brush. Shifting the third brush in a clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. Tighten the lock nut after making the adjustment. With maximum third brush setting the output is 18-20 amperes at 7.5 volts reached at 1600 R.P.M. or 25 M.P.H.

Generator Data

Amperes	Volts	R.P.M.
3	....	600
9	....	800
18-20	7.5	1600

Motoring generator draws 6 amperes at 6 volts. Shunt field current is 3 amperes at 6 volts. Brush spring tension is 24-28 ounces.

Mounting:—Generator is cradle mounted on front end of motor and is accessible from the left side of engine. To remove generator, disconnect generator lead and remove lock nut and nut from hold down strap. Then lift generator from place.



Oiling:—Put 8 or 10 drops of light engine oil in the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Model 5766. Relay is mounted on top of the generator. Relay contacts close when the voltage of the generator reaches 6.75-7.5 volts and open with a discharge current of 0-3 amperes. Relay contacts separate .015-.020 inch. Air gap between relay armature and coil core is .025-.035 inch, contacts closed.

LIGHTING:—Delco-Remy Switch Model 1281. Switch is mounted on the instrument board. Dimming is by resistance on switch. Head, stop and backing lights are each 6-8 volt, 21 cp. S.C. Mazda No. 1129. Side, dome, corner, tonneau and step lights are each 6-8 volt, 6 cp. D.C. Mazda No. 82. Dash and tail lights are 6-8 volt, 3 cp. S.C. Mazda No. 63.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on back of the switch. A current of 25-30 amperes causes this device to operate. While vibrating the current is 10-15 amperes.

ACCESSORIES:—Waltham Clock.

DAGMAR

MODELS 6-60, 6-70 (1925)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY:—Prest-O-Lite, Type 615-RHK. 6 volt. Starting capacity is 135 amperes for 20 minutes. Lighting capacity is 5 amperes for 24 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model 2178. Distributor Model 5208. Breaker contacts separate .020-.025 inch. Resurface contacts with a fine flat jeweler's file or on a medium hard oilstone. Distributor is of the semi-automatic type. Manual advance is 30°. Automatic advance begins at 600 R.P.M. and reaches a maximum of 16-22° at 2000 R.P.M. The tension of the breaker arm spring is 16-20 ounces.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Wipe out the distributor head with a small bit of heavy grease and polish with a soft clean cloth. Place a small bit of heavy grease on the face of the breaker cam under the fiber bumper of the contact arm every 1000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

STARTER:—Model 181. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, looking at the commutator end. Starter brush tension should be 2¼-2¾ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	36
27 "	Lock	2.75	—

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless. Once each year saturate the wick in the oiler in the end of the Bendix housing with light engine oil.

GENERATOR:—Model 258. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, remove the commutator cover band and shift the third brush mounting plate by means of the lug or handle on the plate. Shifting the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. Generator brush tension is 1¼-1¾ pounds each.

Generator Data

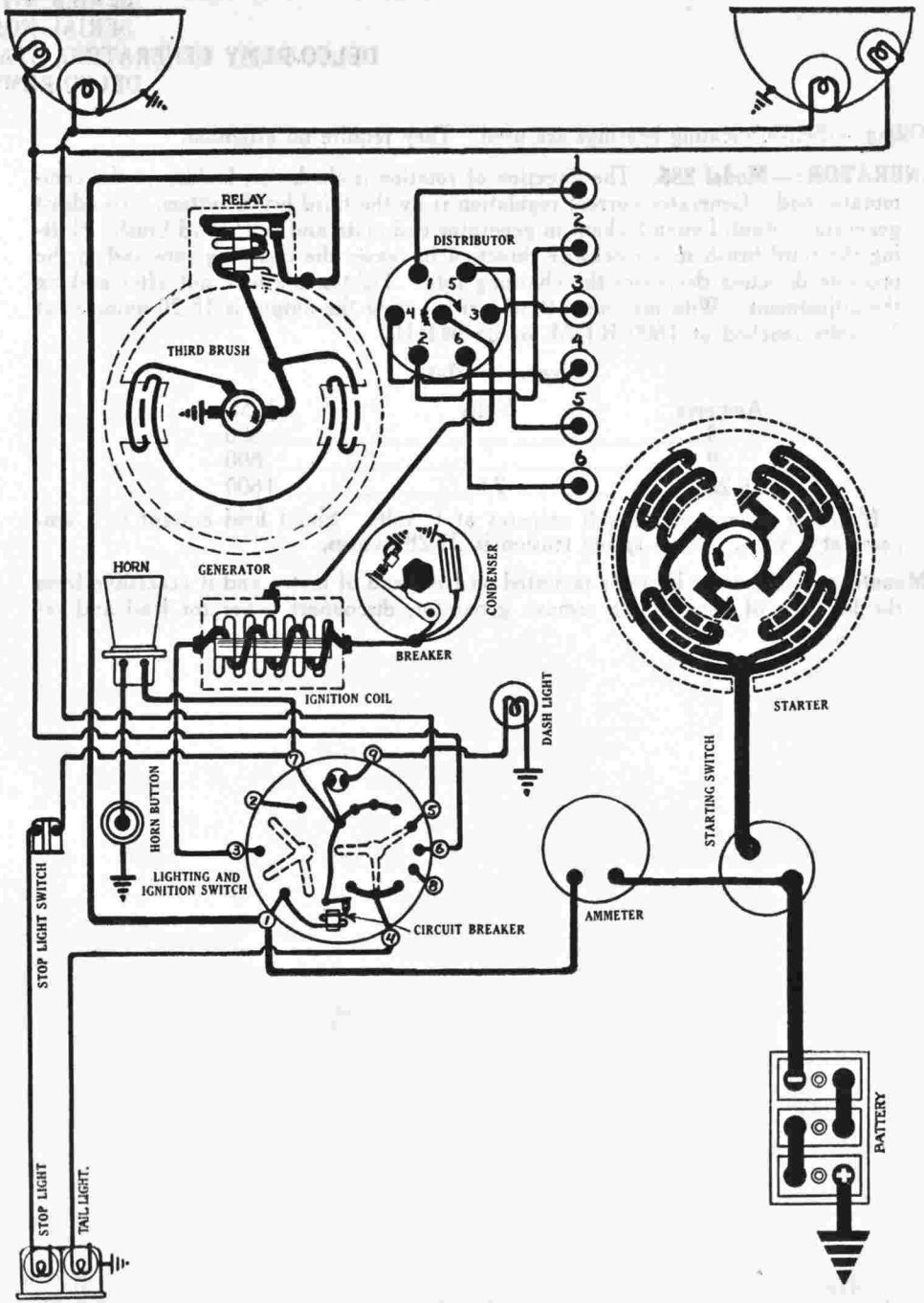
Amperes	R.P.M.
7	800
17	1600

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Relay is mounted on top of the generator. Relay contacts close when the voltage of the generator reaches 6.75-7.5 volts and open with a discharge current of 1-3 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .015-.020 inch, contacts closed.

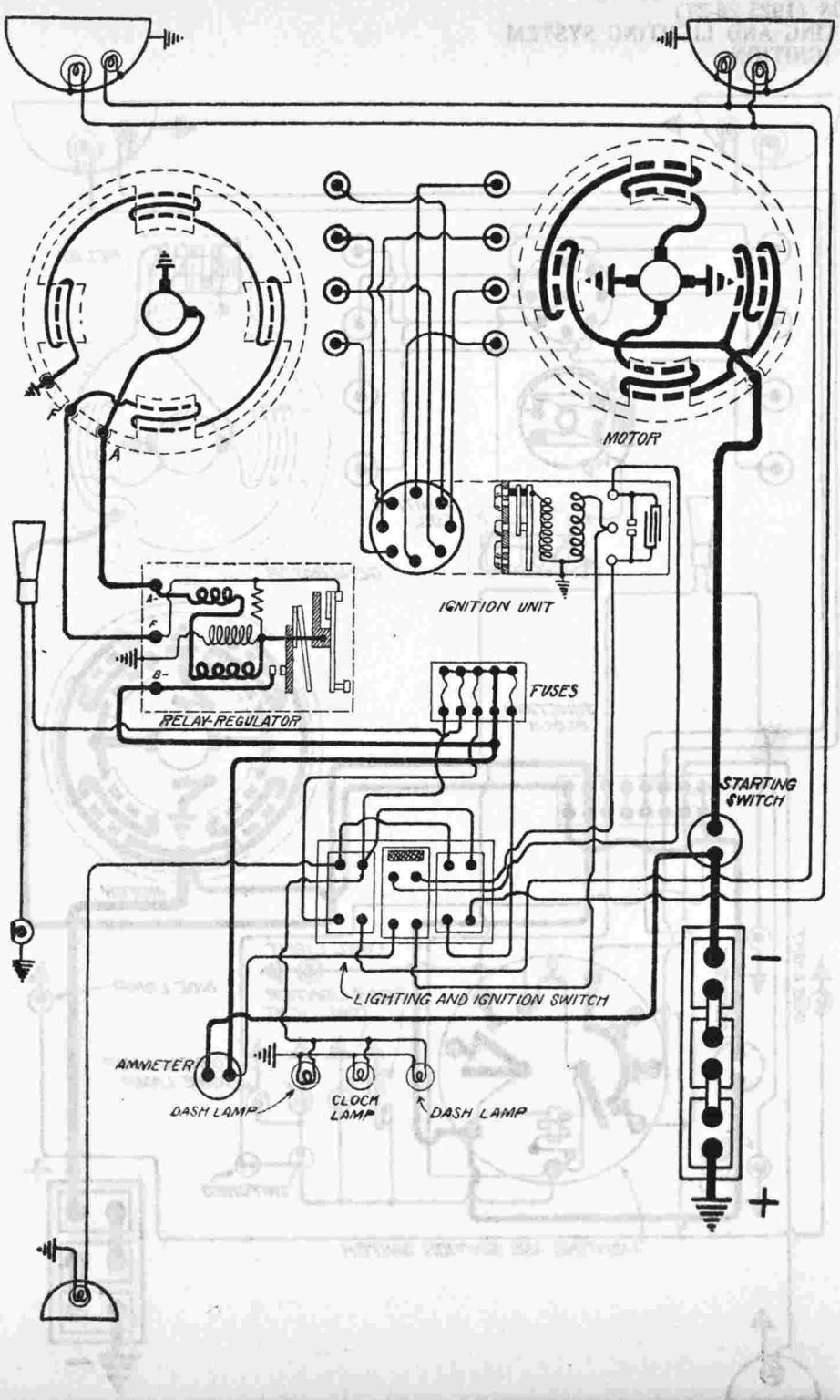
LIGHTING:—Switch Model 1260. Head and stop lamps are each 6-8 volt, 21 cp. S.C. Dimmer lamps are 6-8 volt, 2 cp. S.C. Dash and tail lamps are each 6-8 volt, 2 cp. S.C.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the back of the switch. A current of 25-30 amperes causes this device to operate. While vibrating the current is 10-15 amperes.



DANIELS
MODELS A AND B (1915-16-17)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WESTINGHOUSE IGNITION



BATTERY.—Willard, 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .008 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper. Adjust the distributor brush springs so that the brushes extend ¼ inch from their holders when the distributor cap is removed, retaining them, however so that they do not fall out. Brushes must move freely in their holders. See that the brushes on the top and bottom of the rotor are in place when installing the rotor.

OILING.—Put 2 or 3 drops of light engine oil in the oiler at the side of the ignition unit every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control advanced one-tenth.

BALLAST RESISTOR.—There is a ballast resistor in the ignition switch. In case it is necessary to operate the car with the ballast defective, a 5 ampere fuse may be used temporarily, but the ballast must be replaced as soon as possible, as continued operation without it will result in serious burning of the timer contacts.

FIRING ORDER.—The firing order is 1R, 1L, 3R, 3L, 4R, 4L, 2R, 2L.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Frame 751. Starter is connected to the engine through a Bendix drive.

Torque	R.P.M.	Amperes
2.5 lb. ft.	1450	140
5.0 lb. ft.	1150	200
10.0 lb. ft.	900	270
15.0 lb. ft.	560	460
21.0 lb. ft.	Lock	650

Frame No. 750. (Used during 1916-17-18)

Torque	R.P.M.	Amperes
3.5 lb. ft.	1050	———
17.5 lb. ft.	Lock	500

Oiling.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Frame 400-R. Generator voltage regulation is by vibrating regulator. Maximum charging rate is 15 amperes, decreasing to 4-6 amperes as battery becomes fully charged. Maximum current output is reached at 1400 R.P.M. of armature or 20 miles per hour. Charging rate is 12 amperes at 1200 R.P.M., with battery of 1250 solution.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY-REGULATOR.—Relay and regulator are combined into one unit. Relay closes at 550-600 R.P.M. of armature or 8-10 miles per hour, and opens at 500-550 R.P.M. of armature or 6-8 miles per hour. Charging current is .5 to 1 ampere at closing and the discharge current 1-3 amperes at opening of relay contacts. Relay is adjusted by bending the two brass prongs at the end of the moving member. To adjust regulator, connect a voltmeter between the "A" generator terminal and ground. Operate the generator at 1400 R.P.M., charging a battery of 1250 solution. Then adjust the regulator spring tension by means of the thumb screw, until the voltmeter indicates 6.8 volts and 15 amperes. To secure accurate setting connect a variable resistance in parallel with the battery. Air gap between the regulator armature (moving member) and coil core is .045 to .055 inch. Air gap between the relay armature and coil core is .055 to .060 inch. Center gap is .015 to .019 inch. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted resurface tungsten contacts on an oilstone, and the silver contacts with a scraper. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash, tail, clock and tonneau lamps are 6-8 volt, 2 cp. In 1916-17-18, head lamps were 6-8 volt, 18 cp. Dimmer. lamps were 6-8 volt, 2 cp.

FUSES.—Fuses are 15 ampere.

MODEL D-19 (1920-21-22)
MODELS 23-32, 23-38 (1923) 24-32, 24-38 (1924)
MODELS 25-32, 25-38 (1925-26-27)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY.—Willard, Type SJR-5. 6 volt, 135 ampere hour. Starting capacity is 145 amperes for 20 minutes. The lighting capacity is 5 amperes for 26 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2127. Distributor Model No. 5212. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel finishing on a hard oilstone. Manual advance is 18-22°. Automatic advance begins at 580 R.P.M. and reaches a maximum of 13-15° at 2400 R.P.M. The tension of breaker arm spring should be 16-20 ounces.

Mounting.—To remove distributor, disconnect manual advance rod and remove two hold down screws. Then lift distributor from place.

Oiling.—Put 4 or 5 drops of light engine oil in the upper ball bearing every two weeks. If the track of the rotor in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. Clean out and repack the distributor housing with soft cup grease every six months. This housing contains the automatic advance and retard mechanism.

Timing.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly one-third advanced.

Firing Order.—The firing order is 1L, 2R, 3L, 1R, 4L, 3R, 2L, 4R.

Spark Plugs.—Diameter 7/8 inch. Spark gaps are .031 inch.

STARTER.—Model No. 170. Starter is connected to the engine through a set of reduction gears meshed by the operator. The raising and lowering of the two grounded starter brushes serves as a starting switch. Lock torque is 27 lb. ft. at 2.75 volts. The starter running free takes 60 amperes at 6 volts. The direction of rotation is clockwise, looking at the commutator end. The tension of each of the stsarter brushes should be from 2¼ to 2¾ pounds.

Mounting.—To remove starter, remove starting pedal return spring and pedal rod. Then remove water pump. Remove motor hold down screws and lift from place.

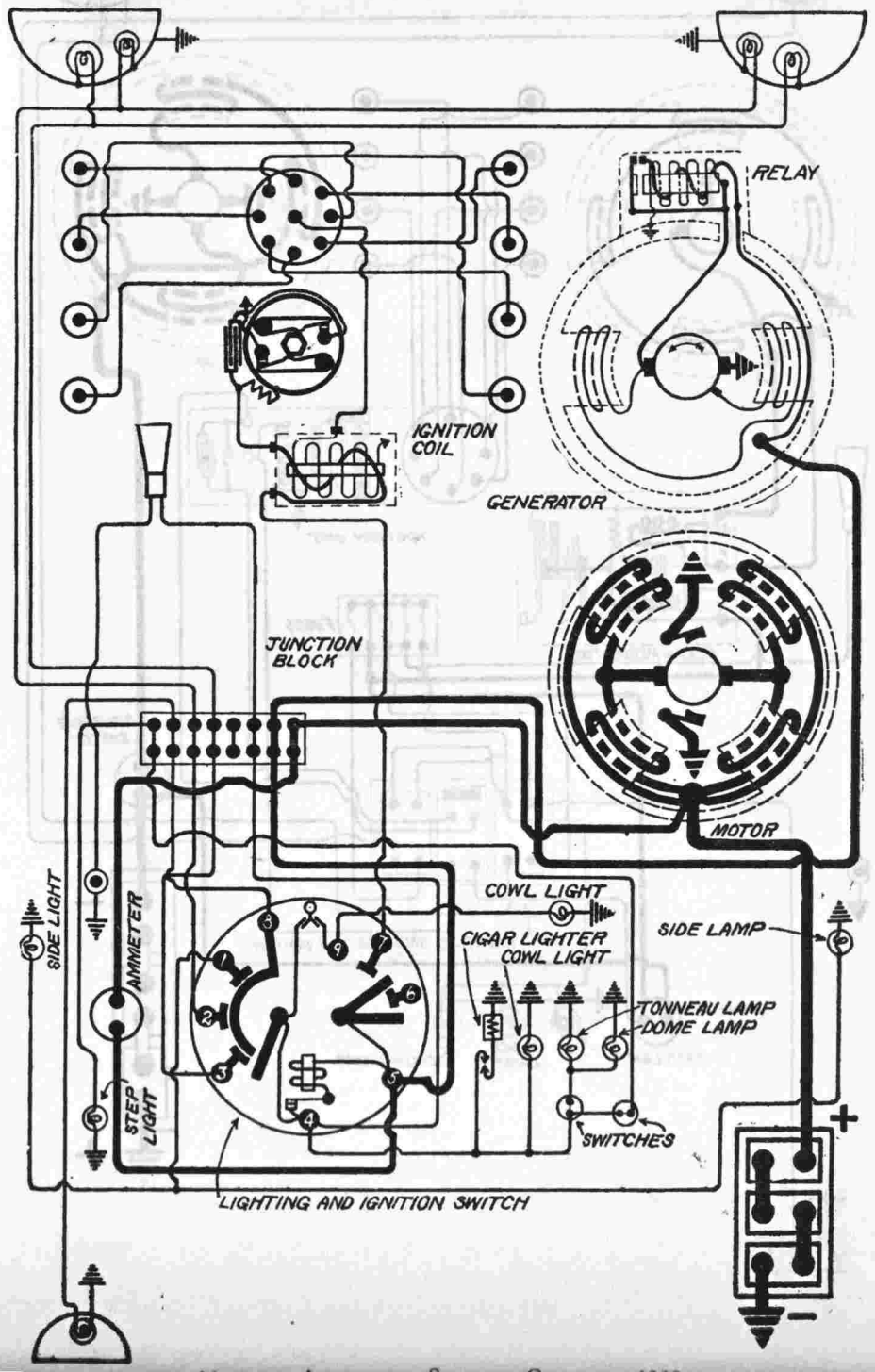
Oiling.—Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every 1000 miles or each month. Saturate the wick in the oiler at starter gear end of motor once each year. Remove grease plug and repack reduction gear housing with medium heavy cup grease once every six months. Disassemble motor clutch once each year and after cleaning it, repack with vaseline.

GENERATOR.—Model No. 169. Generator current regulation is by the third brush system. The direction of rotation is counter-clockwise, looking at the commutator end. The maximum charging rate is 20-22 amperes, reached at 1450 R.P.M. of the armature or approximately 20 M.P.H. To adjust the charging rate, loosen the three screws in the bearing retainer plate on the end of the generator and shift the third brush. Moving the third brush in the direction of rotation (counter-clockwise) increases the charging rate and in the opposite direction decreases the charging rate. After making the adjustment tighten the three screws.

Generator Data

Amperes	R.P.M.
0	600
12	1000
18-22	1450

The shuntfield current is 2 amperes at 6 volts. The tension of the generator brushes should be 1½-2 pounds each.



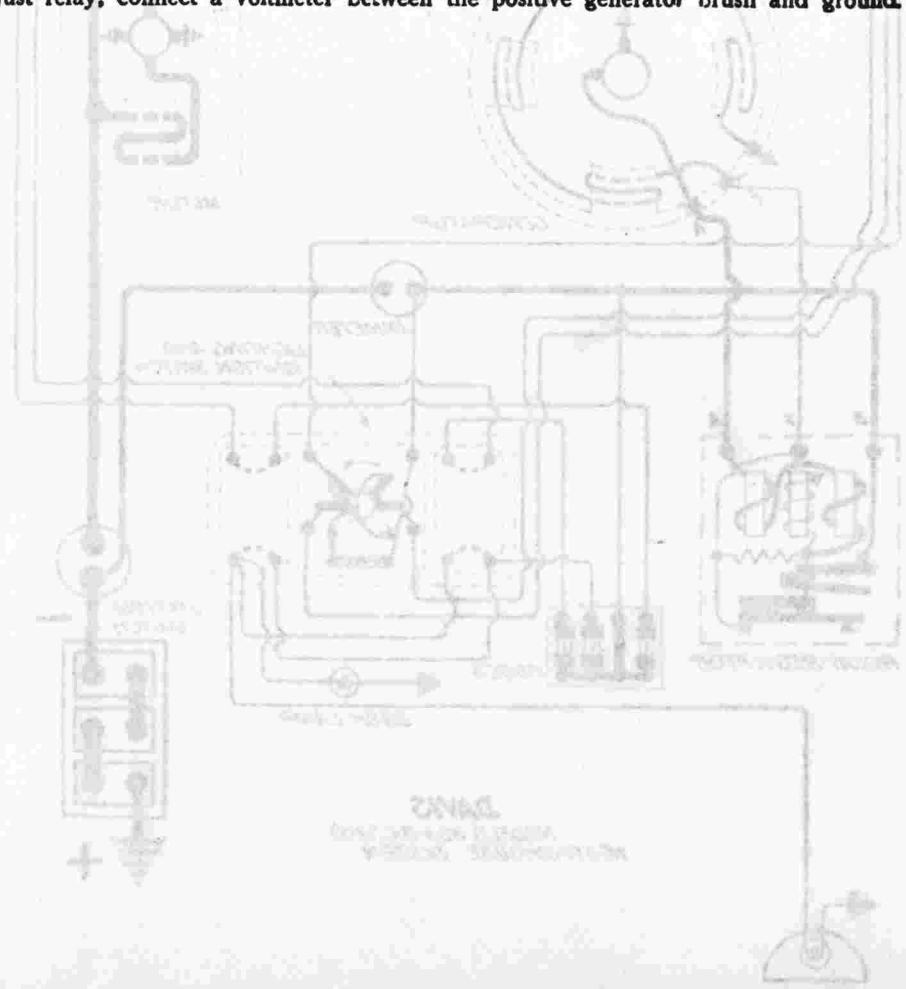
DANIELS

MODEL D-19 (1920-21-22)
MODELS 23-32, 23-38 (1923) 24-32, 24-38 (1924)
MODELS 25-32, 25-38 (1925-26-27)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

Mounting.—To remove generator, drain radiator and remove. Then jack up front end of engine and remove all engine bolts. Remove front gear cover and water pump. Then remove generator mounting studs and lift generator from place.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes at 8 miles per hour or 500-550 R.P.M. of the armature, and opens at 6 miles per hour or 450-500 R.P.M. of the armature. Relay contacts separate .046 to .062 inch. Air gap between relay armature (moving member) and coil core is .040 inch, contacts closed. To adjust relay, connect a voltmeter between the positive generator brush and ground. Then slowly speed up the generator and adjust the relay spring tension until the relay contacts close when the voltmeter indicates 7.5 volts. Clean the relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.



LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp. Dome lamp is 6-8 volt, 2 cp.

Switch.—Combination switch is Delco Model 1161.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start the vibrator. While vibrating the current is 10-15 amperes.

DAVIS

MODELS 38A, 38B AND 38C (1915)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM

WESTINGHOUSE IGNITION

BATTERY.—Battery is 6 volt, 85 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Vertical Type. Breaker contacts separate .006 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper. Adjust the distributor brush springs so that the brushes extend ¼ inch from their holders when the distributor cap is removed, retaining them, however so that they do not fall out. The brushes must move freely in their holders. See that the brushes on the top and bottom of the rotor are in place when installing the rotor.

OILING.—Put 3 or 4 drops of light engine oil in the oiler at the side of the ignition unit every month. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position. The breaker contacts are just beginning to separate when the end of the distributor rotor is directly opposite the V notch on the rim of the case.

BALLAST RESISTOR.—There is a ballast resistor in the ignition switch. In case it is necessary to operate the car with the ballast defective, a 5 ampere fuse may be used temporarily, but the ballast must be replaced as soon as possible, as continued opera-

FIRING ORDER.—The firing order is 1, 3, 4, 2.

tion without it will result in serious burning of the contacts.

comes fully charged. Maximum current output is reached at 1400 R.P.M. of arma-

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model No. 318. Starter is connected to the engine through a Bendix drive. Torque at 1400 R.P.M. is 2 pound-feet at 125 amperes. The lock torque is 11.5 pound-feet, current being 400 amperes.

OILING.—Refill starter oil wells with light engine oil every three months.

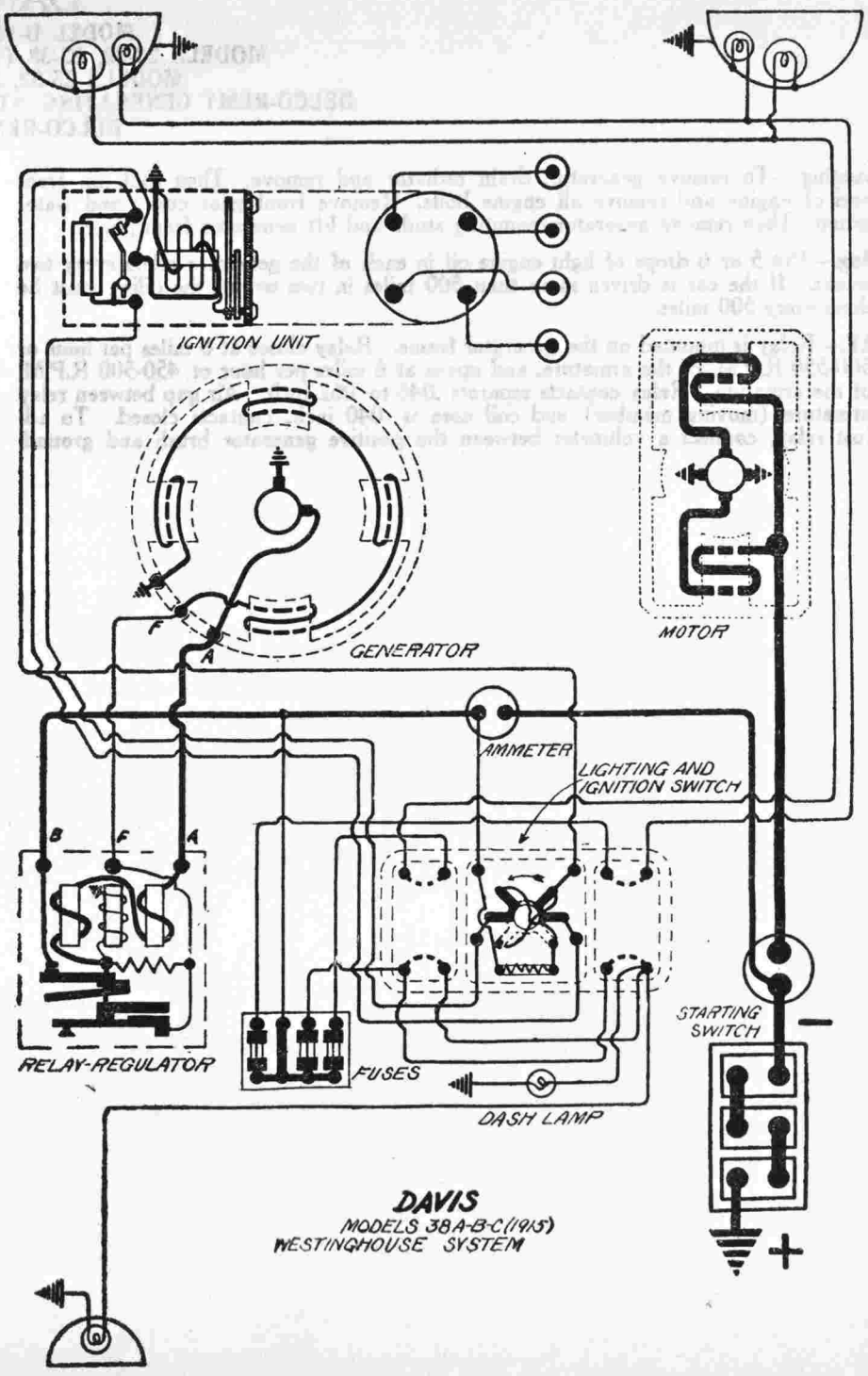
GENERATOR.—Frame 400-R. Generator voltage regulation is by vibrating regulator. Maximum charging rate is 15 amperes, decreasing to 4-6 amperes as battery be-

ture or 20 miles per hour.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

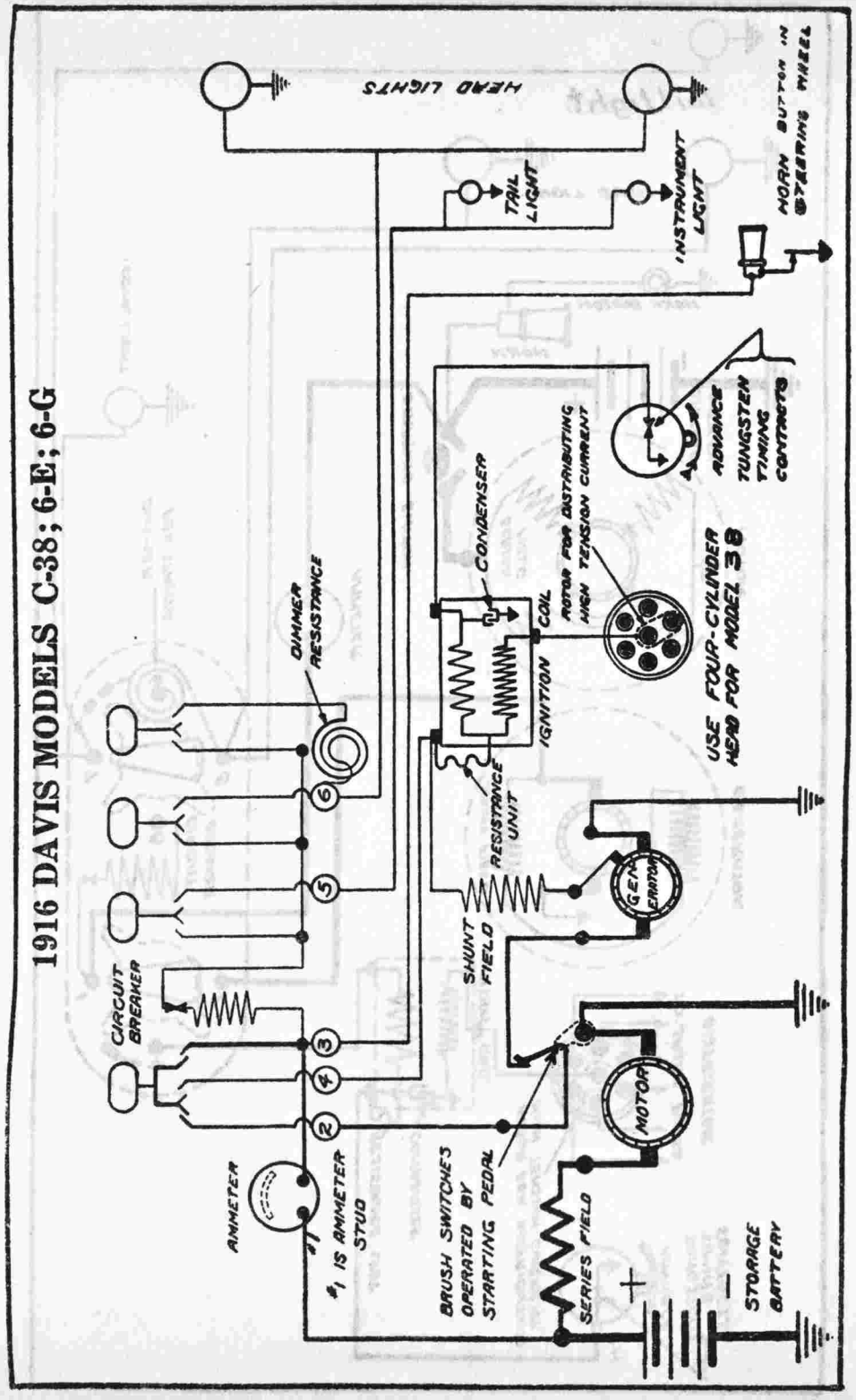
RELAY-REGULATOR.—Relay and regulator are combined into one unit. Relay closes at 550-600 R.P.M. of armature or 8-10 miles per hour, and opens at 500-550 R.P.M. of armature or 6-8 miles per hour. Charging current is .5 to 1 ampere at closing and the discharge current 1-3 amperes at opening of relay conacts. Relay is adjusted by bending the two brass prongs at the end of the moving member. To adjust regulator connect a voltmeter between the "A" generator terminal and ground. Operate the generator at 1400 R.P.M., charging a battery of 1.250 solution. Then adjust the regulator spring tension by means of the thumb screw, until the voltmeter indicates 6.8 volts and 15 amperes. Air gap between regulator armature (moving member) and coil core is .045 to .055 inch. Air gap between relay armature and coil core is .055 to .060 inch. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.



DAVIS

MODELS 38-D, 38-E, 6-E, 6-F, 6-G (1916)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION



Battery.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Timing.—Breaker contacts begin to separate when the top dead center mark on flywheel is at indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .027 to .030 inch.

Oiling.—Put 4 or 5 drops of light engine oil in timer bearing oiler every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Starter.—Starter is connected to engine through a set of reduction gears meshed by the operator. Two overrunning clutches are provided. In connection with the ignition switch a circuit is closed allowing current to flow through the generator windings causing the armature to revolve slowly, aiding the meshing of the reduction gears. One clutch permits this rotation, and also permits a relatively high speed of the armature, necessary when operating as a starter. The second overrunning clutch prevents the engine driving the armature through the reduction gears. Depressing the starting pedal meshes the reduction gears, opens the generator circuit and allows the motor brush to come in contact with the commutator, closing the starter circuit and cranking the engine. When the pedal is released, a spring reverses these operations.

Generator.—Generator current regulation is by third brush system. Generator begins to supply current at 8 miles per hour or 400-450 R. P. M. of armature. Maximum charging rate of 16-20 amperes is reached at 20-25 miles per hour.

GENERATOR DATA, MOTOR-GENERATOR MODELS 73, 81 AND 83

Amperes	R. P. M.
Neutral	400
6-10	600
16-20	1000
10-15	1500
9-13	1800

When operating freely as a motor, clutch at driving end the only retarding force, generator takes 4.5 amperes.

Oiling.—Put several drops of light engine oil in rear starter-generator bearing oiler every two weeks. At the same time fill the front oiler. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles. Refill grease cup at end of idler reduction gear shaft with soft cup grease and turn down every month.

Relay.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch. The overrunning clutch at driving end allows generator to operate as a motor when battery's pressure is above that of generator. If engine is killed when stopping the noise made by the clutch serves to attract the operator's attention to open the ignition switch. The opening and closing of the generator-battery circuit by the operator takes the place of the relay.

Lamps.—Head lamps are 6-8 volt, 18 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

Circuit Breaker.—A vibrating type circuit breaker takes the place of fuses. It takes 25 amperes to start this device vibrating, but when vibrating 3 to 5 amperes will cause it to continue.

Model Numbers.—Motor-generator is Model No. 73, 81 or 83. Ignition coil is Mode No. 2120, 2124, 2125, 2140 or 2141. Combination switch is Model No. 1058 or 1067

Davis

Models 6H, 6I and 6K (1917) (Serial Nos. 17624 to 64199)
Delco Generating, Starting and Lighting System
Delco Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded

Ignition.—Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Put 5 or 6 drops of light engine oil in the oiler on the side of distributor housing every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles. If the track of the distributor rotor buttor is not well polished, apply a very small amount of vaseline with a soft cloth.

Timing.—Breaker contacts should separate when dead center mark on flywheel is 1½ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .030 inch.

Starter.—Starter is connected to the engine through a Bendix drive. Operating freely starter takes 40 amperes. The lock torque is 16 pound-feet with 3.5 to 3.8 volts.

Oiling.—Starter bearings are of the oilless type.

Generator.—Generator current regulation is by third brush system.

GENERATOR DATA, NO. 105

Warm—Amperes	R. P. M.	Cold—Amperes	R. P. M.
Neutral	500	Neutral	500
10-12	900	10.5-12.5	900
14-16	1400	15.5-18.0	1400
11-13	2000	13.0-17.0	2000

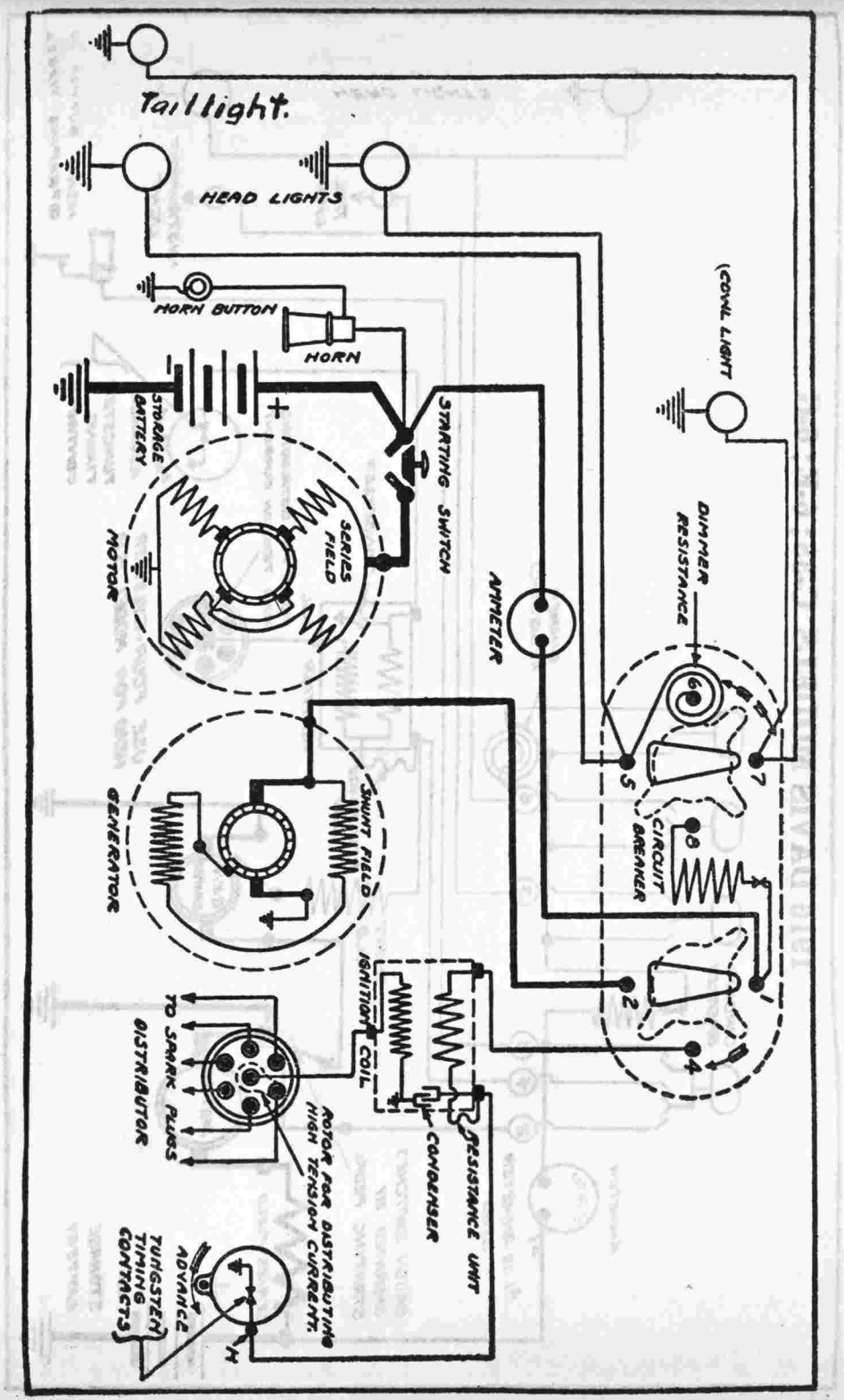
Generator begins to supply current at 7-8 miles per hour and reaches its maximum output at 20-22 miles per hour. To increase the charging rate move the third brush in a counter-clockwise direction (looking at commutator end) and in a clockwise direction to decrease the charging rate.

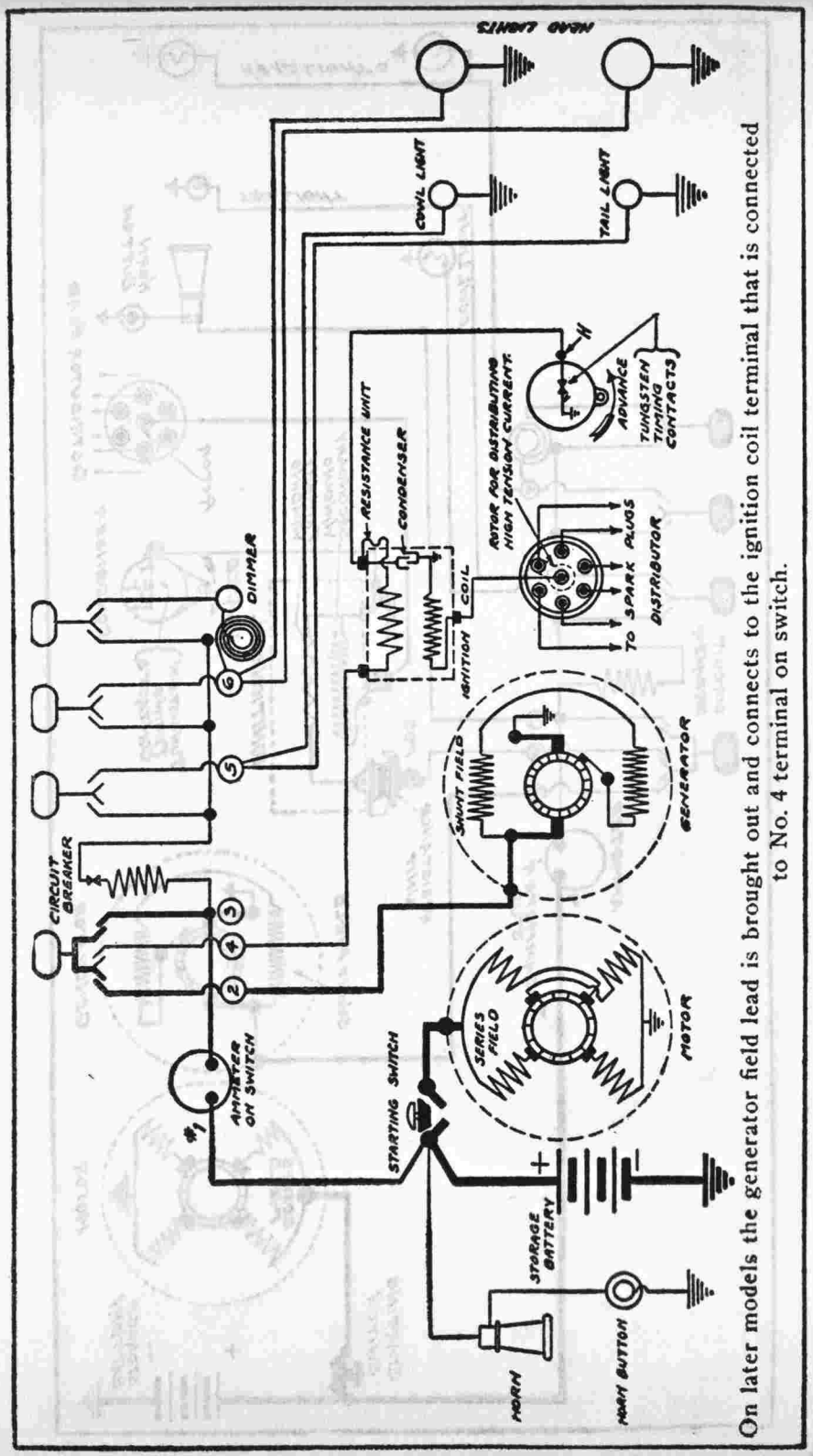
Oiling.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch. The overrunning clucth at driving end allows generator to operate as a motor when battery's pressure is above that of generator. The noise made by the clutch serves to attract the operator's attention to open the ignition switch. The opening and closing of the generator-battery circuit by the operator, takes the place of the relay

Lamps.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are each 6-8 volt, 2 cp.

Model Numbers.—Generator is No. 105. Starter is No. 106. Ignition coil is No. 2139. Combination switch is 1078





Davis

Model 6-J (1917) Serial Nos. 14500 to 24050
Delco Generating, Starting and Lighting System
Delco Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Put 5 or 6 drops of light engine oil in the oiler on the side of distributor housing every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles If the track of the distributor rotor button is not well polished, apply a very small amount of vaseline with a soft cloth.

Timing.—Breaker contacts begin to separate when dead center mark on flywheel is 1½ inches past the indicator, spark control lever and breaker assmebly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .030 inch.

Starter.—Starter is connected to the engine through a Bendix drive. Operating freely, starter takes 40 amperes. The lock torque is 16 pound-feet at 3.5 to 3.8 volts.

Oiling.—Starter bearings are of the oilless type.

Generator.—Generator current regulation is by third brush system.

GENERATOR DATA, No. 114

Warm—Amperes	R. P. M.	Cold—Amperes	R. P. M.
Neutral	500	Neutral	500
10-12	900	10.5-12.5	900
14-16	1400	15.5-18.0	1400
11-13	2000	13.0-17.0	2000

Generator begins to supply current at 7-8 miles per hour and reaches its maximum output at 20-22 miles per hour. To increase the charging rate move the third brush in a counter-clockwise direction (looking at commutator end) and in a clockwise direction, to increase the charging rate.

Oiling.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch. The overrunning clutch at driving end allows generator to operate as a motor when battery's pressure is above that of generator. The noise made by the clutch serves to attract the operator's attention to open the ignition switch. The opening and closing of the generator-battery circuit by the operator, takes the place of the relay.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are each 6-8 volt, 2 cp

Model Numbers.—Generator is No. 114 Starter is No. 102. Ignition coil is No. 2139 Combination swtich is No. 1067.

Davis

Model 6-J (1918)

Delco Generating, Starting and Lighting System

Delco Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Coil, Model No. 2159. Distributor, No. 5157. Breaker contacts begin to separate when the top dead center mark on the flywheel is 1¾ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .027 inch to .030 inch.

Oiling.—Put 3 or 4 drops of light engine oil in timer bearing every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Starter—Model No. 136. Starter is connected to engine through a Bendix drive.. When operating freely, starter current is 35 amperes, armature revolving at 4500 R. P. M.

Generator.—Model No. 135. Generator current regulation is by third brush system. Generator begins to supply current at 8-10 miles per hour, or 500-550 R. P. M., of armature. Maximum charging rate of 16-18 amperes is reached at 20-25 miles per hour.

GENERATOR DATA, MODEL 135

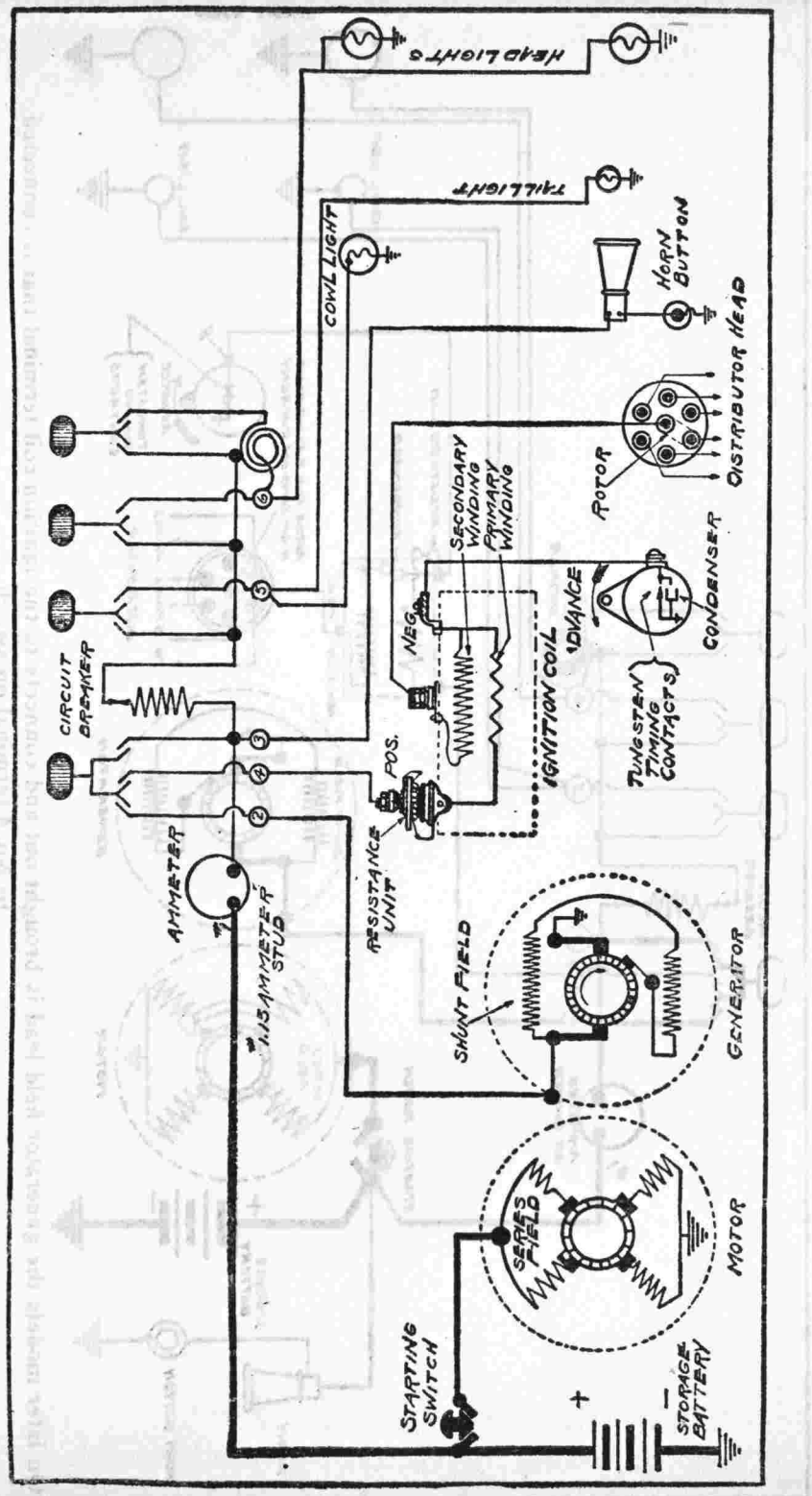
Amperes	R. P. M.	Amperes	R. P. M.
Neutral	500	Neutral	500
10-12	900	10.5-12.5	900
14-16	1400	15.5-18	1400
11-13	2000	13.0-17	2000

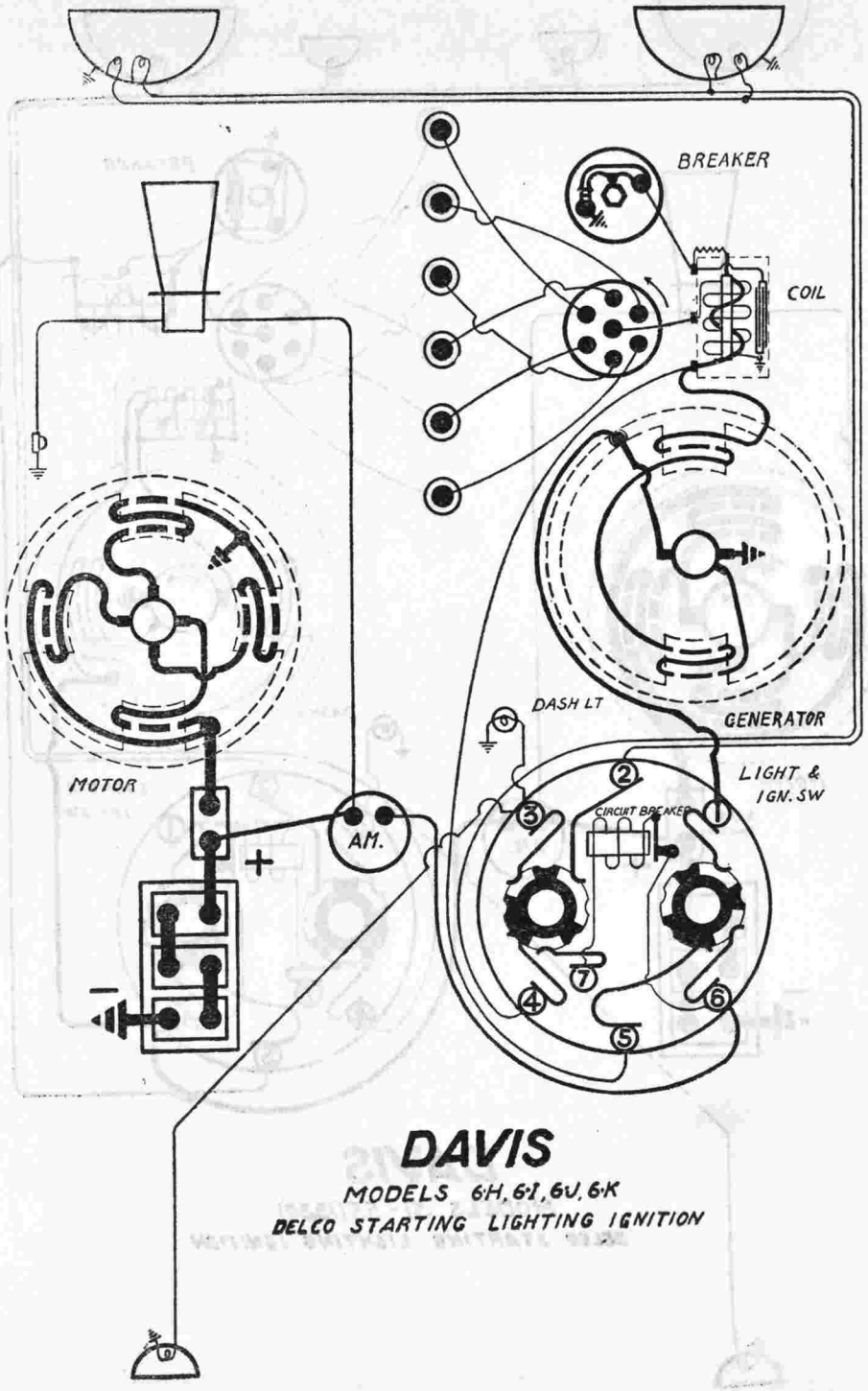
Oiling.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Relay.—There is no relay. The circuit between generator and battery is controlled by the ignition switch. The overrunning clutch at driving end allows generator to operate as a motor when battery's pressure is above that of generator. The noise made by the clutch serves to attract the operator's attention to open the ignition switch. The opening and closing of the generator-battery circuit by the operator takes the place of the relay.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dash lamp is 6-8 volt, 4 cp. Tail lamp is 6-8 volt, 4 cp.

Circuit-Breaker.—A vibrating type circuit breaker takes the place of fuses. It takes 25 amperes to start this device vibrating, but when vibrating, 3 to 5 amperes will cause it to continue.





DAVIS

MODELS 6H, 6I, 6J, 6K

DELCO STARTING LIGHTING IGNITION

DAVIS

MODELS 6H, 6I, 6J AND 6K (1919)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Distributor bearings are of the oilless type. If the track of the rotor button in the distributor head is not well polished apply a small amount of vaseline with a soft cloth.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control one-third advanced.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model No. 106. Starter is connected to the engine through a Bendix drive. Lock torque is 16 pound-feet. Running freely, starter takes 40 amperes.

OILING.—Starter bearings are of the oilless type.

GENERATOR.—Model No. 105. Generator current regulation is by the third brush system. Generator begins to supply current at 500 R.P.M. of the armature or 7-8 miles per hour, and reaches its maximum current output at 1400 R.P.M. of armature or 18-25 miles per hour.

Generator Data

Cold Test		Hot Test	
Neutral	500	Neutral	500
10.5-12.5	900	10-12	900
15.5-18.0	1400	14-16	1400
13.0-17.0	2000	11-13	2000

To vary charging rate loosen the two screws which hold the third brush arm. Move the third brush to the right (facing commutator end) to increase the charging rate. Tighten the two screws and reseat the brush after adjusting position. Maximum current output must not exceed 20 amperes.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch.

LAMPS.—The head lamps are 6-8 volt, 15 cp. Dash and tail lamps are 6-8 volt, 4 cp.

CIRCUIT-BREAKER.—A vibrating circuit-breaker takes the place of fuses. It requires a current of 25 amperes to start this device vibrating. While vibrating, the current is 3-5 amperes.

DAVIS

MODELS 51-55 (1920). SERIAL NOS. 6501 UP
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SJWN-3, 6 volt, 80 ampere-hour. The negative (—) termina. is grounded.

IGNITION:—Coil Model No. 2159. Distributor Model No. 5207. Breaker contacts separate .018 inch. They are made of platinum. When the condition of the contacts affects the ignition, remove and resurface wtih fine emery cloth or against the flat side of an emery wheel, finishing on a hard oilstone.

Oiling:—Put 3 or 4 drops of light engine oil in the ignition unit oilers every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing:—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1⅜ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plug Gaps:—Spark plug gaps are .030 inch.

STARTER:—Model 164. Starter is connected to the engine through a Bendix drive. Lock torque is 28 pound-feet at 4 volts, the current being 525 amperes.

Oiling:—Put 4 or 5 drops of light engine oil in the starter oilers every month. Remove the grease plug and inject soft cup grease every six months.

GENERATOR:—Model No. 165. Rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Maximum charging rate is 11-15 amperes, reached at 1200 R.P.M. of the armature, or 16-20 miles per hour.

Generator Data

Amperes	R.P.M.
Neutral	500
4	800
8	1000
11-15	1200
11-14	2000

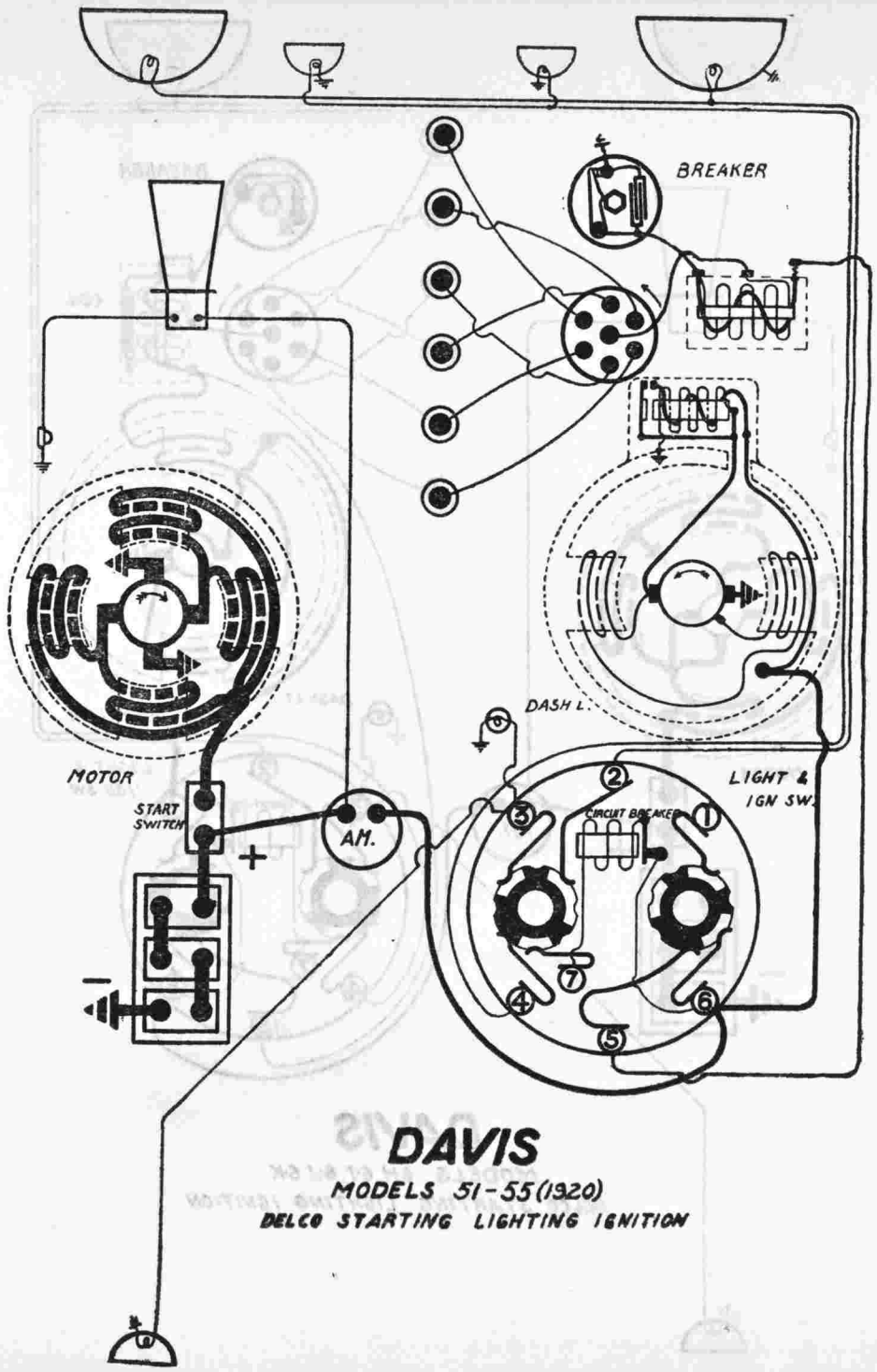
Charging rate is varied by adjustment of the third brush setting. To move the third brush, loosen the three screws holding the bearing retainer plate on the commutator end and shift the plate. Move in a counter-clockwise direction to increase the charging rate, or in the opposite direction to decrease the charging rate. Tighten the adjusting screws and reseat the brush after making the adjustment. Maximum charging rate must not exceed 16 amperes.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

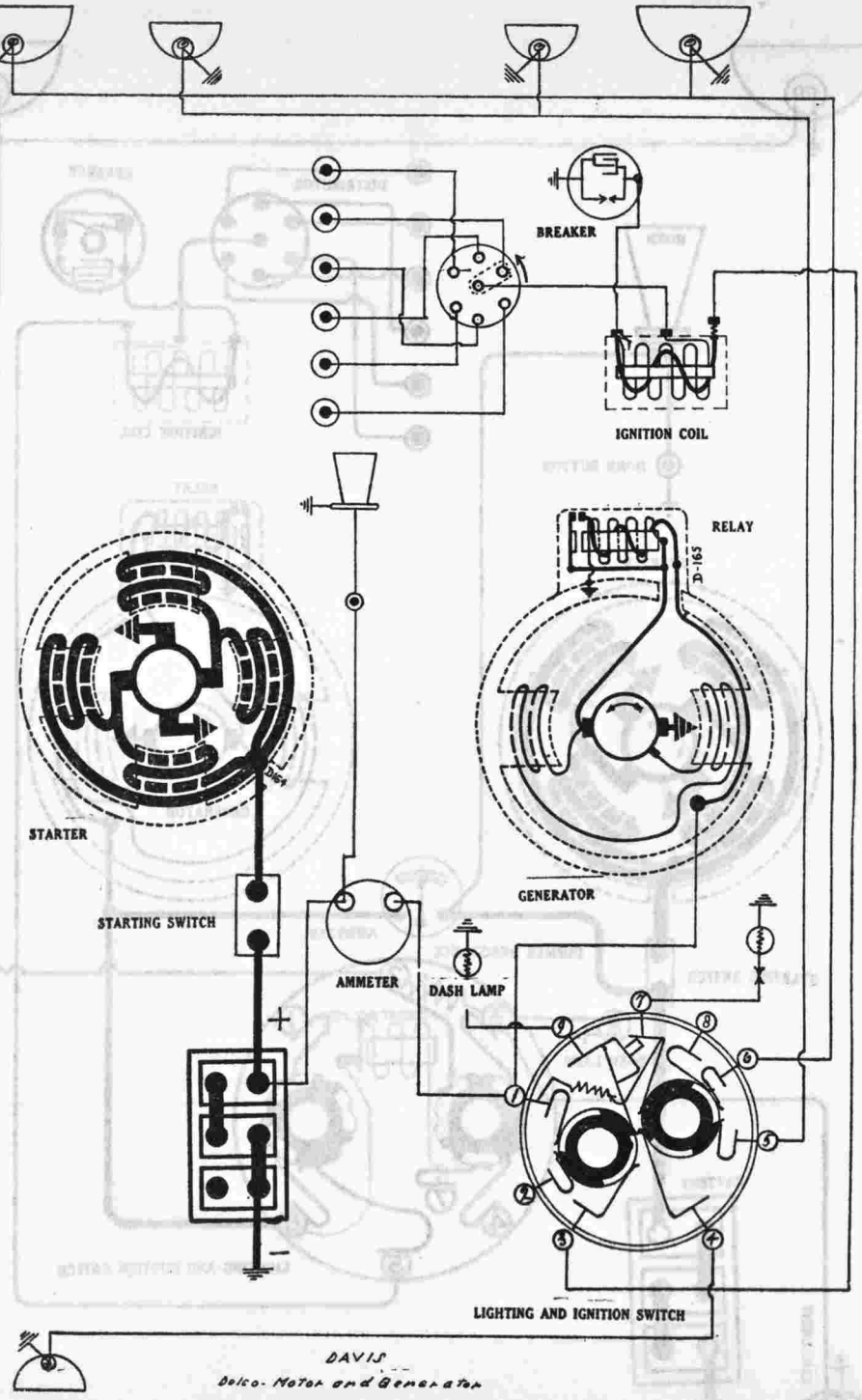
RELAY:—Relay is mounted on the generator frame. Relay closes at 550-600 R.P.M. of the armature or 7-8 miles per hour, and opens at 500-550 R.P.M. of the armature or 5-6 miles per hour. Relay contacts separate .046 to .062 inch. Air gap between relay armature and coil core is .020 to .035 inch, contacts closed. To adjust relay, connect a voltmeter between the positive (+) generator brush and the ground. Then slowly speed up the generator and adjust the relay spring tension by turning the thumb nut, until the contacts close when the voltmeter indicates 7.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS:—Head lamps are 6-8 volt, 24 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

CIRCUIT BREAKER:—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start the vibrator, but 3.5 amperes will cause it to continue.



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DAVIS

MODELS 51 TO 57 (1921) AND 61 TO 67 (1922)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—(1922) Prest-O-Lite, (1921) Willard Type SJWN-3. 6 volt 80 ampere hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2159. Distributor Model No. 5207. Breaker contacts separate .018 inch. They are made of platinum. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oilstone.

Oiling.—Put 3 or 4 drops of light engine oil in the ignition unit oilers every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1 3/8 inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .030 inch.

STARTER:—Models 164 and 181. Starter is connected to the engine through a Bendix drive. Lock torque is 28 pound-feet at 4 volts, the current being 525 amperes.

Oiling.—Put 4 or 5 drops of light engine oil in the starter oilers every month. Remove the grease plug and inject soft cup grease every six months.

GENERATOR.—Model No. 165. Rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Maximum charging rate is 11-15 amperes, reached at 1200 R.P.M. of the armature, or 16-20 miles per hour.

Generator Data

Amperes	R.P.M.
Neutral	500
4	800
8	1000
11-15	1200
11-14	2000

Charging rate is varied by adjustment of the third brush setting. To move the third brush, loosen the three screws holding the bearing retainer plate on the commutator end and shift the plate. Move in a counter-clockwise direction to increase the charging rate, or in the opposite direction to decrease the charging rate. Tighten the adjusting screws and reseat the brush after making the adjustment. Maximum charging rate must not exceed 16 amperes.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers ever two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes at 550-600 R.P.M. of the armature or 7-8 miles per hour, and opens at 500-550 R. P. M. of the armature or 5-6 miles per hour. Relay contacts separate .046 to .062 inch. Air gap between relay armature and coil core is .020 to .035 inch, contacts closed. To adjust relay, connect a voltmeter between the positive (+) generator brush and the ground. Then slowly speed up the generator and adjust the relay spring tension by turning the thum nut, until the contacts close when the voltmeter indicates 7.5 volts. Clean relay contacts by drawing unglazed peper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 24 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp. On the models 51 to 57, head lamps are 6-8 volt, 24 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start the vibrator, but 3.5 amperes will cause it to continue.

DAVIS

MODELS 71, 72 (1922-23)
6-Y CONTINENTAL ENGINE
DELCO GENERATING, STARTING, AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SJR-3, 6 volts, 80 ampere-hour capacity. The negative (—) terminal is grounded.

IGNITION.—Ignition Coil Model No. 2159. Breaker contacts separate .020-.0275 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone.

Oiling.—Put 8 or 10 drops of light engine oil into distributor oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles. Apply a very small amount of vaseline or soft cup grease to the surface of the breaker cam each 2000 miles. Apply a very small amount of vaseline to rotor track in distributor occassionally during the first 2000 miles. The track will then become glazed and no further lubrication is required. It is only necessary to keep the track wiped with a clean cloth. Repack distributor housing with soft cup grease up to the advance ring and yoke once every season.

Timing.—Breaker contacts just begin to separate when piston No. 1 is at top dead center, on compression stroke, indicated by marking "UD" on the flywheel, at indicator on flywheel housing, spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug.—The spark plug diameters are 7/8 inch, and the spark plug gaps are .025-.030 inch.

STARTER.—Motor Model No. 240. The starter is connected to the engine by a Bendix Drive. The direction of rotation is counter-clockwise, looking at commutator end. Lock torque is 15 pounds-feet, taking a current of 450-550 amperes, at 3-4 volts.

Oiling.—Put 8 or 10 drops of light engine oil into each starter oiler every month. Saturate the wick in the oiler on the Bendix gear case with light engine oil once each year. Remove grease plug and fill reduction gear case with medium heavy cup grease twice each year.

GENERATOR.—Model No. 241.....The direction of rotation is counter-clockwise, looking at commutator end. The maximum charging rate is 14-16 amperes reached at 1600 R.P.M. of armature. The third brush system is used for current regulation. To adjust the output of the generator, remove the cover band over the generator brushes. Loosen one or two turns of the three clamping screws located on the brush plate and move the third brush in the direction of rotation (counter-clockwise) to increase the charging rate, and move third brush in the opposite (clockwise) direction to decrease the charging rate.

Generator Test Data

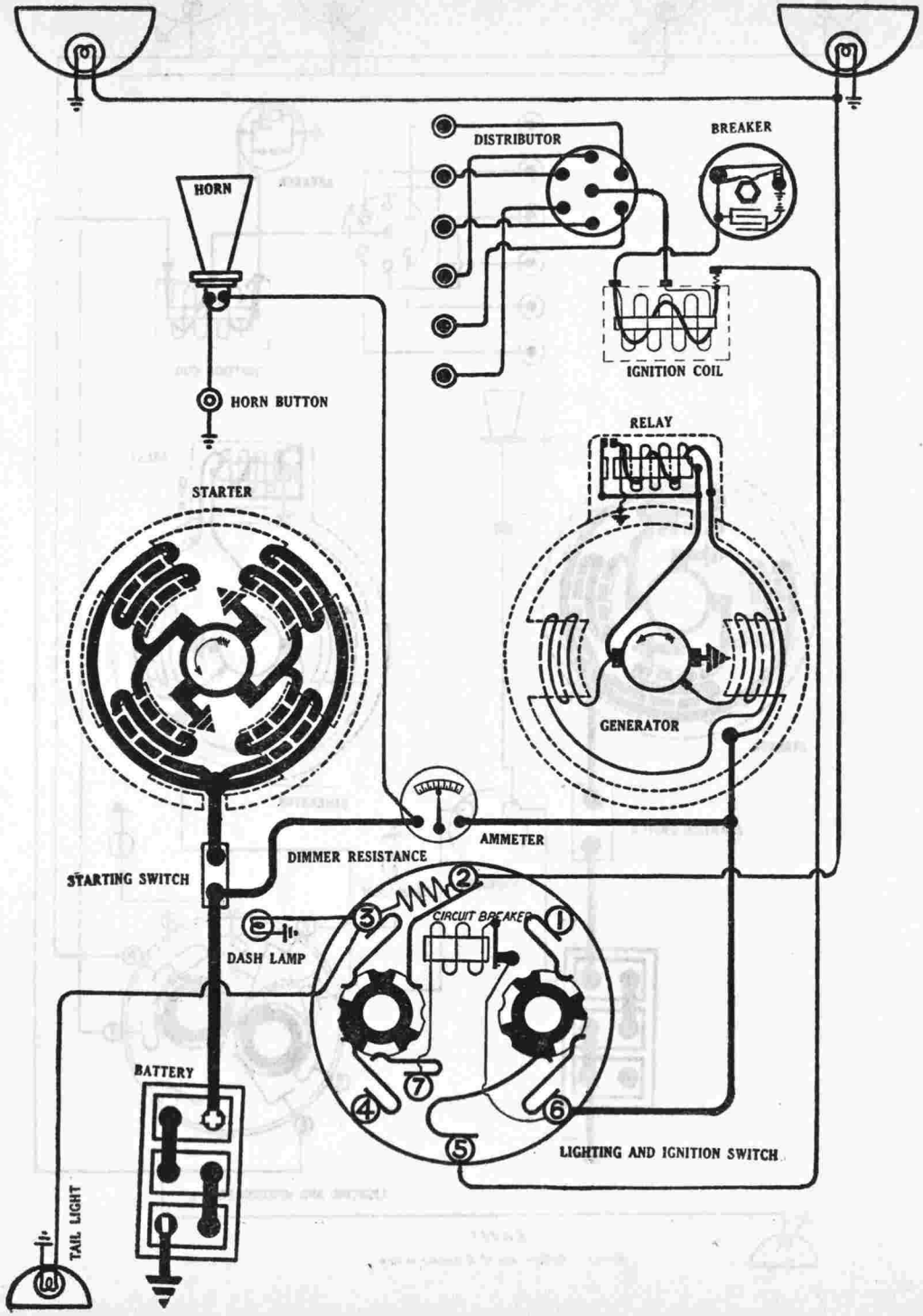
Amperes	R.P.M.
5	700
11	1000
14-16 (Max)	1600
15	1800

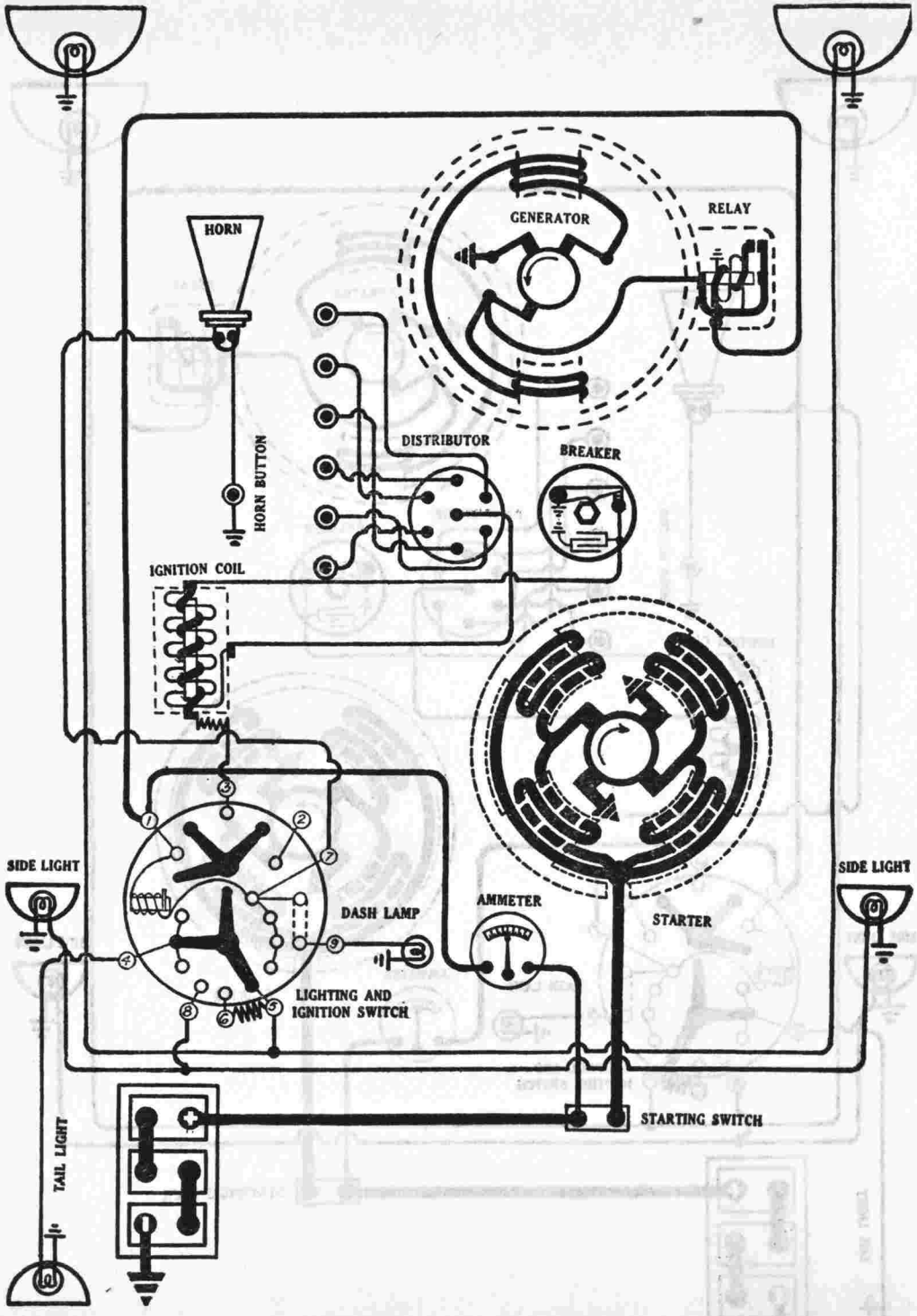
Oiling.—Put 8 or 10 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Relay contact closes at 7-8 volts, or 8-10 M.P.H. and opens at 6-7 M.P.H. with a discharge of three amperes. Contact gap is .025-.035 inch, and the air gap between relay armature and coil core is .025-.035 inch.

LIGHTING.—Delco Combination Switch No. 1172 is used. Head lights are each 6-8 volts, 21 cp. Dash and tail lights are each 6-8 volts, 2cp. All lights are of the single contact type.

CIRCUIT BREAKER.—A circuit breaker is used in place of fuses. Circuit breaker begins to vibrate with a current flow of 25-30 amperes. It will continue to vibrate with a current flow not exceeding 15 amperes. Also not over 15 amperes must pass with a dead short circuit across the circuit-breaker terminals.





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MODEL 71 (1923-24), 90 (1925-26)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Willard, Type SJR-3. 6 volts, 80 ampere-hour capacity. The negative (—) terminal is grounded.

IGNITION:—Ignition Coil Model No. 2178. Breaker contacts separate .020-.0275 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone.

Oiling:—Put 8 or 10 drops of light engine oil into distributor oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles. Apply a very small amount of vasetline or soft cup grease to the surface of the breaker cam each 2000 miles. Apply a very small amount of vaseline to rotor track in distributor occasionally during the first 2000 miles. The track will then become glazed and no further lubrication is required. It is only necessary to keep the track wiped with a clean cloth. Repack distributor housing with soft cup grease up to the advance ring and yoke once every season.

Timing:—Breaker contacts just begin to separate when piston No. 1 is at top dead center, on compression stroke, indicated by marking "UD" on the flywheel, at indicator on flywheel housing, spark control lever and breaker assembly fully retarded.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—The spark plug diameters are 7/8 inch, and the spark plug gaps are .025-.030 inch.

STARTER:—Motor Model No. 240. The starter is connected to the engine by a Bendix drive. The direction of rotation is counter-clockwise, looking at commutator end. Lock torque is 15 pounds-feet, taking a current of 450-550 amperes, at 3-4 volts.

Oiling:—Put 8 or 10 drops of light engine oil into each starter oiler every month. Saturate the wick in the oiler on the Bendix gear case with light engine oil once each year. Remove grease plug and fill reducton gear case with medium heavy cup grease twice each year.

GENERATOR—Model No. 257. The direction of rotation is counter-clockwise, looking at commutator end. The maximum charging rate is 14-16 amperes, reached at 1600 R.P.M. of armature. The third brush system is used for current regulation.

Generator Test Data

Amperes	R.P.M.
5	700
11	1000
14-16 (Max)	1600
15	1800

To adjust the charging rate, remove the cover band and move the third brush mounting plate by means of an extension handle. Shift the third brush in a counter-clockwise direction (direction of rotation) to increase the charging rate, and in the opposite (clockwise) direction to decrease the charging rate. The plate can be held in any position desired by means of friction clamps.

Oiling:—Put 8 or 10 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY:—Relay contact closes at 7-8 volts, or 8-10 M.P.H. and opens at 6-7 M.P.H. with a discharge of 3 amperes. Contact gap is .025-.035 inch, and the air gap between relay armature and coil core is .025-.035 inch.

LIGHTING:—Combination Switch Model No. 1244. The headlights are each 6-8 volts, 21 cp. Dash and tail lights are each 6-8 volts, 2 cp. All lights are of the single contact type.

CIRCUIT BREAKER:—A circuit breaker is used in place of fuses. Circuit breaker begins to vibrate with a current flow of 25-30 amperes. It will continue to vibrate with a current flow not exceeding 15 amperes. Also not over 15 amperes must pass with a dead short circuit across the circuit-breaker terminals.

DAVIS

MODEL 81 (1924), 91 (1925-26)
8R CONTINENTAL ENGINE
DELCO IGNITION

BATTERY:—Willard, Type SJR-3. 6 volts, 80 ampere-hour capacity. The negative (—) terminal is grounded.

IGNITION:—Ignition Coil Model No. 2178. Breaker contacts separate .020-.0275 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone.

Oiling:—Put 8 or 10 drops of light engine oil into distributor oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles. Apply a very small amount of vaseline or soft cup grease to the surface of the breaker cam each 2000 miles. Apply a very small amount of vaseline to rotor track in distributor occasionally during the first 2000 miles. The track will then become glazed and no further lubrication is required. It is only necessary to keep the track wiped with a clean cloth. Repack distributor housing with soft cup grease up to the advance ring and yoke once every season.

Timing:—Breaker contacts just begin to separate when piston No. 1 is at top dead center, on compression stroke, indicated by marking "UD" on the flywheel, at indicator on flywheel housing, spark control lever and breaker assembly fully retarded.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plug:—The spark plug diameters are 7/8 inch, and the spark plug gaps are .025-.030 inch.

STARTER.—Model No. 181. The starter is connected to the engine by a Bendix The direction of rotation is clockwise, looking at the commutator end. Lock torque is 27 lb. ft. at 2.75 volts. The starter running free takes 36 amperes at 6 volts. The brush tension should be 2¼ to 2¾ pounds on each brush.

Oiling:—Put 8 or 10 drops of light engine oil into each starter oiler every month. Saturate the wick in the oiler on the Bendix gear case with light engine oil once each year. Remove grease plug and fill reduction gear case with medium heavy cup grease twice each year.

GENERATOR:—Model No. 258. The direction of rotation is counter-clockwise, looking at commutator end. The maximum charging rate is 14-16 amperes, reached at 1600 R. P. M. of armature. The third brush system is used for current regulation.

Generator Test Data

Amperes	R.P.M.
5	700
11	1000
14-16 (Max)	1600
15	1800

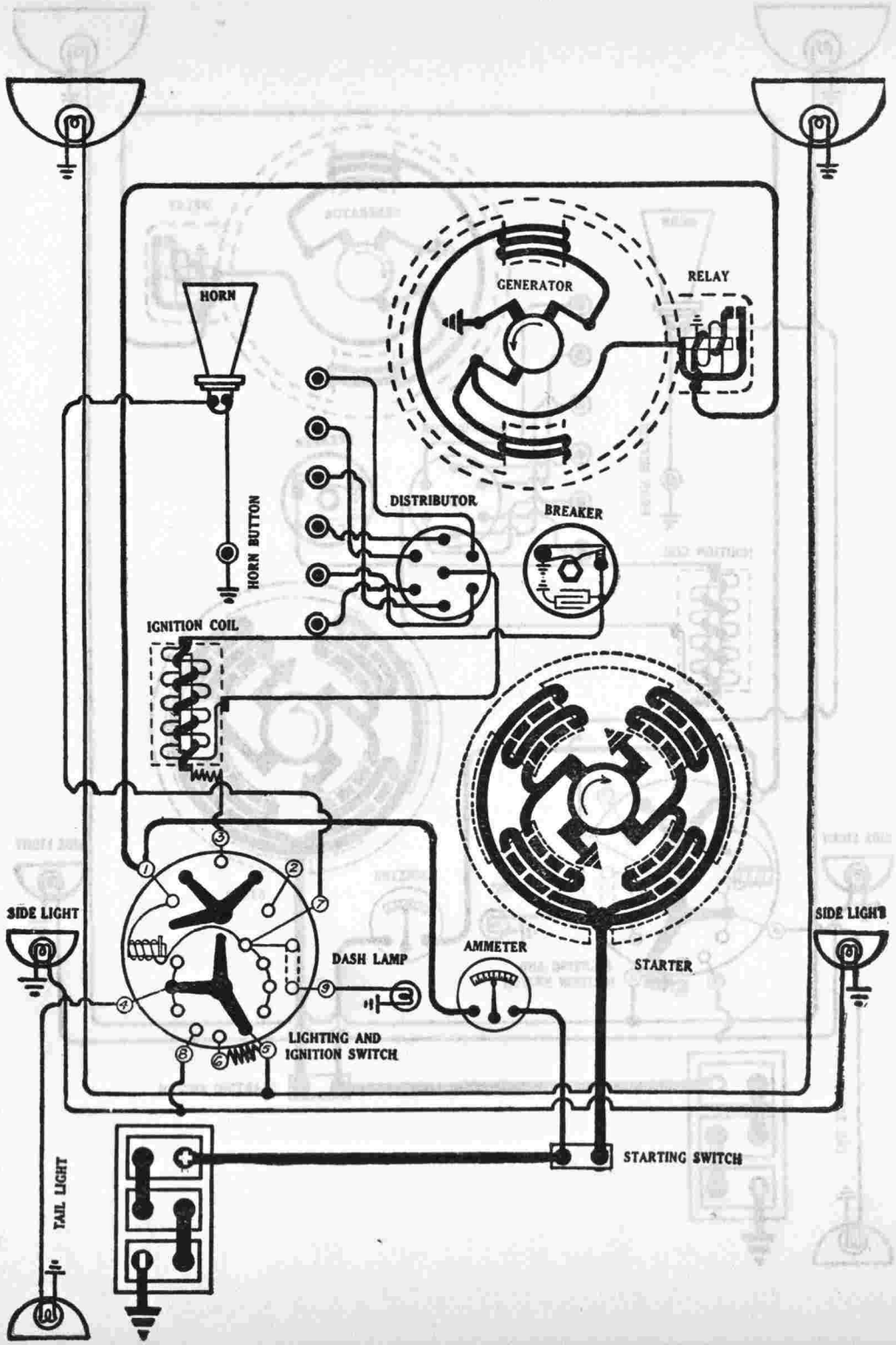
To adjust the charging rate, remove the cover band and move the third brush mounting plate by means of an extension handle. Shift the third brush in a counter-clockwise direction (direction of rotation) to increase the charging rate, and in the opposite (clockwise) direction to decrease the charging rate. The plate can be held in any position desired by means of friction clamps.

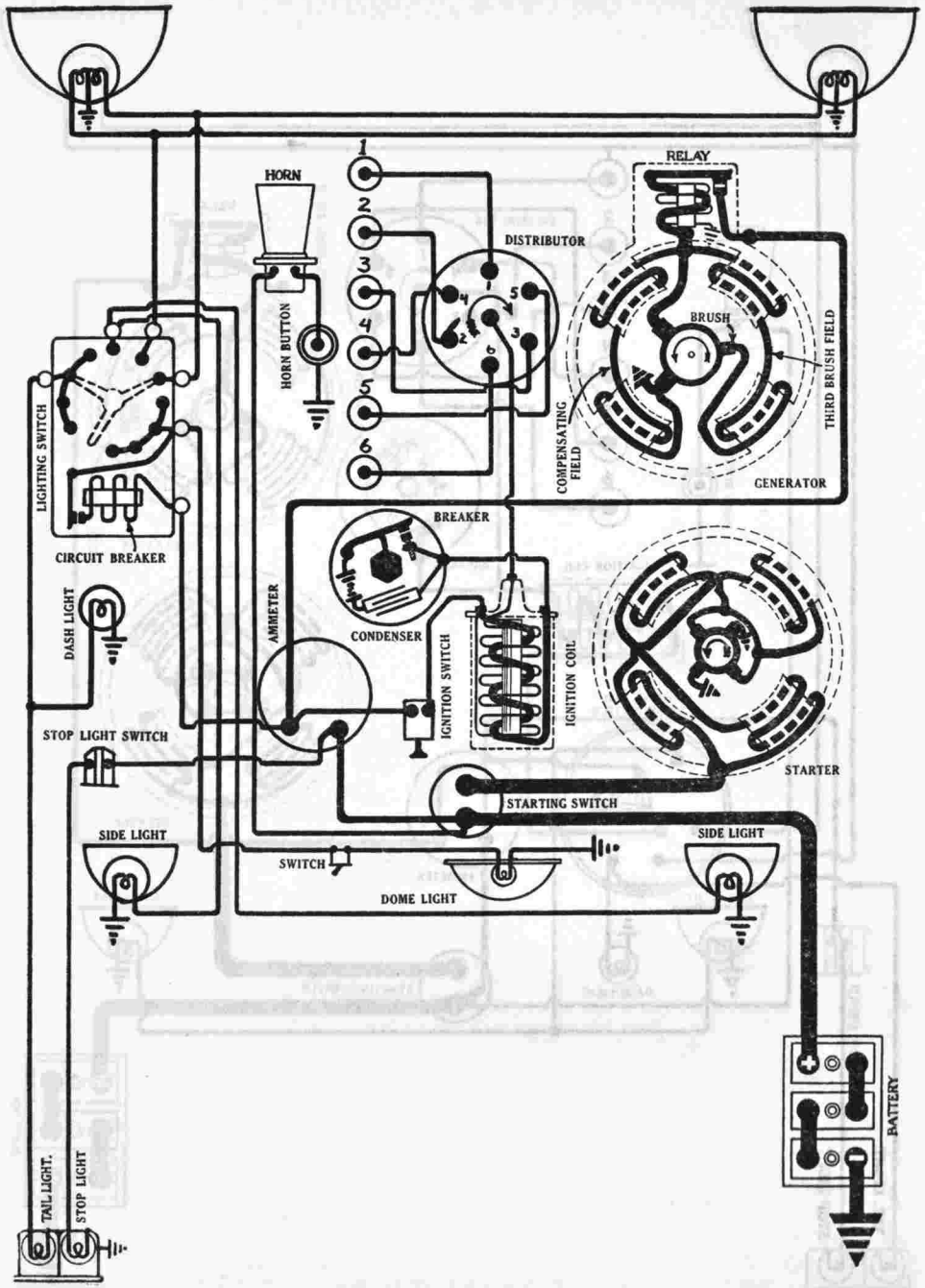
Oiling:—Put 8 or 10 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY:—Relay contact closes at 7-8 volts, or 8-10 M.P.H. and opens at 6-7 M.P.H. with a discharge of 3 amperes. Contact gap is .025-.035 inch, and the air gap between relay armature and coil core is .025-.035 inch.

LIGHTING:—Combination Switch Model No. 1246. The head lights are each 6-8 volts, 21 cp. Dash and tail lights are each 6-8 volts, 2 cp. All lights are of the single contact type.

CIRCUIT BREAKER:—A circuit breaker, mounted on the back of the combination switch, takes the place of fuses. A current flow of 25-30 amperes will cause the circuit breaker to operate. It will continue to operate with a current flow of not more than the circuit breaker terminals.





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MODEL 92 (1926)
DELCO GENERATING, STARTING SYSTEM
DELCO IGNITION

BATTERY:—Willard, Type CWR-13, 6 volt. The negative (—) terminal is grounded. The starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours.

IGNITION:—Coil Model 2182. Distributor Model 5294. Breaker contacts separate .018-.022 inch. They are made of tungsten. Resurface contacts with a fine contact file or on a medium hard oilstone. Automatic advance begins at 580 R.P.M. Maximum automatic advance is 30 degrees reached at 2800 R.P.M. Breaker arm spring tension is 16-20 ounces.

Oiling:—Put 8 or 10 drops of light engine oil in the distributor oilers every two weeks or each 500 miles. Put a small bit of vaseline on the face of the breaker cam every 2000 miles.

Timing:—Breaker contacts begin to separate when piston No. 1 reaches top dead center on the compression stroke, with the spark control and breaker assembly in fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are .025 inch.

STARTER:—Model 313. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush tension is 2¼-2½ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	50
13 lb. ft.	Lock	3.2	....

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model 325. The direction of rotation is counter-clockwise, looking at the commutator end. Current regulation is by the third brush system combined with a stabilizing shunt field. The stabilizing field is a straight shunt field of comparatively small wire wound on two poles. It draws about 1 ampere at 6 volts. The third brush shunt field is wound on the other two field poles. To adjust the generator output remove the commutator cover band and shift the third brush mounting plate by the handle on the plate. Shift the plate in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The plate is held in any position by friction washers. Generator brush tension should be 1¼-1½ pounds each.

Generator Data

Amperes	R.P.M.
5	800
8	1000
12-15	1600

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every two weeks or each 500 miles.

RELAY:—Relay contacts close at 7-7.5 volts and open with a discharge current of 0-2 amperes. Contacts separate .025 inch. Air gap is .009-.010 inch with contacts closed.

LIGHTING:—Delco Switch Model 1283. Switch is mounted at the base of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact), Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash light is 6-8 volt, 3 cp. D.C. Mazda 64. Tail light is 6-8 volt, 3 cp. S.C. Mazda 63.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the back of the lighting switch. It begins to operate with a current flow of 25-30 amperes and continues to operate limiting the current to 10-15 amperes.

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MODEL 93 (1926)

DELCO GENERATING, STARTING SYSTEM
DELCO IGNITION

BATTERY:—Willard, Type CW-15, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 114 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours.

IGNITION:—Coil Model 2182. Distributor Model 5294. Breaker contacts separate .018-.022 inch. They are made of tungsten. Resurface contacts with a fine contact file or on a medium hard oilstone. Automatic advance begins at 580 R.P.M. Maximum automatic advance is 30 degrees reached at 2800 R.P.M. Breaker arm spring tension is 16-20 ounces.

Oiling:—Put 8 or 10 drops of light engine oil in the distributor oilers every two weeks or each 500 miles. Put a small bit of vaseline on the face of the breaker cam every 2000 miles.

Timing:—Breaker contacts begin to separate when piston No. 1 reaches top dead center on the compression stroke, with the spark control and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are ⅞ S.A.E. Standard. Gaps are .025 inch.

STARTER:—Model 313. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush tension is 2¼-2½ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	50
13 lb. ft.	Lock	3.2	....

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model 325. The direction of rotation is counter-clockwise, looking at the commutator end. Current regulation is by the third brush system combined with a stabilizing shunt field. The stabilizing field is a straight shunt field of comparatively small wire wound on two poles. It draws about 1 ampere at 6 volts. The third brush shunt field is wound on the other two field poles. To adjust the generator output, remove the commutator cover band and shift the third brush mounting plate by the handle on the plate. Shift the plate in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The plate is held in any position by friction washers. Generator brush tension should be 1¼-1½ pounds each.

Generator Data

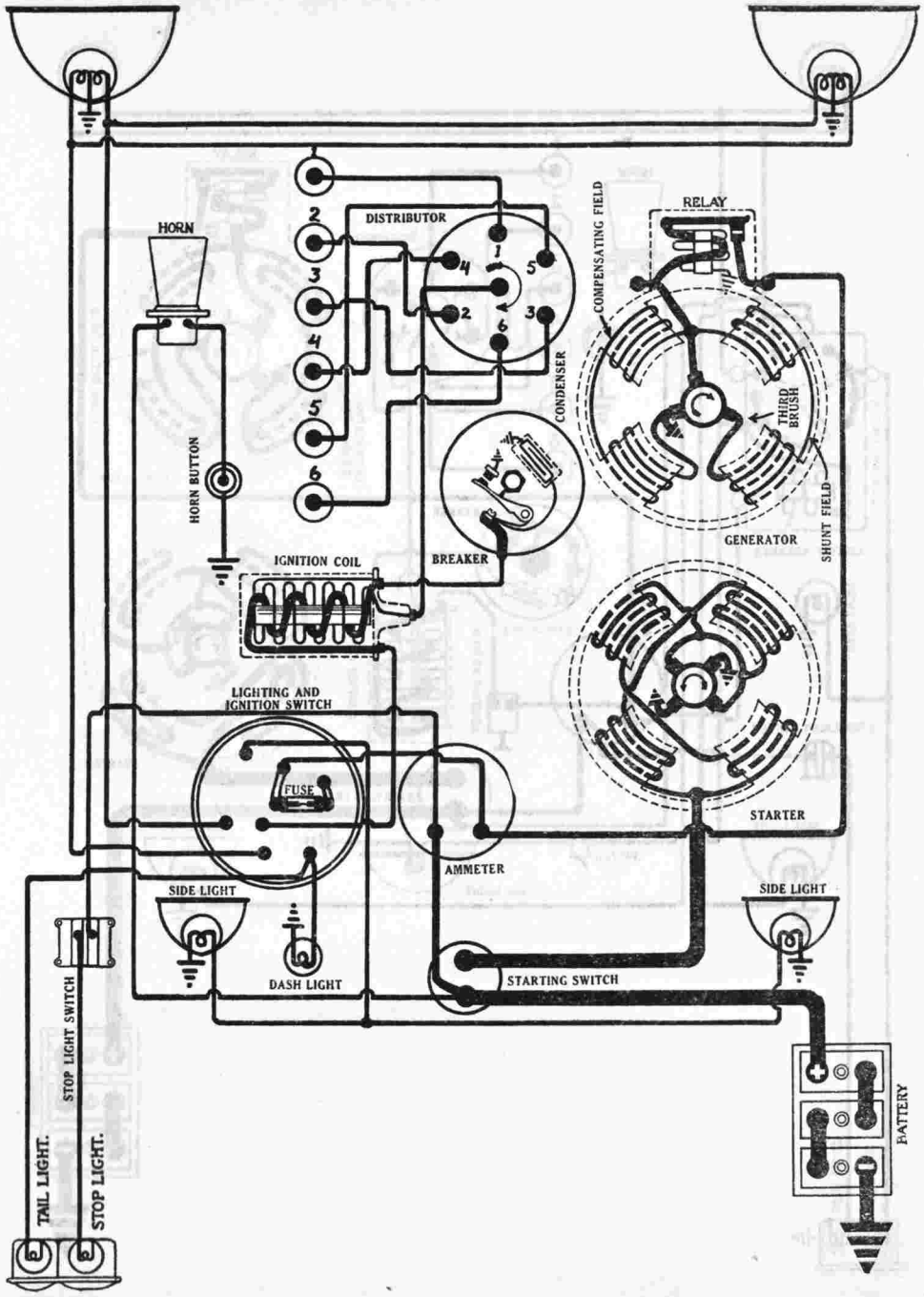
Amperes	R.P.M.
5	800
8	1000
12-15	1600

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every two weeks or each 500 miles.

RELAY:—Relay contacts close at 7-7.5 volts and open with a discharge current of 0-2 amperes. Contacts separate .025 inch. Air gap is .009-.010 inch with contacts closed.

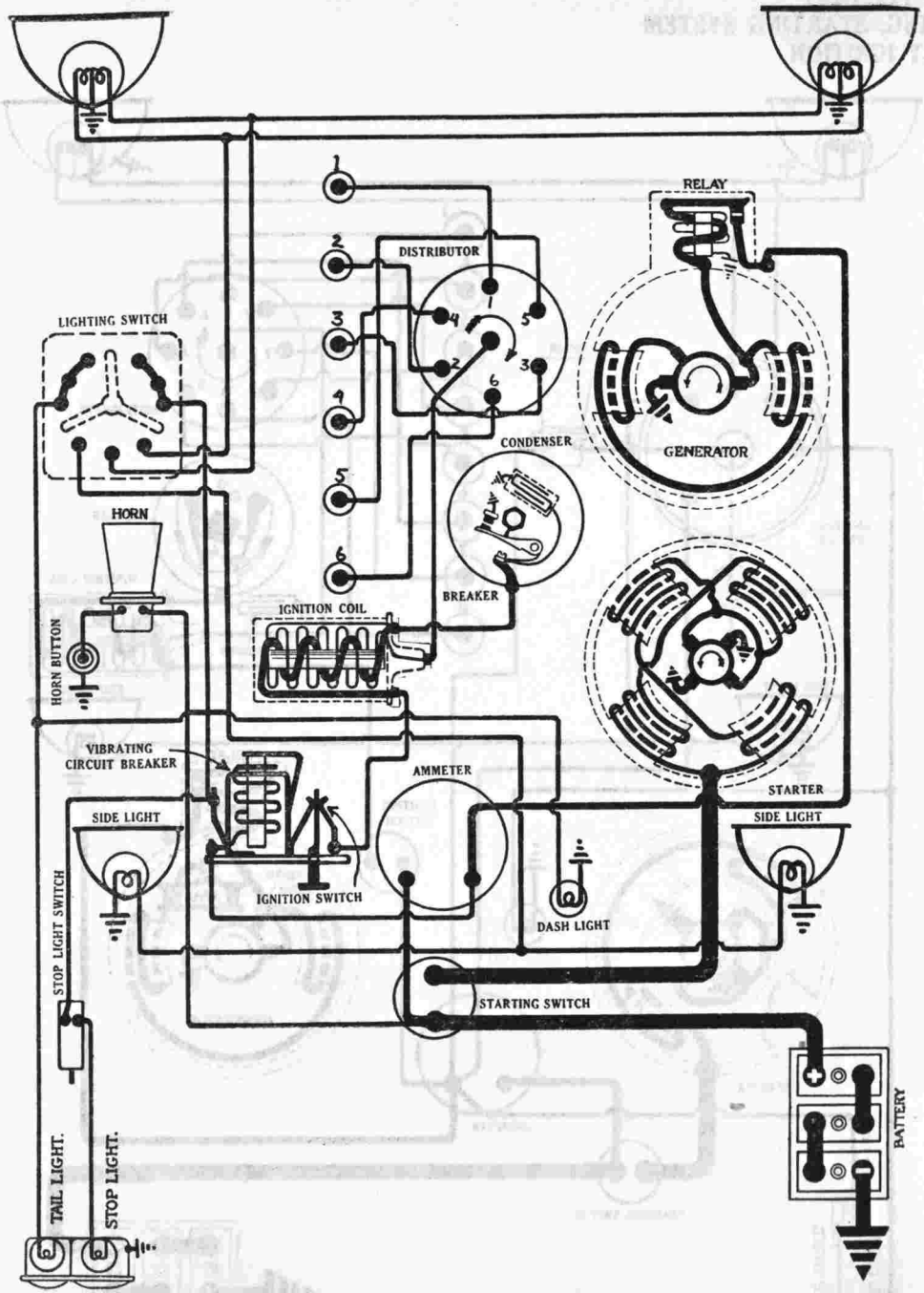
LIGHTING:—Clum Switch Model 10623. Switch is mounted on the dash. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact), Mazda 1110. Stop light is 6-8 volt, 21 cp. S.C. Mazda 1129. Dash light is 6-8 volt, 3 cp. D.C. Mazda 64. Tail light is 6-8 volt, 3 cp. S.C. Mazda 63. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63.

FUSES:—A single 20 ampere fuse is mounted on the back of the switch.



DAVIS

MODEL 94 (1927)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION



BATTERY:—Willard, Type WR-13, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours.

IGNITION:—Coil Model 2182. Distributor Model 5294. Breaker contacts separate .018-.022 inch. They are made of tungsten. Resurface contacts with a fine contact file or on a medium hard oilstone. Automatic advance begins at 580 R.P.M. Maximum automatic advance is 30 degrees reached at 2800 R.P.M. Breaker arm spring tension is 16-20 ounces.

Oiling:—Put 8 or 10 drops of light engine oil in the distributor oilers every two weeks or each 500 miles. Put a small bit of vaseline on the face of the breaker cam every 2000 miles.

Timing:—Breaker contacts begin to separate when piston No. 1 reaches top dead center on the compression stroke, with the spark control and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are ⅞ S.A.E. Standard. Gaps are .025 inch.

STARTER:—Model 313. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush tension is 2¼-2½ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	50
13 lb. ft.	Lock	3.2	....

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model 332. The direction of rotation is counter-clockwise, looking at the commutator end. The maximum charging rate is 14-17 amperes reached at 1600 R.P.M. The third brush system is used for current regulation. To adjust generator charging rate, loosen the lock screw and shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Generator brush tension is 1¼-1½ pounds.

Generator Data

Amperes	R.P.M.	Volts
0	575	6.5
10	1000	7.8
14-17	1600	8.1

Motoring, generator draws 4.5-6 amperes at 6 volts. Shunt field current is 4 amperes at 6 volts.

RELAY:—Relay closes when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2 amperes. Contacts separate .025 inch. Air gap is .009-.010 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 1300. Switch is mounted at the base of the steering column. Head lights are 21-21 cp. (double filament-double contact), Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash light is 6-8 volt, 3 cp. D.C. Mazda 64. Dome and tail lights are 6-8 volt, 3 cp. S.C. Mazda 63.

CIRCUIT BREAKER:—A vibrating circuit breaker is combined with the ignition switch on the dash. Circuit breaker begins to vibrate with a current of 25-30 amperes and continues to operate limiting the current to 10-15 amperes.

DAVIS

MODEL 99 (1927-28)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type CWR-15, 6 volt, 15 plates. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 104 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours.

IGNITION:—Coil Model 525-A. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped. Coil is mounted at right of engine.

Distributor Model 658-G. Breaker contacts separate .022 inch. Set contact gap by loosening lockscrew on stationary contact mounting plate and turning eccentric adjusting screw until contact gap is .022 inch with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Breaker has two sets of contacts on a single four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval for the Davis engine and must be accurately set. See Timing. Distributor is semi-automatic. Maximum manual advance is 33 degrees (engine). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 35 degrees reached at 2400 R.P.M.

Mounting:—Distributor is mounted at forward end of generator at right of engine. To remove distributor, disconnect primary lead and manual advance rod and remove distributor head with cables intact. Then loosen distributor clamp screw and lift unit from place.

Oiling:—Fill the grease cup on the side of the shaft and turn down one turn every month or each 1000 miles. Once each month remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light oil. At the same time put a small bit of vaseline on the face of the breaker cam.

Timing:—Synchronization of Contacts:—Use Delco-Remy tool, Part No. 820738, and follow directions on Page S-2 of Reed Service Manual. Contacts can be synchronized without tool after distributor has been timed to the engine. Crank engine over 90 degrees from firing position of piston No. 1 when piston No. 6 will reach top dead center entering power stroke. The second set of contacts should separate at this point. Loosen lockscrews and turn eccentric adjusting screw until contacts begin to separate. Tighten the lockscrews and connect segment opposite rotor to spark plug in cylinder No. 6. Connect remaining spark plugs in order 2-5-8-3-7-4-1 clockwise around the distributor head.

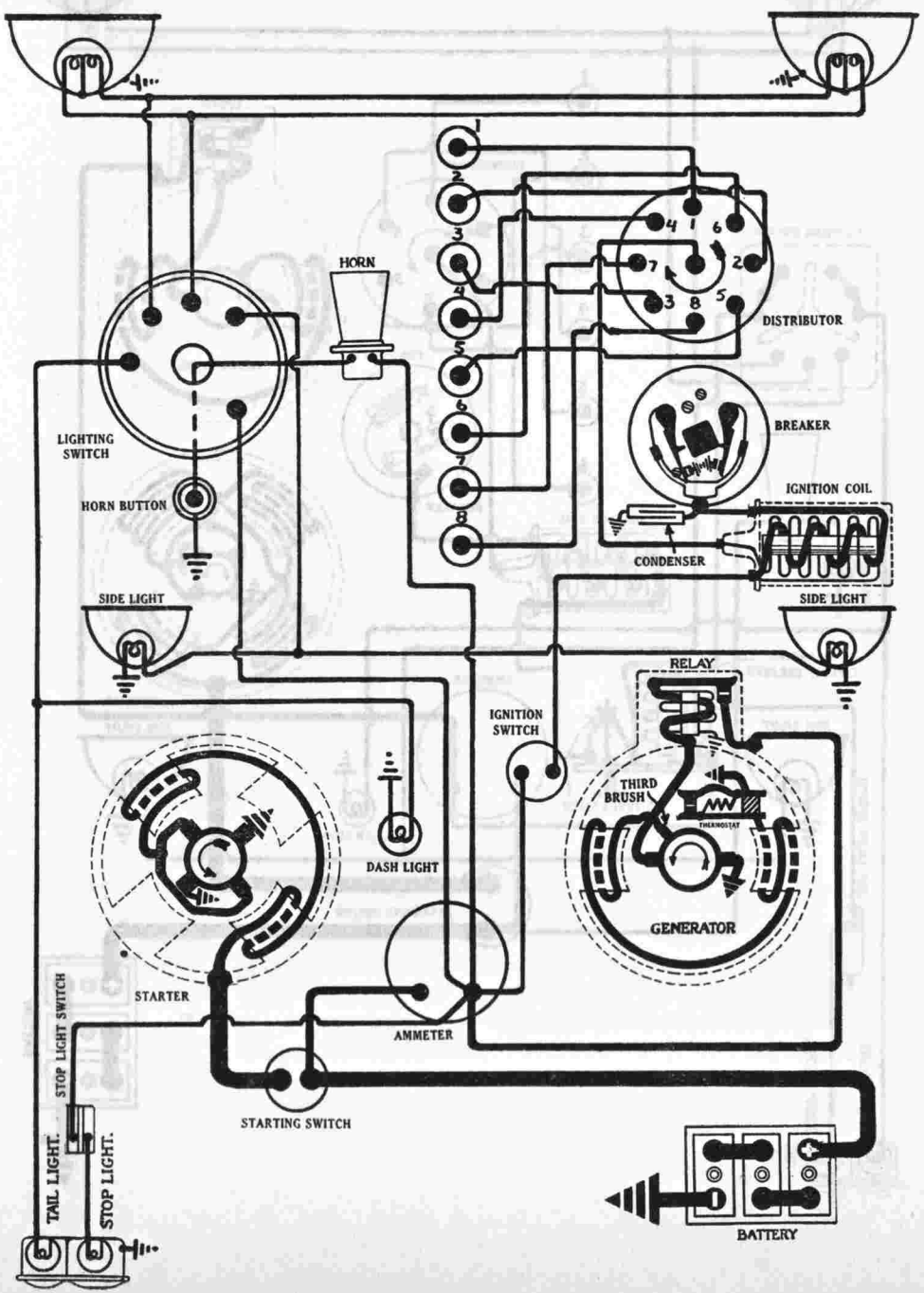
Timing Distributor to Engine:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control lever fully retarded. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully retard spark control lever. Continue to crank engine until piston reaches top dead center. Then loosen advance arm clamp screw and turn distributor housing until one set of contacts begin to separate. Tighten the clamp screw and make certain that the segment opposite the rotor is connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1½ inches; stem diameter, .3095/.3085 inch; stem length, 5 61/64 inches (top of seat to end). Valve lift, 5/16 inch; spring pressure, 87 pounds total. Tappet clearance, .004 inch (hot). Inlet Valves open 8 degrees past top dead center and close 40 degrees past lower dead center.

EXHAUST VALVES:—Head diamter, 1⅜ inches; stem diameter, .0395/.3085 inch; stem length, 5 61/64 inches (top of seat to end). Valve lift, 5/16 inch;



spring pressure, 87 pounds total. Tappet clearance, .006 inch (hot). Valve stem guides are removable. Exhaust valves open 40 degrees before lower dead center and close 8 degrees past top dead center.

STARTER:—Model 716-B. Starter is connected to the engine through a Bendix Drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter switch is Model 406-A. Brush spring tension is 24-28 ounces.

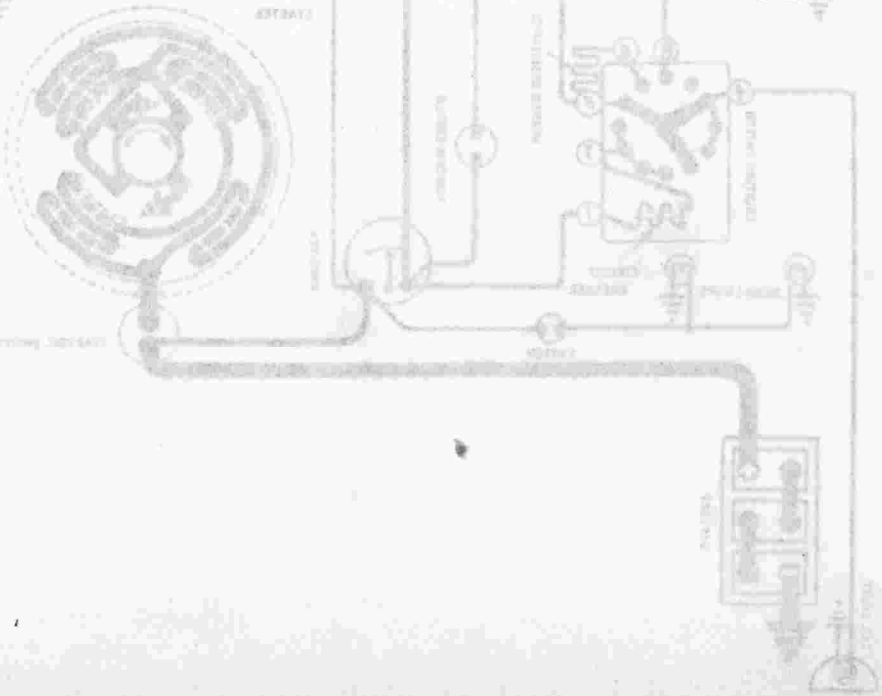
Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	5	70
15 "	Lock	3.7	450

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove 3 flange mounting cap-screws. Then slide starter forward and lift from place.

Oiling:—Put 8 to 10 drops of light oil in the commutator end oiler every month or each 1000 miles. The drive end bearing is oilless.

GENERATOR:—Model 944-D. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the outside of the generator endplate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting the maximum charging rate is 20 amperes (cold) reached at 1300 R.P.M.



Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
20	8.5	1300	12	7.65	1500

Motoring generator draws 6 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 16-18 ounces.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and remove distributor. Remove 3 nuts from flange mounting bolts and pull generator to rear. Use care not to disturb timing chain adjustment.

Oiling:—Put 8 or 10 drops of light oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay closes when the voltage of the generator reaches 7.25 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING:—Ross Switch. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming). Mazda No. 1110. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Side lights are 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash light is 6-8 volt, 3 cp. S.C. Mazda No. 63. Tail light is 6-8 volt, 3 cp. S.C. Mazda No. 63.

DIANA

EIGHT (1925-26-27-28)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

BATTERY.—U. S. L. Type XY-15. 6 volt. Starting capacity is 115 amperes for 20 minutes. Lighting capacity is 5 amperes for 21 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model 2178. Distributor Models 5282 and 5287. Breaker contacts separate .025 inch. Resurface contacts on a medium hard oilstone. Manual advance is 40°. Automatic advance begins at 600 R.P.M. and reaches a maximum of 18-24° at 2000 R.P.M. The tension of the contact arm spring should be 13-16 ounces.

Mounting.—Distributor is mounted at right of engine. To remove, disconnect manual advance rod and remove manual advance stop screw. Then lift distributor from place.

Oiling.—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

Timing.—Breaker contacts begin to separate when piston entering power stroke reaches top dead center with the manual advance control lever in the fully retarded position. This system uses two sets of contacts with a four-sided cam, the contacts opening alternately at intervals of 45° (distributor) corresponding to 90° of engine travel. Each breaker thus fires 4 cylinders. They must be set to open at exact points. To time engine, turn until flywheel marking DC/1EC is at indicator. Adjust stationary contacts so that they begin to separate. Tighten adjusting screw and turn engine over 90° until straight mark on flywheel is opposite indicator. Then adjust other set of contacts to just begin to separate. On Model 5282 this is done by loosening two hold-down screws and rotating the movable breaker plate. Tighten the two screws. On Model 5287, turn the eccentric adjusting screw which shifts one set of contacts on the plate.

Valve Timing:—INLET VALVES:—Head diameter, 1 7/16 inches; stem diameter, 3/8 inch; stem length, 5 9/16 inches; tappet clearance, .004 inch; spring pressure, 49¼ pounds; valve lift, 5/16 inch; intake opens 4° past top dead center, and closes 46° past lower dead center.

EXHAUST VALVES:—Head diameter, 1 5/16 inches; stem diameter, 3/8 inch; stem length, 5 9/16 inches; tappet clearance, .006 inch; spring pressure, 49¼ pounds; valve lift, 5/16 inch; exhaust opens 41° before lower dead center, and closes 1° past top dead center.

Firing Order.—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER.—Model 313. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 2¼-2½ pounds each. Starter switch is Model 1953.

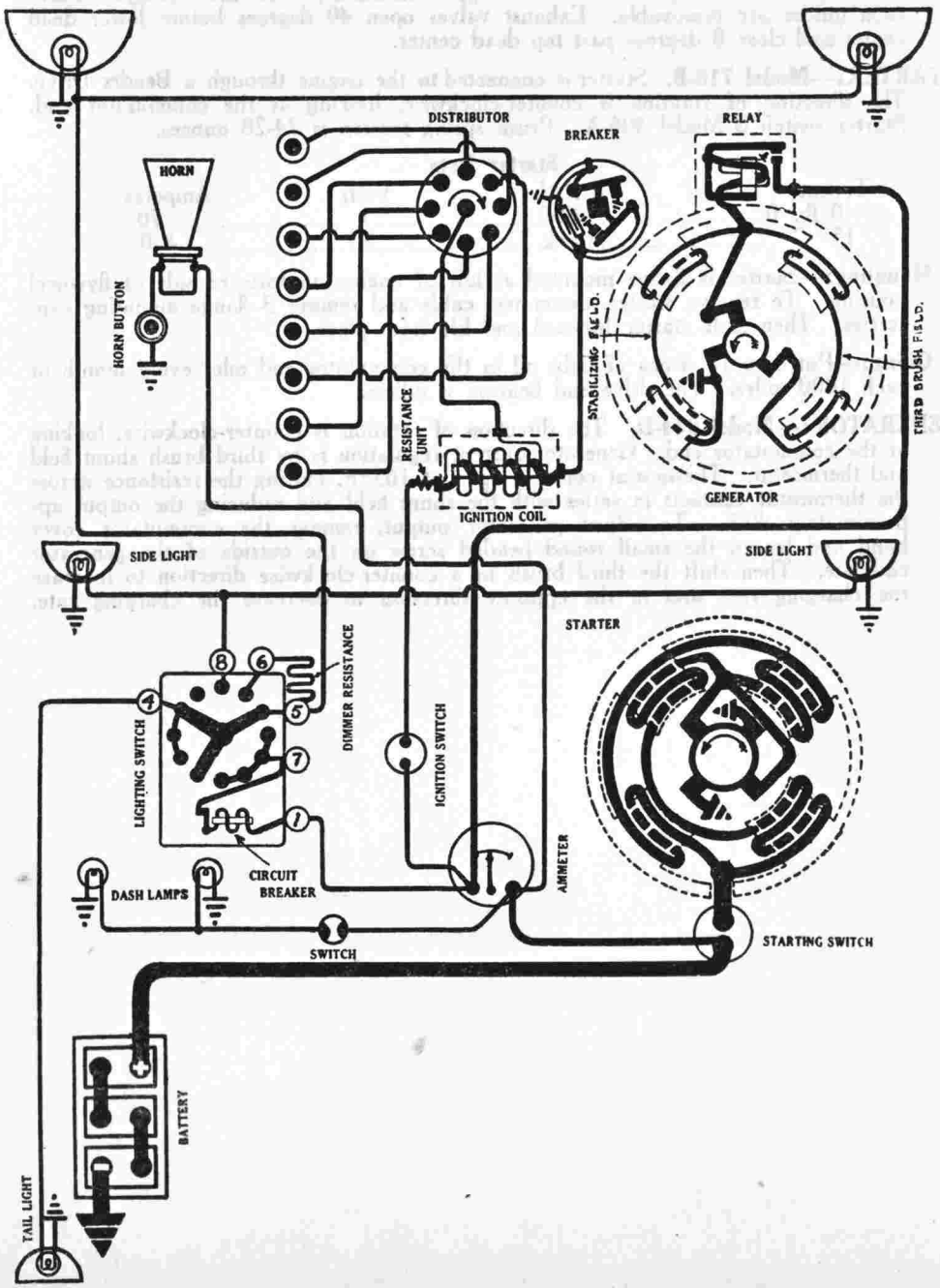
Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	50
13 lb. ft.	Lock	3.2	....

Mounting.—Starter is mounted at right of engine. To remove, remove three flange mounting screws and lift starter to rear and out.

Oiling.—Starter bearings are self-oiling. They require no attention.

GENERATOR.—Model 325. The direction of generator rotation is counter-clockwise, looking at the commutator end. Current regulation is by the third brush system

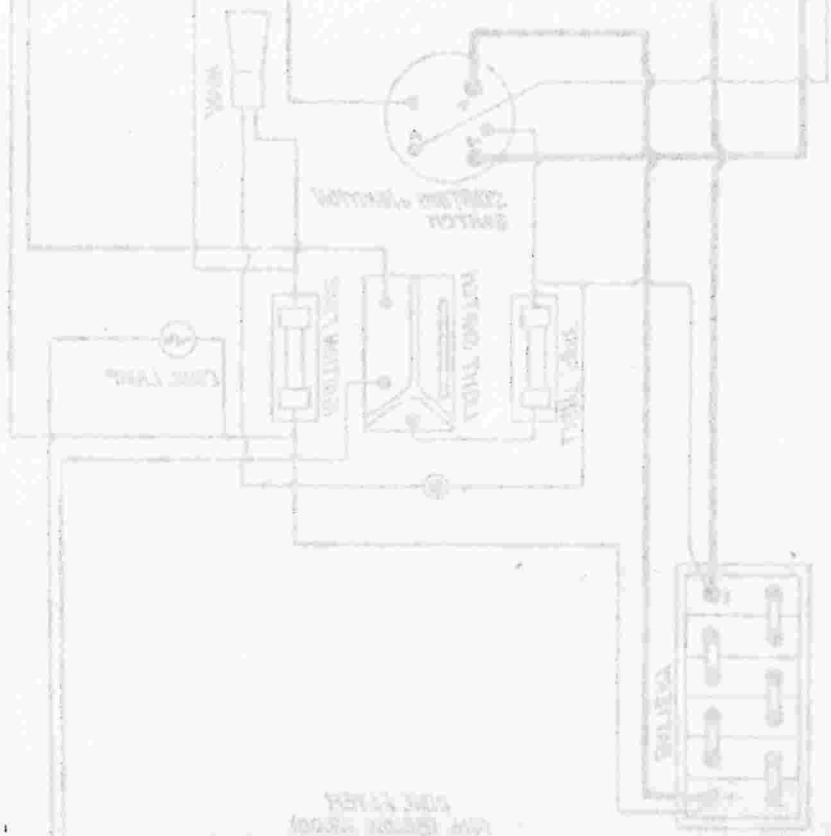


combined with a stabilizing shunt field. The stabilizing field is a straight shunt field of comparatively small wire wound on two poles. It draws about 1 ampere at 6 volts. The third brush shunt field is wound on the other two field poles. To adjust the generator output remove the commutator cover band and shift the third brush mounting plate by the handle on the plate. Shifting the plate in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. It is held in any desired position by friction washers. Generator brush tension should be 1¼-1½ pounds each.

Generator Data.

Amperes	R.P.M.
5	800
8	1000
12-15	1600

Mounting.—Generator is mounted at right of engine. To remove, remove two mounting screws and slide generator to rear. Then lift from place.



Oiling.—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY.—Relay is mounted on the generator. Contacts close when the voltage of the generator reaches 6.75-7.5 volts and open with a discharge current of 0-3 amperes. Relay contacts separate .015-.020 inch. Air gap between relay armature and coil core is .009-.010 inch, contacts closed.

LIGHTING.—Head lamps are 6-8 volt, 21 cp. S. C. Side and dome lamps are 6-8 volt, 4 cp. S. C. Dash and tail lamps are 6-8 volt, 2cp. S. C.

Switches.—Ignition switch is Model 1285. Lighting switch is Model 1285.

CIRCUIT BREAKER.—A vibrating circuit breaker in the lighting circuits takes the place of fuses. A current of 25-30 amperes causes this device to operate. While vibrating the current is 10-15 amperes.

Dixie-Flyer

1916 (Cars below Serial No. 2200)
Dyneto Starting and Lighting System
Connecticut Ignition

Battery.—Battery is 12 volt, 60 ampere-hour. The two wire system is used.

Ignition.—Breaker contacts should separate .023 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Breaker contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps should be .025 inch to .027 inch.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Starter-Generator.—Starter and generator are combined to form a single unit. It is chain connected to engine crank shaft.

STARTER DATA, MODEL B

Torque	R. P. M.	Amperes	Volts
5 lb. ft.	410	40	11.8
10 lb. ft.	310	65	11.5
15 lb. ft.	240	90	11.1
20 lb. ft.	175	115	10.8
25 lb. ft.	120	130	10.5
30 lb. ft.	75	160	10.2
35 lb. ft.	40	180	9.9
40 lb. ft.	Lock	210	9.6

Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current.

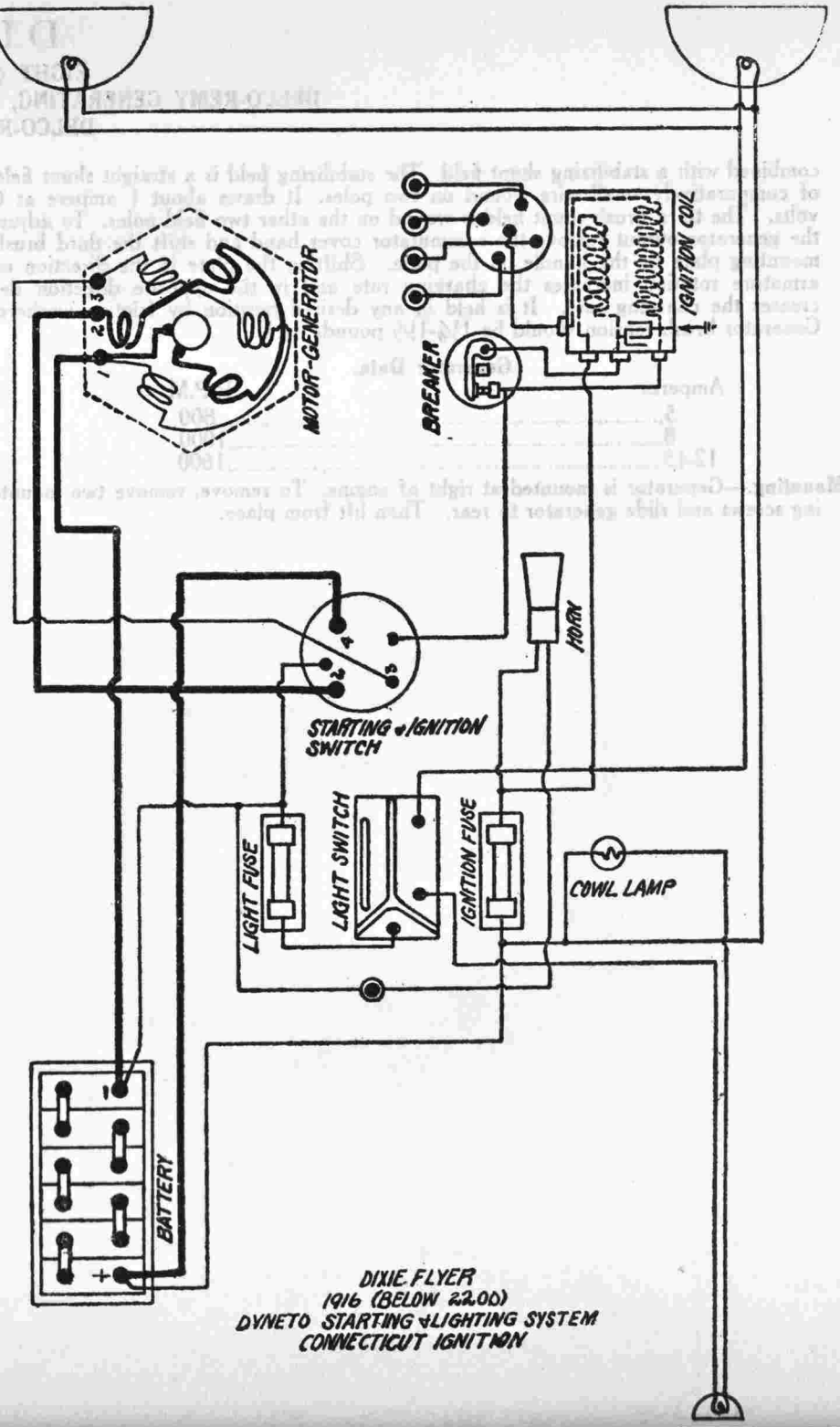
Generator.—The unit operates as a generator when its pressure is greater than that of the battery. Current regulation is by reverse series field. There is no relay, the circuit between the generator and battery being controlled by the starting switch. Starting switch has three positions marked "On" and "Neutral" or "Touring". In the "On" position, ignition circuit and the circuit between starter-generator and battery is completed. In the "Off" position, starter-generator and ignition circuits are broken. When in the "Neutral" or "Touring" position, the ignition circuit is completed and generator is disconnected from the battery and the shunt field is broken, rendering generator inoperative. This position is to be used on long runs with battery fully charged, to prevent overcharging. Generator should begin to supply current at 900 R. P. M. of armature, or 7-8 miles per hour. Generator output should be 5 amperes at 1150-1200 R. P. M., and 10 amperes at 1400-1600 R. P. M.

GENERATOR DATA, MODEL B

Amperes	M. P. H.
5.0	8
7.5	10
10.0	13
12.5	17

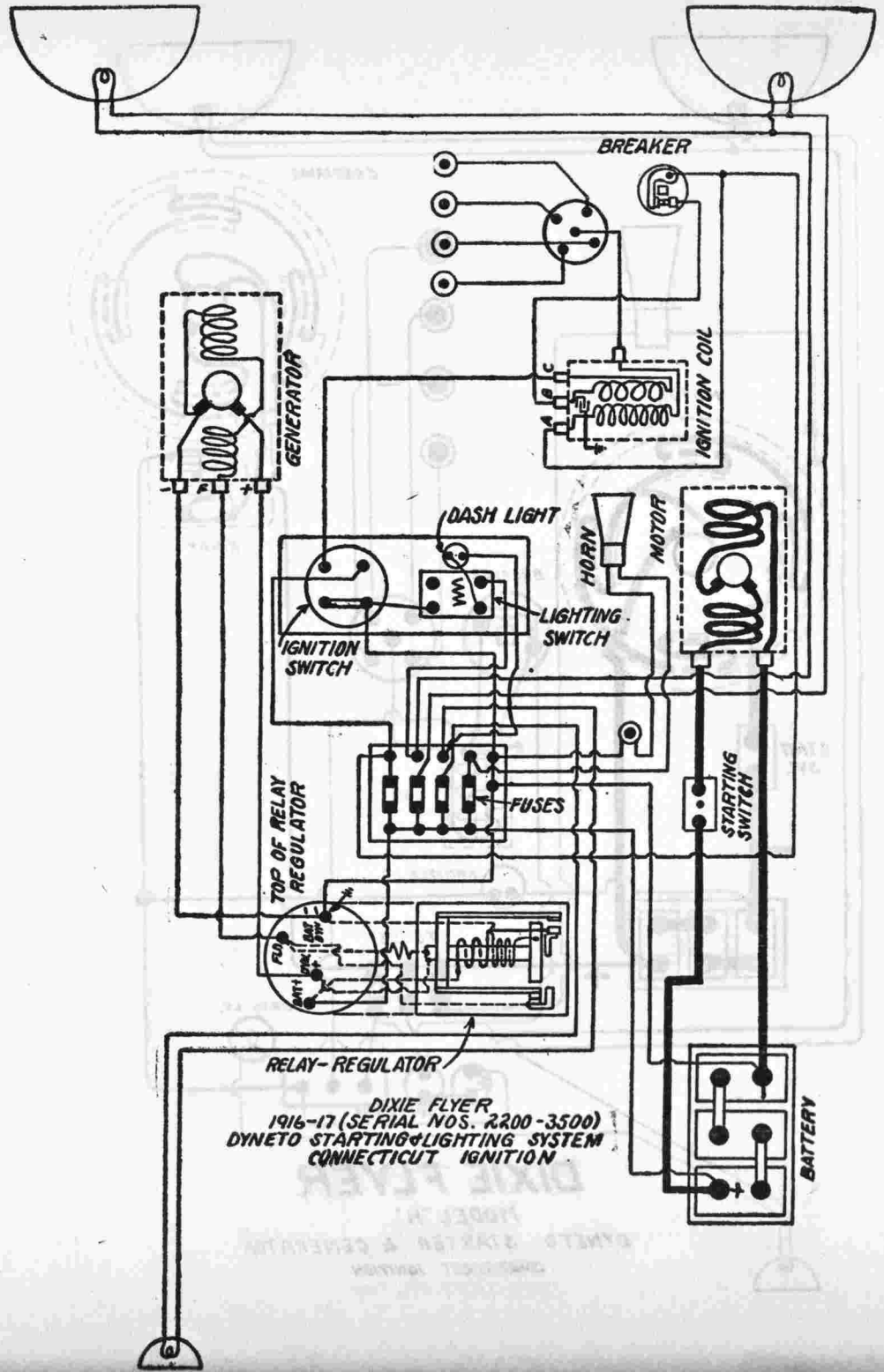
Oiling.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 12-14 volt, 15 cp. Dash and tail lamps are each 6-7 volt, 2 cp.,



DIXIE FLYER

MODEL 36, 56 (1916) (CARS HAVING SERIAL NOS. 2200-3500)
DYNETO STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION



Battery—Battery is 6 volt, 108.5 ampere-hour. The two wire system is used.

Ignition.—Breaker contacts separate .023 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps should be .025 inch to .027 inch.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Starter.—Starter is connected to engine through a Bendix drive.

STARTER DATA, MODEL UA

Torque	R. P. M.	Amperes	Volts
2.5	1320	150	5.2
5.0	620	280	4.8
7.5	300	380	4.5
10.0	Lock	500	3.8

A 6 volt, 180 ampere-hour battery having specific gravity reading of 1.250 or above, should be used in making these tests. Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current.

Oiling.—Starter bearings are inlaid with graphite so do not require much oil. There is a felt washer at the commutator end which should receive a quantity of light machine oil every three months. At the other end there is a hole provided with a felt wick. Put several drops of light machine or engine oil on this wick every three months.

Generator.—Generator current regulation is by a vibrating regulator.

Amperes	GENERATOR DATA, MODEL VA	M. P. H.
2.5		9
5.0		10
7.5		12
10.0		14
12.0		15
10.0		45

Damp, grounded or short circuited armature or field windings, sticking brushes, dirty commutator, high mica, defective connections or dirty or corroded regulator contacts are the chief causes of low current. Sticking of regulator contacts or resistance unit shorted out, will cause output to continue to rise as speed increases, after the normal maximum is reached.

Oiling.—Generator bearings are inlaid with graphite so do not require a great amount of oil. There is a felt washer at the commutator end and a hole provided with a felt wick at the other end. Keep these well oiled at all times, but do not over saturate them.

Relay Regulator.—Relay should close at 8 miles per hour and open at 6 miles per hour. Clean relay and regulator contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface them with a piece of well worn No. 00 sand paper, drawing a piece of unglazed paper between them, to remove all grit, and adjust before again putting into service. Increasing spring tension on regulator armature (moving member) will increase the output. Decreasing the spring tension will decrease the output.

Lamps.—Head lamps are 6-8 volt, 17 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

DIXIE FLYER

MODEL H, SERIES 5000 AND 7000 (1917-18-19-20)

DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—Willard, 6 volt, 80 ampere-hour. The two-wire system is used.

IGNITION.—Breaker contacts separate .018 to .020 inch. They are made of tungster. When the condition of the points affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever in a horizontal position. (First see that the breaker assembly is fully retarded when the control lever is in the fully retarded position.)

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model No. D69-D284. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes	Volts
0.0 lb. ft.	5600	25	6.4
2.5 lb. ft.	1400	150	5.8
5.0 lb. ft.	850	250	5.3
10.0 lb. ft.	250	420	4.6
14.0 lb. ft.	Lock	530	4.0

OILING.—Put several drops of light engine oil in starter oilers every month.

GENERATOR.—Model No. C69-C284. Generator current regulation is by the third brush system. Maximum current output of 14 amperes is reached at 16-18 miles per hour or 1500 R.P.M. of armature.

Generator Data

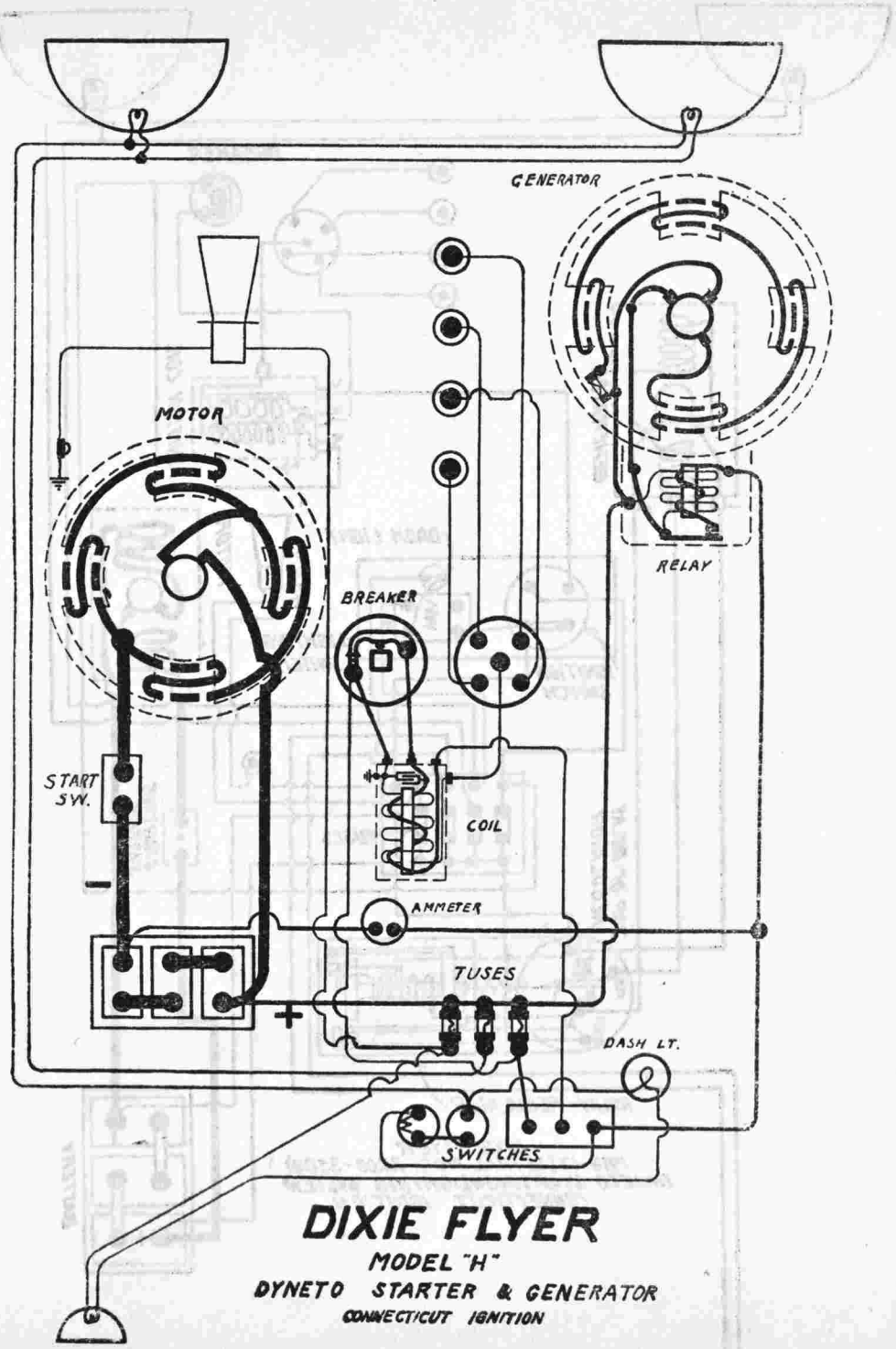
Amperes	M.P.H.	Volts
0	7- 9	6.4
5	9-10	6.6
10	12-14	6.8
12-14	16-18	7.8
8	40-45	6.7

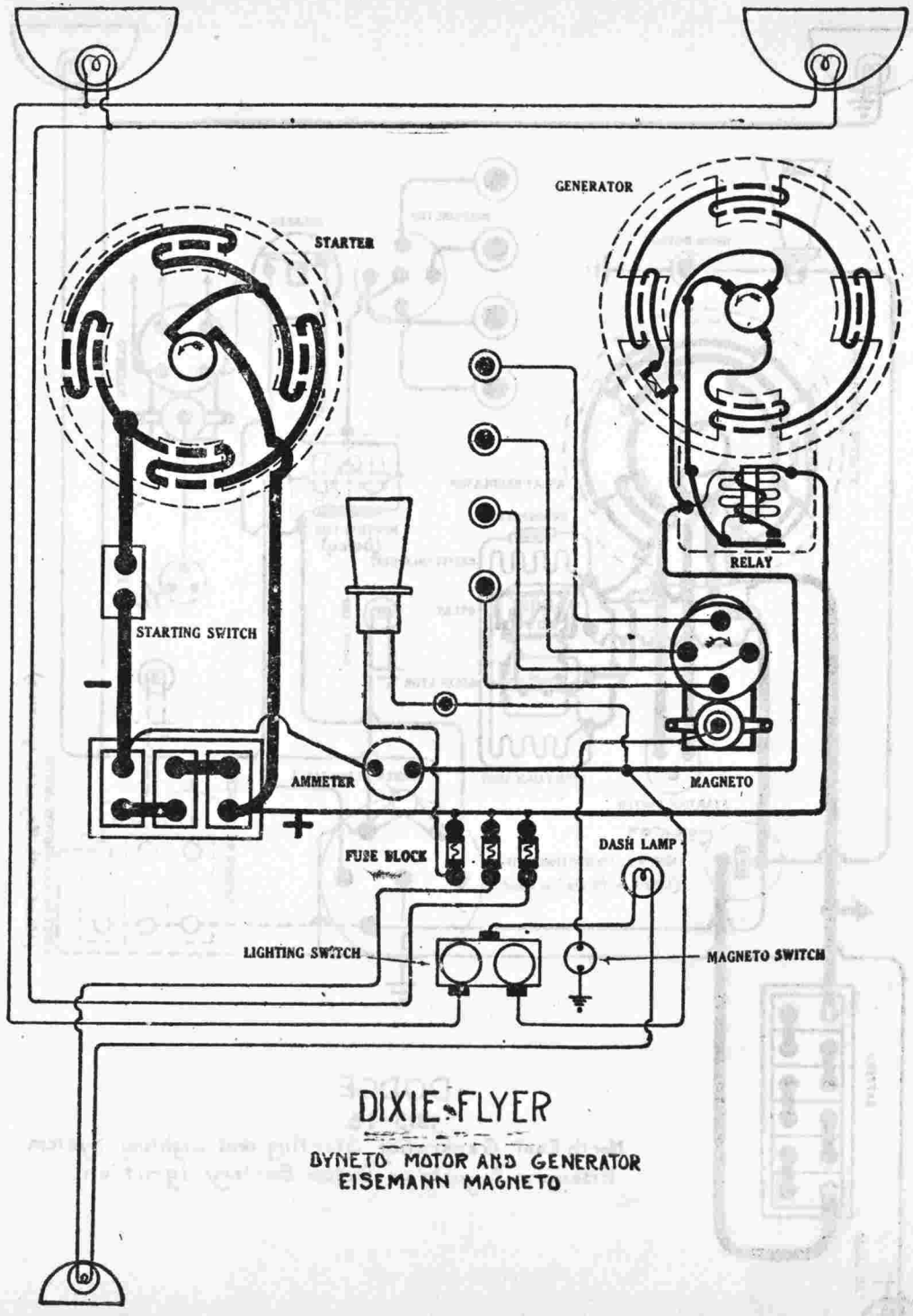
Charging rate may be varied by adjusting the third brush setting. Shunt field current is 3.5 amperes at 6.5 volts.

OILING.—Put 4 or 5 drops of light engine oil in the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 450-500 R.P.M. of armature, and opens at 6-8 miles per hour or 400-450 R.P.M. of armature. Relay contacts separate 3/32 inch. Air gap between relay armature and coil core is ⅛ inch. Clean relay contacts by drawng unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are in series and are each 3-4 volt, 2 cp.





DIXIE FLYER

MODEL H SERIES 7000 (1921-22)
MODEL H 1923-24-25) SERIAL NOS. 12001 UP
DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
EISEMANN MAGNETO IGNITION

BATTERY.—Willard, Type SJR-4, 6 volt, 80 ampere-hour. The two-wire system is used.

IGNITION.—Breaker contacts separate .015 inch. They are made of platinum. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or well worn No. 00 sandpaper.

Oiling.—Put 3 or 4 drops of light engine oil in each of the magneto oilers every month. Put a very small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

Timing.—Breaker contacts begin to separate when the piston entering the power stroke is on top dead center, spark control lever and magneto breaker assembly in a fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps are .030 inch.

STARTER.—Model No. D69-D284. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes	Volts
0.0 lb. ft.	5600	25	6.4
2.5 lb. ft.	1400	150	5.8
5.0 lb. ft.	850	250	5.3
10.0 lb. ft.	250	420	4.6
14.0 lb. ft.	Lock	530	4.0

Oiling.—Put several drops of light engine oil in starter oilers every month.

GENERATOR.—Model No. C69-C284. Generator current regulation is by the third brush system. Maximum current output of 14 amperes is reached at 16-18 miles per hour or 1500 R.P.M. of armature.

Generator Data

Amperes	M.P.H.	Volts
0	7- 9	6.4
5	9-10	6.6
10	12-14	6.8
12-14	16-18	7.8
8	40-45	6.7

Charging rate may be varied by adjusting the third- brush setting. Shunt field current is 3.5 amperes at 6.5 volts.

Oiling.—Put 4 or 5 drops of light engine oil in the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 450-500 R.P.M. of armature, and opens at 6-8 miles per hour or 400-450 R.P.M. of armature. Relay contacts separate 3/32 inch. Air gap between relay armature and coil core is 1/8 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust befor again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 or 32 cp. Dash and tail lamps are in series. They are 3-4 volt, 2 cp.

FUSES.—Generator fuse is 5 ampere. Lighting fuses are 10 ampere.

Dodge

1915-1916

North East Starting and Lighting System
Eisemann Magneto or Delco Ignition

Battery.—Battery is 12 volt, 45 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Magneto breaker contacts should open .015 inch to .020 inch. If badly burned or pitted, affecting the ignition, resurface them with a very fine, flat jeweler's file or a strip of worn No. 00 sand paper. Delco battery breaker contacts should open .010 inch to .012 inch on the 1915 cars having the steel bumper on contact arm. The clearance betwen the stop on the spring and the contact blade should be .015 inch. Should contacts become badly burned or pitted, resurface them with a fine, flat jeweler's file or well-worn No. 00 sandpaper. On 1916 cars, equipped with a fiber bumper on the contact arm, breaker contacts separate .020 inch.

Timing.—Breaker contacts should just begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Spark Plug Gaps.—Spark plug gaps should be .016 inch on cars equipped with Eisemann magneto ignition and .030 inch on cars equipped with Delco battery ignition.

Firing Order.—The firing order is 1, 3, 4, 2.

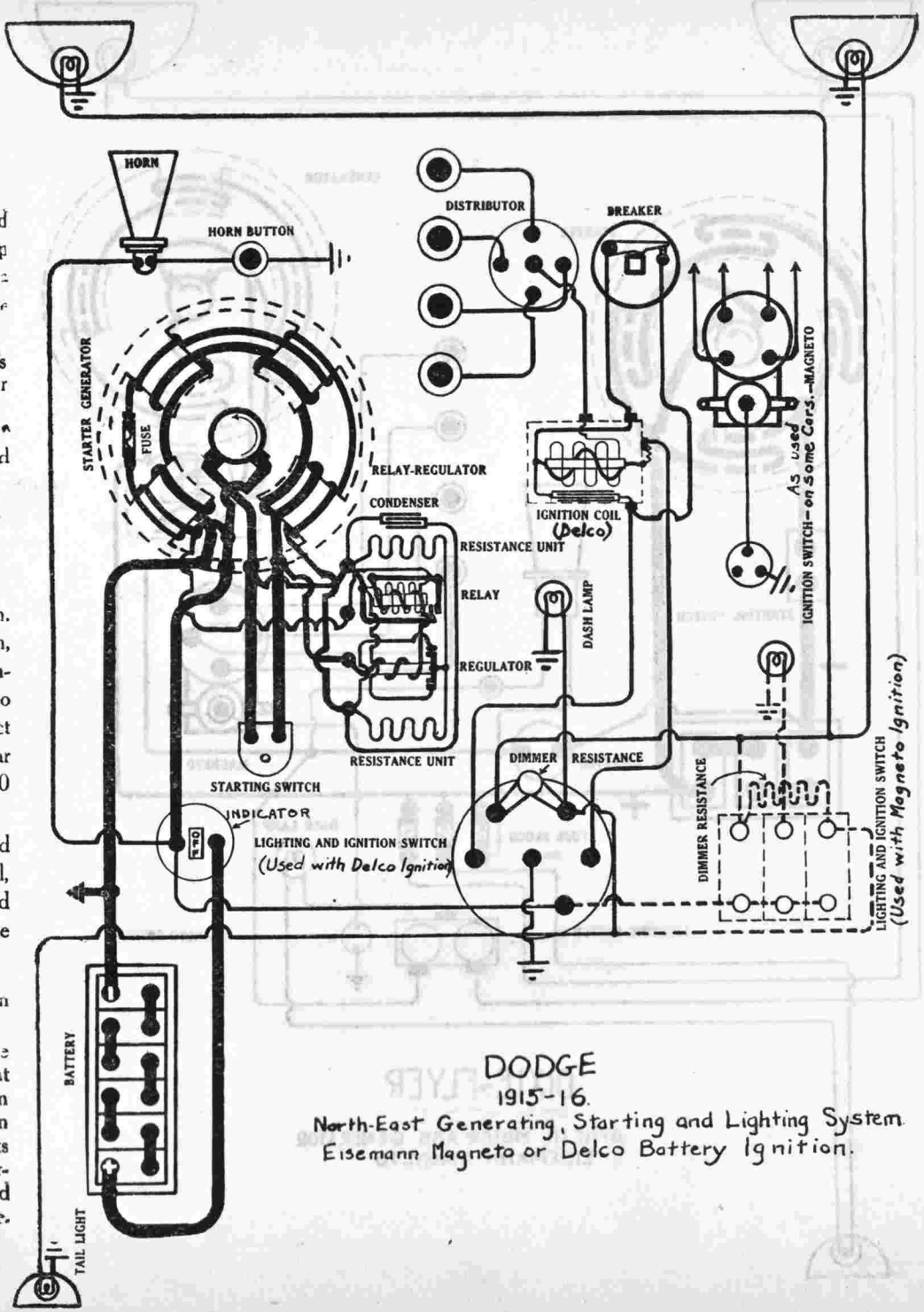
Oiling.—Put in 3 or 4 drops of light machine oil in each of the magneto oilers every month. At the same time put a very small trace of vaseline on the fiber bumper of contact arm, applying with a toothpick. If car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles. Put several drops of light engine oil in Delco ignition breaker bearings every two weeks. If a fiber bumper is provided on the contact arm, put a very small amount of vaseline on the cam, applying with a toothpick. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Starter-Generator.—Starter and generator are combined into one unit. Starter should deliver 35 pound feet lock torque when taking 210 amperes. Cold engine, heavy oil, tight bearings or other mechanical obstructions, or damp, grounded or short circuited motor windings or commutator bars will cause low speed and excessive current during the cranking operation.

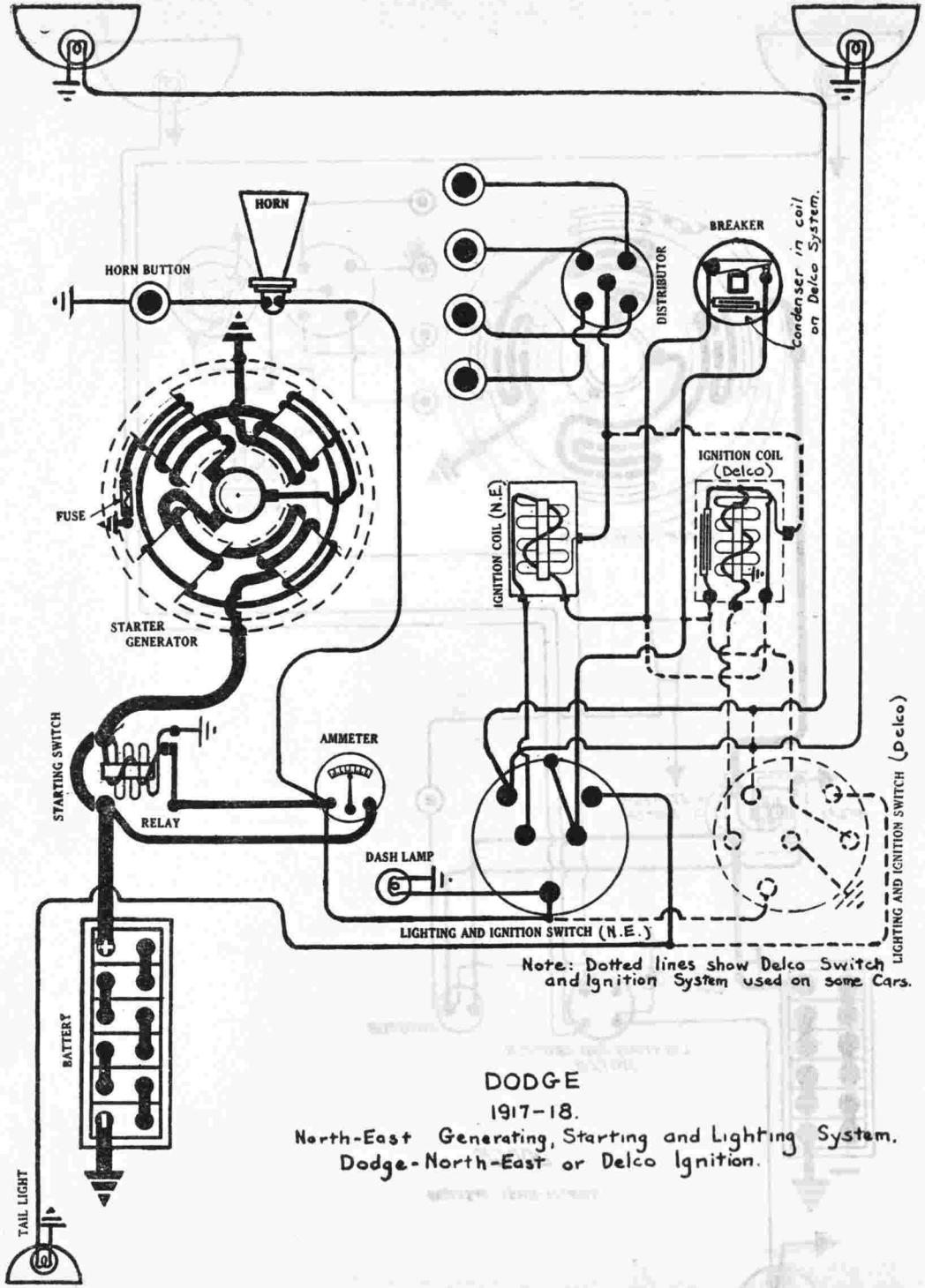
Generator.—Generator current regulation is by vibrating regulator. Normal maximum output should be 6.5 amperes.

Relay-Regulator.—Relay is combined with the regulator. Relay should close at about [illegible] miles per hour, or 1000 R. P. M. of armature. Charging current should be 3 amperes at closing and discharge current 0 to 1 ampere at opening of relay contacts. Air gap between relay armature (moving member) and coil core should be .030 inch. Air gap between regulator armature and coil core should be .025 inch. Clean relay and regulator contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface them with a piece of well worn No. 00 sand paper, drawing a piece of unglazed paper between them to remove all grit and adjust before again putting into service.

LAMPS.—Head lamps are 12-16 volt, 16 cp. Dash lamp is 12-16 volt, 3 cp. Tail lamp is 12-16 volt, 3 cp. All lamps are single contact.



DODGE
1915-16.
North-East Generating, Starting and Lighting System
Eisemann Magneto or Delco Battery Ignition.



DODGE
1917-18.
North-East Generating, Starting and Lighting System.
Dodge-North-East or Delco Ignition.

Dodge

(1917-18)

North East Generating, Starting and Lighting System
Delco or Dodge-North East Ignition

Battery.—Willard, Type, SJW-26, 12 volt, 51.4 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Delco Model No. 5151, or Dodge-North East Model O. Delco breaker contacts separate .018 inch. Dodge-North East breaker contacts separate .020 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Delco. Remove the ignition coil mounting plate every six months and repack distributor driving gear housing with soft cup grease.

Oiling.—Dodge-North East. Refill the grease cup above the horizontal shaft and turn down one turn every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles.

Timing.—Breaker contacts begin to separate when the exhaust valve in cylinder No. 4 just closes, spark control lever and breaker assembly in the fully retarded position. This is the firing position for No. 1 cylinder.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps are .030 inch.

Starter-Generator.—Model G. Starter and generator are combined into one unit. The unit is chain-connected to the engine crank shaft. Adjust chain so as to permit ½ inch up and down play midway between the two sprockets.

STARTER DATA

Torque	R. P. M.	Amperes	Volts
4 lb. ft	480	40	11.2
8 lb. ft	365	65	10.8
12 lb. ft	280	85	10.5
16 lb. ft	200	110	10.0
20 lb. ft	120	145	9.5
31 lb. ft	Lock	180	8.75

Generator.—Generator current regulation is by reverse series field and third brush system. Rotation is counter-clockwise, viewed from commutator end.

GENERATOR DATA, COLD TEST

Amperes	R. P. M.	Miles per Hour
0	900	8.5
3	1000	9.5
5	1200	11.0
7	1800	17.0
6.5	2400	22.0
5	3600	34.0

Charging rate is varied by adjusting the third brush setting. Position of third brush is adjustable by a rack and pinion movement, operated by turning a screw, exposed in commutator end plate. The adjusting screw is the upper one. It is necessary to first loosen the lower screw one or two turns, in order to unlock the third brush plate. Turn the upper screw in a clockwise direction (looking at commutator end) to increase the charging rate and in a counter-clockwise direction to decrease the charging rate. Tighten the lower screw after making the adjustment. Maximum current output must not exceed 10 amperes.

Oiling.—Put 4 or 5 drops of light engine oil in rear bearing oiler of starter-generator every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

Relay.—Relay is mounted with the starting switch. Relay closes at 10 miles per hour, or 1050 R. P. M. of armature, and opens at 8½ miles per hour, or 900 R. P. M. of armature. Relay contacts separate .030 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 12-14 volt, 15 cp. Dash and tail lamps are each 12-16 volt.

DODGE

1918-19-20-21-22

NORTH-EAST GENERATING, STARTING AND LIGHTING SYSTEM

DODGE-NORTH EAST IGNITION

BATTERY.—Willard, Type SJW-26, 12 volt, 51.4 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Type 10,210. Distributor Model O, Type 10,004. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Every two weeks refill the grease cup above the horizontal shaft and turn down one turn. If car is driven more than 500 miles in two weeks, this must be done every 500 miles.

Timing.—Breaker contacts begin to separate when the exhaust valve in cylinder No. 4 just closes, spark control lever and breaker assembly in the fully retarded position. This is the firing position for No. 1 cylinder.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—The spark plug gaps are .030 inch.

STARTER-GENERATOR.—Model G. Type 3566. The direction of rotation is counter-clockwise, looking at the commutator end. Starter and generator are combined into one unit. The unit is chain-connected to the engine crank shaft. Adjust chain so as to permit ½ inch up and down play midway between the sprockets.

Starter Data

Torque	R.P.M.	Amperes
5 lb. ft.	460	45
10 lb. ft.	350	78
12 lb. ft.	295	92
15 lb. ft.	230	111
29 lb. ft.	Lock	210

GENERATOR.—Generator current regulation is by reverse series field and third brush system. Rotation is counter-clockwise, viewed from commutator end.

Generator Data

Amperes	Hot Test R.P.M.	Amperes	Cold Test R.P.M.
0.0	1000	0.0	940
4.0	1240	3.0	1090
6.0	1350	6.0	1200
7.5	1800	8.5	1800
7.0	3200	7.0	3400

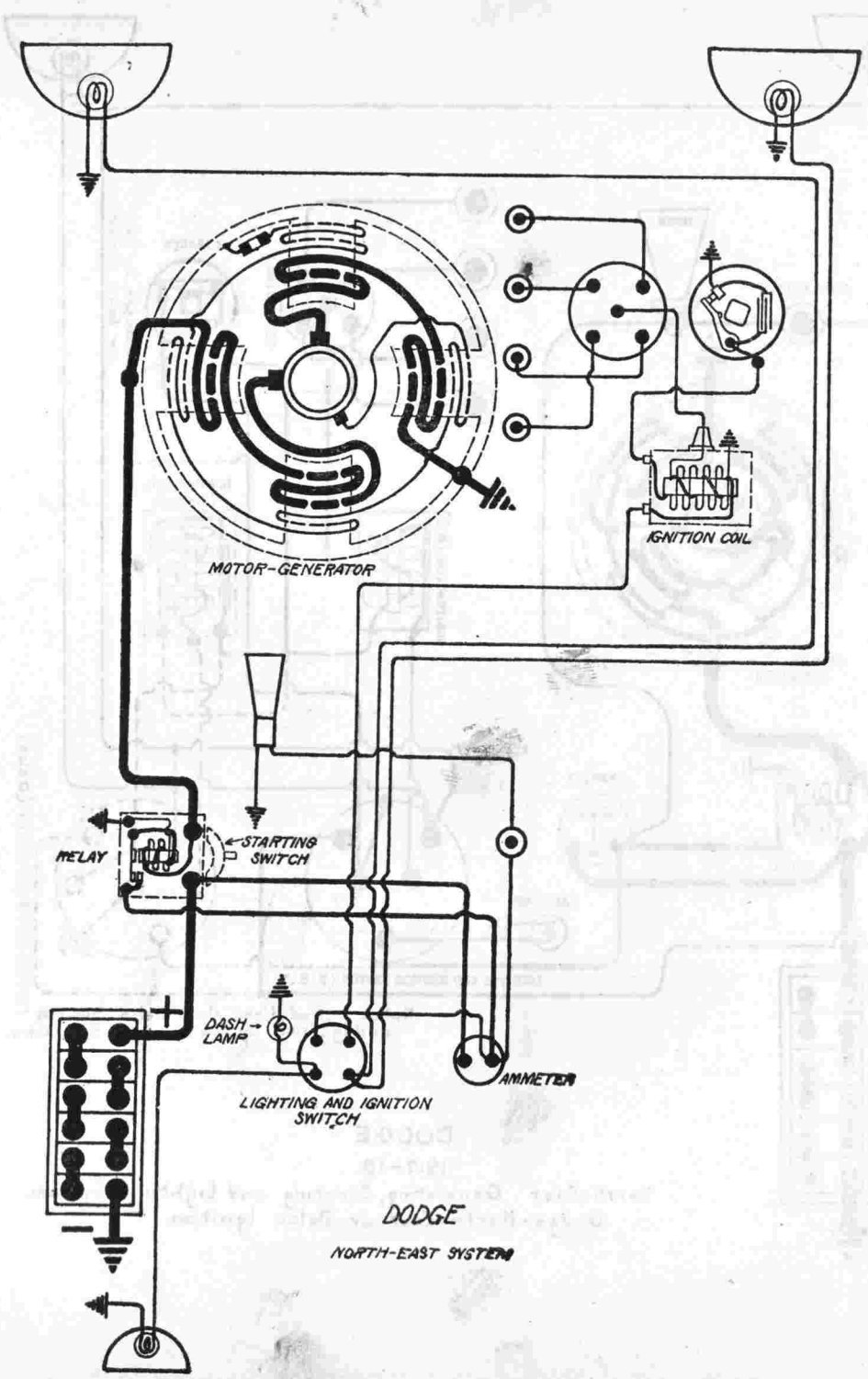
Charging rate is varied by adjusting the third brush. The position of the brush is adjustable by a rack and pinion movement, operated by turning a screw, exposed in commutator end plate. The adjusting screw is the upper one. It is necessary to first loosen the lower screw one or two turns, in order to unlock the third brush plate. Turn the upper screw in a clockwise direction (looking at commutator end) to increase the charging rate, and in a counter-clockwise direction to decrease the charging rate. Tighten the lower screw after making the adjustment. Maximum current output must not exceed 10 amperes. Main and third brush tension is 2 to 2½ lbs.

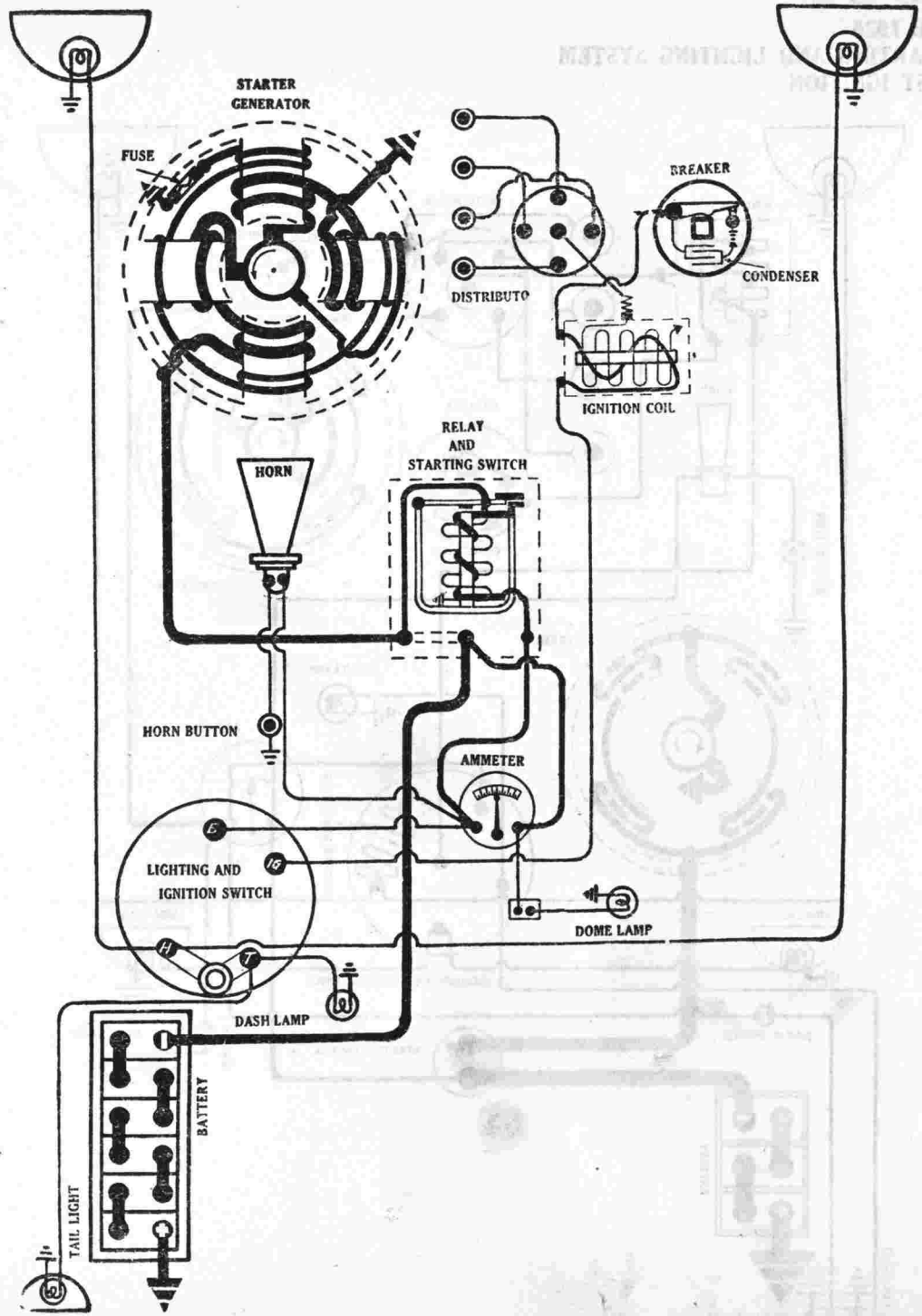
Oiling.—Put 4 or 5 drops of light engine oil in rear bearing oiler of starter-generator every 2000 miles.

RELAY.—Relay is mounted with the starting switch. Relay closes at 10 miles per hour, or 1050 R.P.M. of armature, and opens at 8½ miles per hour, or 900 R.P.M. of armature. Relay contacts separate .030 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 12-16 volt, 15 cp. Dash and tail lamps are each 12-16 volt, 2 cp. Dome lamp is 12-16 volt, 4 cp. All lamps have single contact base.

FUSES.—Field fuse, mounted on generator frame, is 10 ampere.





DODGE

1923-24-25-26

NORTH-EAST GENERATING, STARTING AND LIGHTING SYSTEM
DODGE-NORTH-EAST IGNITION

BATTERY.—Willard, Type SJR-26, also **Exide,** 12 volt, 51.4 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Type 10,205. Distributor Model O, Type 10,004. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oilstone.

Oiling.—Force grease into distributor by means of a grease nipple, using a pressure feed grease gun once every month or 2000 miles.

Timing.—Breaker contacts begin to separate when the exhaust valve in cylinder No. 4 just closes, spark control lever and breaker assembly in the fully retarded position. This is the firing position for No. 1 cylinder.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps are .030 inch.

STARTER-GENERATOR.—Model GA, Type 3804. The direction of rotation is counter-clockwise, looking at the commutator end. Starter and generator are combined into one unit. The unit is chain-connected to the engine crank shaft. Adjust chain so as permit ½ inch up-and-down play midway between the sprockets.

Starter Data.

Torque	R.P.M.	Amperes
6 lb. ft.	460	49
10 lb. ft.	350	78
13 lb. ft.	295	95
16 lb. ft.	233	116
35 lb. ft.	Lock	225

GENERATOR.—Generator current regulation is by reverse series field and third brush system. Rotation is counter-clockwise, viewed from commutator end.

Generator Data

Amperes	Hot Test	R.P.M.	Amperes	Cold Test	R.P.M.
0.0		1000	0.0		900
5.0		1200	5.5		1100
7.0		1200	8.0		1200
8.0		1800	9.0		1800
6.0		3400	7.0		3800

Charging rate is varied by adjusting the third brush. The position of the brush is adjustable by a rack and pinion movement, operated by turning a screw, exposed in commutator end plate. The adjusting screw is the upper one. It is necessary to first loosen the lower screw one or two turns, in order to unlock the third brush plate. Turn the upper screw in a clockwise direction (looking at commutator end) to increase the charging rate, and in counter-clockwise direction to decrease the charging rate. Tighten the lower screw after making the adjustment. Maximum current output must not exceed 10 amperes. Main and third brush tension is 1-1¼ pounds.

Oiling.—Put 4 or 5 drops of light engine oil in rear bearing oiler of starter-generator every 2000 miles.

RELAY.—Relay is mounted with the starting switch. Relay closes at 10 miles per hour, or 1050 R.P.M. of armature, and opens at 8½ miles per hour, or 900 R.P.M. of armature. Relay contacts separate .030 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well-worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 12-16 volts, 21 cp. Dash and tail lamps are each 12-16 volts, 2 cp. Dome lamp is 12-16 volts, 4 cp. All lamps have single contact base.

FUSES.—Field fuse, mounted on generator frame, is 10 amperes.

DODGE

LATE 1926

NORTHEAST GENERATING, STARTING AND LIGHTING SYSTEM

NORTHEAST IGNITION

BATTERY.—Willard, Type SJRR-4. 6 volt. Starting capacity is 125 amperes for 20 minutes. Lighting capacity is 5 amperes for 21 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model 17,232-A. Distributor Model 10,786. Breaker contacts separate .020 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone. Distributor is of the semi-automatic type. Manual advance is 20°. Automatic advance is 25°.

Mounting.—Ignition coil is mounted on cylinder head at front of engine. Distributor is mounted at right front of engine. To remove distributor, disconnect manual advance rod and remove distributor head. Then remove set screw and lift distributor from place. This set screw must always be kept tight when the distributor is in operation on the car.

Oiling.—Put a few drops of medium machine oil in the oiler on the side of the distributor housing every 2000 miles. At the same time lift the rotor button from place and put 2 or 3 drops of oil on the felt pad in the center of the breaker cam. Once each season place a small bit of medium heavy grease (No. 4 Keystone or equivalent) on the face of the breaker cam.

Timing.—Breaker contacts begin to separate when the piston entering power stroke reaches a position 8° past top dead center (measured on the flywheel) with the spark control lever in the fully retarded position. To check timing, retard spark lever and crank engine until piston No. 1 enters compression stroke. This is the upward stroke of the piston with both valves closed and may be checked by removing the spark plug and holding the thumb over the opening when the escaping air can be felt. Crank engine until piston reaches top dead center. On cars with ignition marking on flywheel, this point can be checked by observing the flywheel marking through the peephole in the flywheel case. The peephole is on the front of the flywheel case at the right of the engine. The top dead center mark is C/1-4. Then crank engine over 8° until the ignition marking "I" on the flywheel is opposite the mark on the edge of the flywheel case. At this point the exhaust valve in cylinder No. 4 is just closing and ignition can be set from this on cars without flywheel markings. The breaker contacts should just begin to separate at this point.

To set timing, loosen clamp screw in manual advance rod and turn distributor until oil cup is approximately above advance rod arm. Then tighten clamp screw and loosen mounting set screw. Lift distributor and disengage gears. Then rotate rotor button until it reaches a position just coming into line with segment connected to spark plug in cylinder No. 1. Remesh gears and tighten set screw. Then loosen clamp screw again and turn distributor until breaker contacts just begin to separate. Tighten the clamp screw. With proper setting of contacts breaker contacts will open by rocking the distributor rotor, the back lash of the gears being sufficient for this purpose.

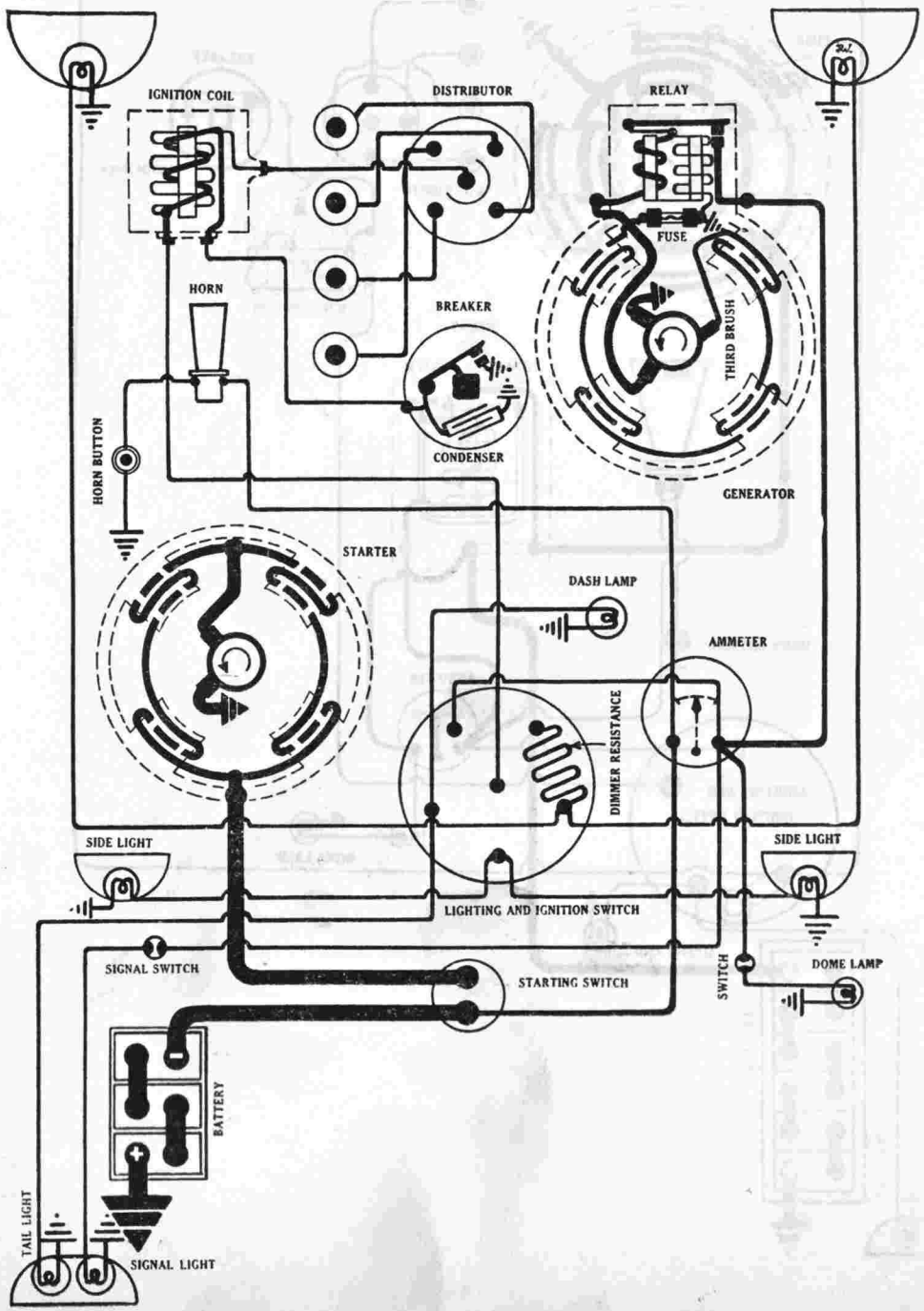
Firing Order.—The firing order is 1-3-4-2.

Spark Plugs.—Spark plugs are S. A. E. Standard 7/8-18. Gaps are .025-.030 inch.

STARTER.—Type 6304-A (Four Brush) Superseded by Type 6304 (Two Brush). Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension is 2¼ pounds each. Starter switch is Model 15380.

Starter Data

Torque	R.P.M.	Volts	Amperes
4 lb. ft.	1200	4.9	220
6 "	900	4.6	280
7 "	600	4.6	350
9 "	300	3.8	430
12 "	Lock	3.4	500



DODGE

LATE 1926

NORTHEAST GENERATING, STARTING AND LIGHTING SYSTEM
NORTHEAST IGNITION

Mounting.—Starter is mounted at left of engine by a Standard S. A. E. No. 2 flange mounting. To remove starter, remove four mounting screws and slide starter forward from place.

Oiling.—Starter bearings are of the oilless type. They require no attention.

GENERATOR.—Model LR, Type 6334, Superseded by Type 6334-B. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust charging rate, loosen the screw marked "Lock" on the generator end plate and shift the third brush by turning the other screw marked "Adjust," located near the lock screw on the generator end plate. Tighten the lock screw after making the adjustment. With standard setting, the maximum charging rate is 15-16 amperes (hot) reached at 1200 R.P.M. of the armature or 23-25 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
8	8	510	8	8	620
12	8	700	12	8	800
16	8	740	14.5	8	1000
19.8	8	1000	14.5	8	1200
19	8	1200	12	8	1600

Running as a motor at 600 R.P.M. generator takes 2-3 amperes at 6.25 volts. Shunt field current is 4 amperes at 6.5 volts. Tested separately each coil draws 17 amperes at 5 volts. The brush tension is 1-1¼ pounds. A six ampere fuse is located in the shunt field circuit.

Mounting.—Generator is strap mounted at right of engine. To remove generator, disconnect generator lead and drive coupling. Loosen clamping strap nut and slide generator from place.

Oiling.—Put a few drops of medium oil in the oilers at each end of the generator every 2000 miles.

RELAY.—Model 15850. Relay is mounted on top of the generator. Relay contacts close when the voltage of the generator reaches 7-7.25 volts at approximately 425 R.P.M. or 10 M.P.H. Charging current at closing of contacts is 1-2 amperes. Relay opens with a discharge current of 1-2 amperes. Contacts separate .015 inch. Air gap between relay armature and coil core is .030 inch, contacts closed.

LIGHTING.—Briggs and Stratton Switch Model 40260. Head and stop lamps are each 6-8 volt, 21 cp. S. C. Dash and tail lamps are each 6-8 volt, 3 cp. S. C. Dome lamp is 6-8 volt, 4 cp.

DODGE

1927

NORTHEAST GENERATING, STARTING AND LIGHTING SYSTEM

NORTHEAST IGNITION

BATTERY:—Willard, Type SJRR-4. 6 volt. Starting capacity is 125 amperes for 20 minutes. Lighting capacity is 5 amperes for 21 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Type 17,232. Distributor Type 10,786. Breaker contacts separate .020 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone. Distributor is of the semi-automatic type. Manual advance is 20°. Automatic advance is 25°.

Mounting:—Ignition coil is mounted on cylinder head at front of engine. Distributor is mounted at right front of engine. To remove distributor, disconnect manual advance rod and remove distributor head. Then remove set screw and lift distributor from place. This set screw must always be kept tight when the distributor is in operation on the car.

Oiling:—Put a few drops of medium machine oil in the oiler on the side of the distributor housing every 2000 miles. At the same time lift the rotor button from place and put 2 or 3 drops of oil on the felt pad in the center of the breaker cam. Once each season place a small bit of medium heavy grease (No. 4 Keystone or equivalent) on the face of the breaker cam.

Timing.—Breaker contacts begin to separate when the piston entering power stroke reaches a position 8° past top dead center (measured on the flywheel) with the spark control lever in the fully retarded position. To check timing, retard spark lever and crank engine until piston No. 1 enters compression stroke. This is the upward stroke of the piston with both valves closed and may be checked by removing the spark plug and holding the thumb over the opening when the escaping air can be felt. Crank engine until piston reaches top dead center. This point can be checked by observing the flywheel marking through the peephole in the flywheel case. The peephole is on the front of the flywheel case at the right of the engine. The top dead center mark is C/1-4. Then crank engine over 8° until the ignition marking "I" on the flywheel is opposite the mark on the edge of the flywheel case The breaker contacts should just begin to separate at this point.

To set timing, loosen clamp screw in manual advance rod and turn distributor until oil cup is approximately above advance rod arm. Then tighten clamp screw and loosen mounting set screw. Lift distributor and disengage gears. Then rotate rotor button until it reaches a position just coming into line with segment connected to spark plug in cylinder No. 1. Remesh gears and tighten set screw. Then loosen clamp screw again and turn distributor until breaker contacts just begin to separate. Tighten the clamp screw. With proper setting of contacts breaker contacts will open by rocking the distributor rotor, the back lash of the gears being sufficient for this purpose.

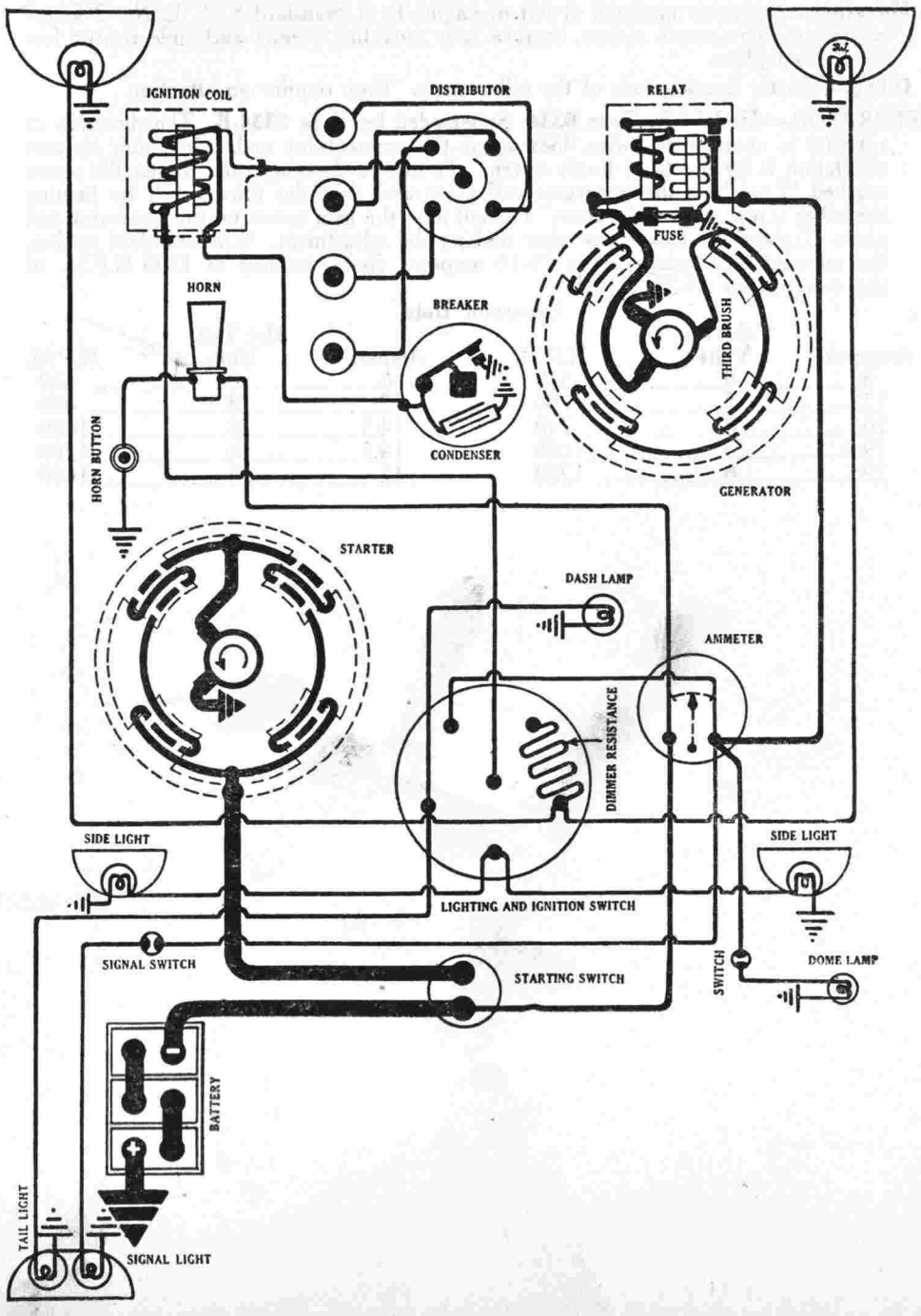
Firing Order:—The firing order is 1-3-4-2.

Spark Plugs:—Spark plugs are S.A.E. Standard 7/8-18. Gaps are .025-.030 inch.

STARTER:—Type 6304-A (Four Brush) Superseded by Type 6304 (Two Brush). Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension is 2¼ pounds each. Starter switch is Model 15380.

Starter Data

Torque	R.P.M.	Volts	Amperes
4 lb. ft.	1200	4.9	220
6 "	900	4.6	280
7 "	600	4.6	350
9 "	300	3.8	430
12 "	Lock	3.4	500



DODGE

1927

NORTHEAST GENERATING, STARTING AND LIGHTING SYSTEM
NORTHEAST IGNITION

Mounting.—Starter is mounted at left of engine by a Standard S. A. E. No. 2 flange mounting. To remove starter, remove three mounting screws and slide starter forward from place.

Oiling:—Starter bearings are of the oilless type. They require no attention.

GENERATOR:—Model LR, Type 6334, Superseded by Type 6334-B. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust charging rate, loosen the screw marked "Lock" on the generator end plate and shift the third brush by turning the other screw marked "Adjust," located near the lock screw on the generator end plate. Tighten the lock screw after making the adjustment. With standard setting, the maximum charging rate is 15-16 amperes (hot) reached at 1200 R.P.M. of the armature or 23-25 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
8	8	510	8	8	620
12	8	700	12	8	800
16	8	740	14.5	8	1000
19.8	8	1000	14.5	8	1200
19	8	1200	12	8	1600

Running as a motor at 600 R.P.M. generator takes 2-3 amperes at 6.25 volts. Shunt field current is 4 amperes at 6.5 volts. Tested separately each coil draws 17 amperes at 5 volts. The brush tension is 1-1¼ pounds. A six ampere fuse is located in the shunt field circuit.

Mounting:—Generator is strap mounted at right of engine. Te remove generator, disconnect generator lead and drive coupling. Loosen clamping strap nut and slide generator from place.

Oiling:—Put a few drops of medium oil in the oilers at each end of the generator every 2000 miles.

RELAY:—Type 15850. Relay is mounted on top of the generator. Relay contacts close when the voltage of the generator reaches 7-7.25 volts at approximately 425 R.P.M. or 10 M.P.H. Charging current at closing of contacts is 1-2 amperes. Relay opens with a discharge current of 1-2 amperes. Contacts separate .015 inch. Air gap between relay armature and coil core is .030 inch, contacts closed.

LIGHTING:—Briggs and Stratton Switch Model 40260. Head and stop lamps are each 6-8 volt, 21 cp. S.C. Dash and tail lamps are each 6-8 volt, 3 cp. S.C. Dome lamp is 6-8 volt, 4 cp.

DODGE

NEW FOUR. SERIES 128 (1927)
NORTHEAST GENERATING, STARTING AND LIGHTING SYSTEM
NORTHEAST IGNITION

BATTERY:—Willard, Type WR-13, 6 volt. Starting capacity is 98 amperes for 20 minutes. Lighting capacity is 5 amperes for 17 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Type 19232. Distributor Type 10826. Breaker contacts separate .020 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Maximum manual advance is 20°. Automatic advance begins at 400 R.P.M. (flywheel). Maximum automatic advance is 26° (flywheel) reached at 2200 R.P.M.

Mounting:—Ignition coil is mounted on the back of the dash. Distributor is mounted on the top of the cylinder block between cylinders 2 and 3. To remove distributor, disconnect primary lead and manual advance rod and remove head with high tension cables attached. Then remove set screw in side of distributor shaft housing and lift distributor from place.

Oiling:—Put a few drops of medium machine oil in the oiler on the side of the distributor housing every 2000 miles. At the same time remove the rotor button and put two or three drops of oil on the felt wick in the oiler in the center of the shaft. Once each season put a small bit of cup grease on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when piston No. 1 reaches a position before top dead center when the ignition mark 'I' on the flywheel is opposite the notch in the flywheel housing peephole on the left side of the flywheel housing. This mark is 12° before the top dead center mark. The manual advance lever must be in the fully advanced position. To check timing, crank engine until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Fully advance spark control lever and continue to crank engine until the flywheel mark 'I' is opposite the notch in the peephole. If the breaker contacts do not separate at this point, loosen advance arm clamp screw and rotate distributor housing until contacts begin to separate. Tighten the clamp screw. With proper setting the backlash of the gears should be sufficient to open and close contacts. This can be checked by watching the dash ammeter while rocking the distributor shaft backward and forward. The ammeter should fluctuate between '0' and discharge.

Valve Timing:—INLET VALVES:—Tappet clearance should be .004-.006 inch. Inlet valves open 3° after top dead center and close 46° after lower dead center. EXHAUST VALVES:—Tappet clearance should be .004-.006 inch. Exhaust valves open 42° before lower dead center and close 1° after top dead center. Valve stem guides are removable. Oversize valve stems are made. The top dead center position on the flywheel is markd by 'DC/1+4'.

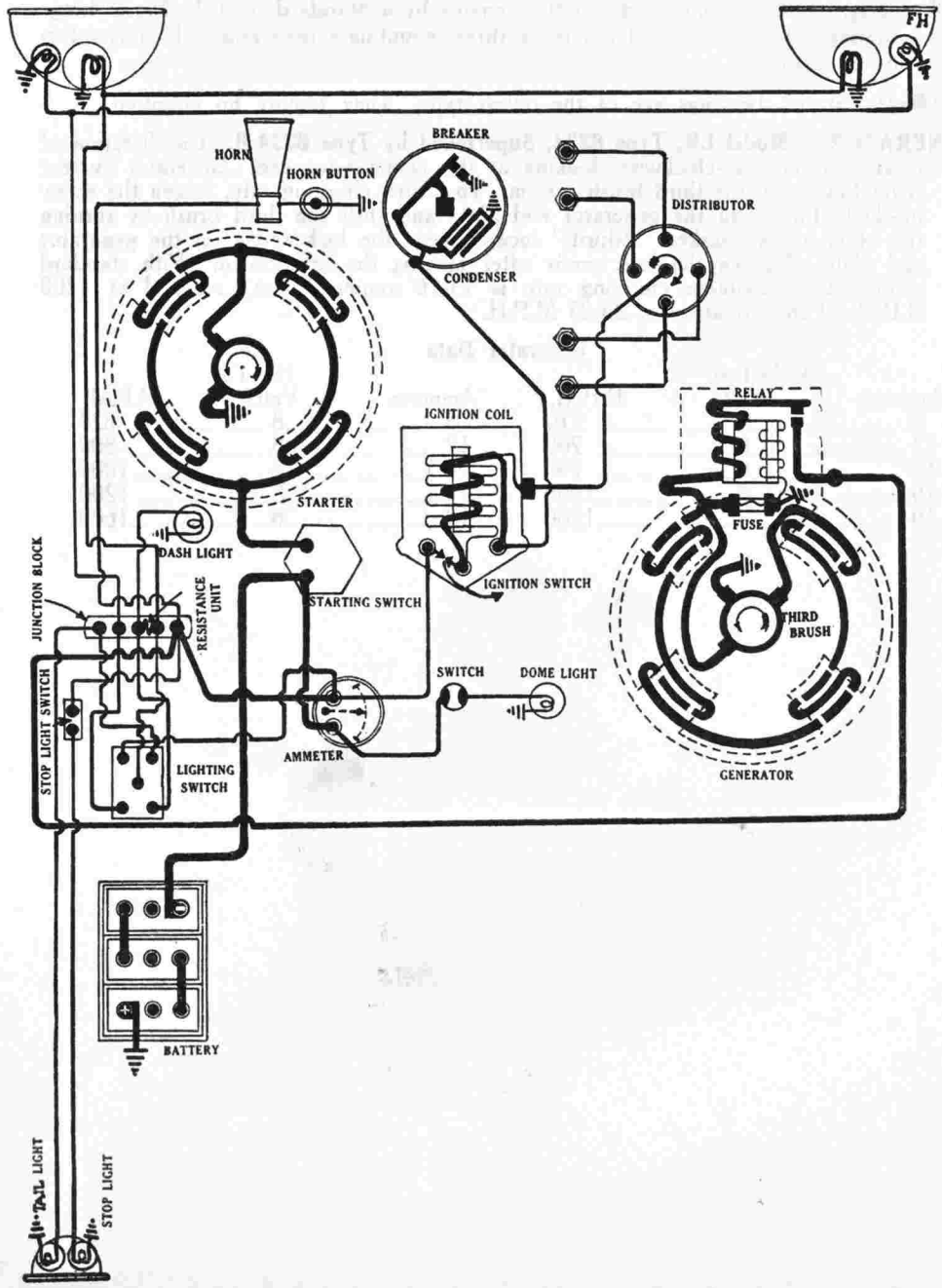
Firing Order:—The firing order is 1-3-4-2.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .030 inch.

STARTER:—Model SB Type 6404. Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush spring tension is 3 pounds.

Starter Data

Torque	R.P.M.	Volts	Amperes
4 lb. ft	1200	5.2	190
5.5 "	900	4.8	250
7.6 "	600	4.5	320
10.3 "	300	4.0	420
13.6 "	Lock	3.3	532



DODGE

NEW FOUR. SERIES 128 (1927)
NORTH EAST GENERATING, STARTING AND LIGHTING SYSTEM
NORTH EAST IGNITION

Mounting:—Starter is mounted at left of engine on forward side of flywheel housing by standard S.A.E. No. 1 flange mounting. To remove starter, discconect starter cable and remove three flange mounting bolts. Then pull starter forward and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model LB Type 6384. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator charging rate, loosen the lockscrew on the commutator endplate and turn the adjusting screw to shift the third brush. Shifting the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. Tighten the lock screw after making the adjustment. The maximum charging rate of 15 amperes (hot) is reached at 1400 R.P.M.

Generator Data

Cold Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
8.25	800	6	800
15.25	1000	11	1000
17.5	1200-1400	13.25	1200
16.75	1600	14	1400
15.5	1800	13.5	1600
14.5	2000	12	2000

Generator brush spring tension is 12-16 ounces.

Mounting:—Generator is flange mounted on right of engine at rear of timing chain case. The tension of the timing chain is adjusted by loosening the flange mounting cap screws and moving the generator around the lower cap screw as a pivot. Do not set timing chain too tight. There should be sufficient looseness for the chain to run quietly. To remove generator, disconnect the generator wire and remove three flange mounting cap screws. Then pull generator to the rear and lift from place. With the generator out do not crank engine or disturb position of generator drive sprocket as this will affect valve timing.

Oiling:—Put a few drops of medium machine oil in each of the generator bearing oilers every 2000 miles.

RELAY:—Type 15850. Relay is mounted on the generator. Relay closes at 750 R.P.M. when the generator voltage reaches 6.75 volts and opens when the voltage drops to 5.75-6.0 volts with a discharge current of 1-2 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .020-.025 inch. Air gap between relay armature and coil core stop pin is .015 inch with contacts closed.

LIGHTING:—Head lamps are 6-8 volt, 21 cp. S.C. Stop lamp is 6-8 volt, 15 cp. S.C. Dome lamp is 6-8 volt, 6 cp. S.C. Side, dash and tail lamps are each 6-8 volt, 3 cp. S.C.

Switches:—Lighting switch is mounted on the side of the steering column. The ignition switch is incorporated in the ignition coil.

FUSES:—Generator field fuse is 6 amperes.

DODGE

SENIOR LINE—SIX CYLINDER MODEL (1927)
NORTHEAST GENERATING, STARTING AND LIGHTING SYSTEM
NORTHEAST IGNITION

BATTERY:—Willard, Type SJRR-5, 6 volt. Starting capacity is 145 amperes for 20 minutes. Lighting capacity is 5 amperes for 26 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Type 19232. Distributor Type 10836. Breaker contacts separate .020 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Maximum manual advance is 20°. Automatic advance begins at 400 R.P.M. Maximum automatic advance is 20° at 2200 R.P.M.

Mounting:—Ignition coil is mounted on the dash. Distributor is mounted on the cylinder head between cylinders 3 and 4. To remove distributor, disconnect primary lead and manual advance rod and remove distributor head with high tension cables intact. Then remove set screw on side of distributor mounting and lift distributor from place.

Oiling:—Put a few drops of medium machine oil in the oiler on the side of the breaker housing every 2000 miles. At the same time remove the rotor button and put 2 or 3 drops of oil on the felt wick in the center of the shaft. Once each season put a small amount of heavy grease on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when piston No. 1 entering power stroke reaches a position before top dead center when the flywheel mark 'IGN' is opposite the notch in the flywheel housing peephole. This is 10° before top dead center. The manual advance lever must be in the fully advanced position. To check timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance manual spark control lever and continue to crank engine until the flywheel mark 'IGN' is opposite the notch in the peephole on the left side of the engine. The breaker contacts should just separate. If they do not, loosen clamp screw in manual advance arm and rotate distributor housing until contacts begin to separate. Tighten the clamp screw. If setting is correctly made the back lash of the gears will be sufficient to open and close contacts. This can be checked by watching dash ammeter while rocking distributor.

Valve Timing:—INLET VALVES open at top dead center and close 48° after lower dead center.

EXHAUST VALVES open at 50° before lower dead center and close 6° after top dead center.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .030 inch.

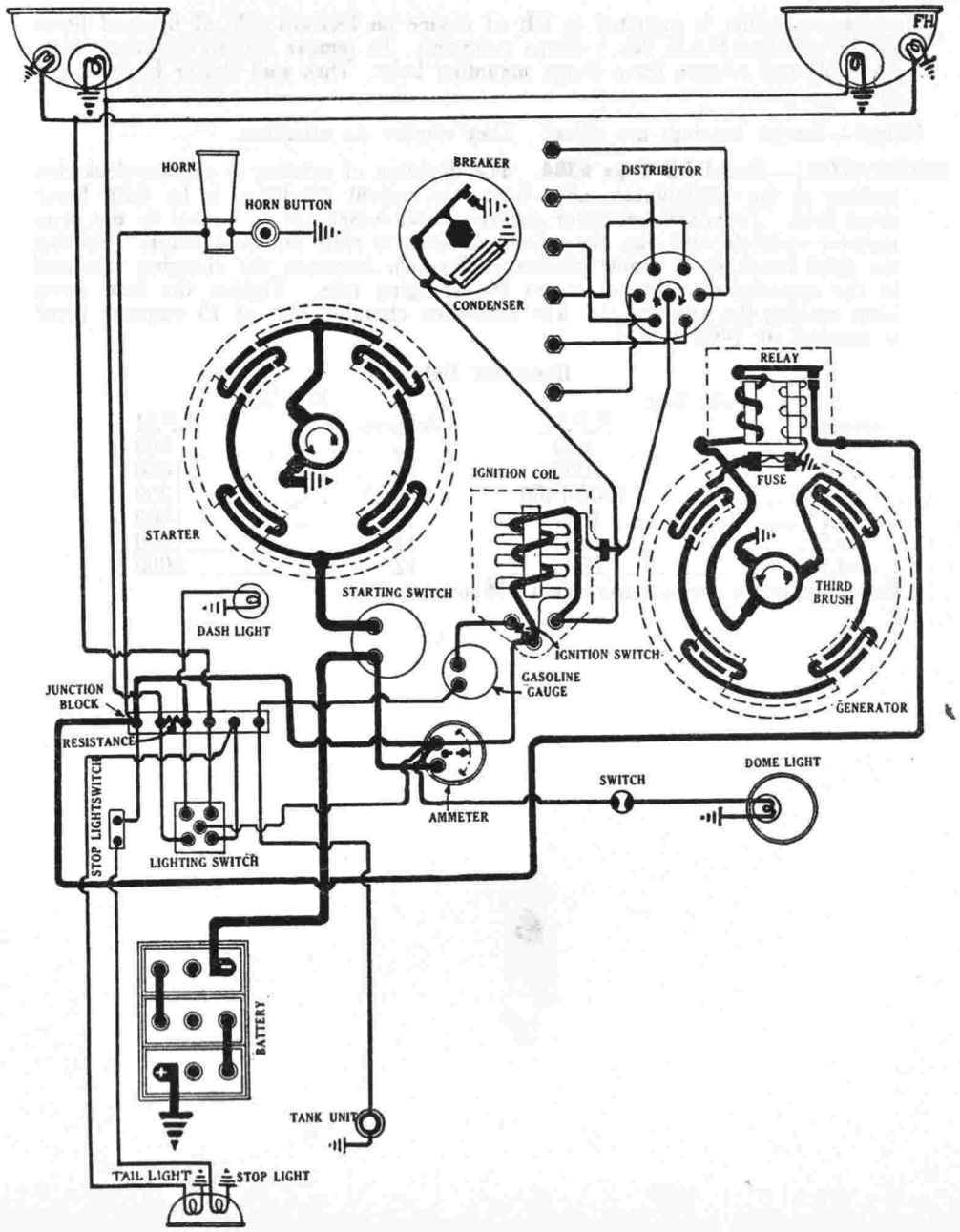
STARTER:—Model SB Type 6400. Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush spring tension is 3 pounds. Starter switch is Model 15380.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	1700	5.6	120
2.4 "	1500	5.5	140
3.9 "	1200	5.25	180
5.75 "	900	4.9	245
8.25 "	600	4.5	320
11.9 "	300	4.0	425
16 "	Lock	3.1	550

Mounting:—Starter is flange mounted by standard S.A.E. No. 1 flange at left of engine on forward side of flywheel housing. To remove starter, disconnect starter cable and remove three flange mounting cap screws. Then slide starter forward and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.



DODGE

SENIOR LINE—SIX CYLINDER MODEL (1927)
NORTH EAST GENERATING, STARTING AND LIGHTING SYSTEM
NORTH EAST IGNITION

GENERATOR:—Model LB. Type 6390. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen the lock screw on the commutator endplate and turn the third brush adjusting screw which shifts the third brush mounting plate. Tighten the lock screw after making the adjustment. The maximum output is 15 amperes (hot) at 8 volts reached at 1500 R.P.M. of the armature or 20-24 M.P.H.

Generator Data

Cold Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
5	800	2	800
14	1000	9.5	1000
18.25	1200	13.25	1200
19.5	1400	14.75	1400
19.0	1500	15.0	1500
18.75	1600	14.75	1600
18	1800	14.25	1800
16.5	2000	13.5	2000

Brush spring tension is 12-16 ounces.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. The tension of the timing chain is adjusted by loosening generator flange cap screws and moving generator around lower capscrew as a pivot. Do not set timing chain too tight. The chain should be loose enough to run quietly.

Oiling:—Put a few drops of medium machine oil in each of the generator oilers every 2000 miles.

RELAY:—Type 1580. Relay is mounted on the generator. Relay closes at 770 R.P.M. when the generator voltage reaches 6.75 volts and opens when the generator voltage falls off to 5.75-6.0 volts with a discharge current of 1-2 amperes. Charging current at closing of contacts should be approximately 2 amperes. Relay contacts separate .020-.025 inch. Air gap between relay armature and coil core is .015 inch.

LIGHTING:—Kellogg Lighting Switch is mounted on side of steering column. Head lamps are 6-8 volt, 21 cp. S.C. Stop lamp is 6-8 volt, 15 cp. S.C. Dome lamp is 6-8 volt, 6 cp. S.C. Dash, tail and side lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Generator field fuse mounted on top of generator is 6 amperes.

DODGE

STANDARD SIX (1928)
NORTH EAST GENERATING, STARTING AND LIGHTING SYSTEM
NORTH EAST IGNITION

BATTERY:—Willard, Type SJWR-4. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours. Battery is 6 volt, having 13 plates, each 5¾ inches wide, 5¼ inches high and ⅛ inch thick. The negative (—) terminal is grounded. Battery is mounted under front seat on left side.

IGNITION:—Coil Type 19232. Ignition switch is located in coil. Coil is mounted on rear of instrument board. Ignition current is 1.0 amperes at 6 volts with engine running, and 5½ amperes at 6 volts with engine stopped.

Distributor Type 10846. Breaker contacts separate .020 inch. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Double contacts are used set to open at the same instant. This is important and contacts should be synchronized when ignition is checked. Distributor is semi-automatic. Maximum manual advance is 20° (flywheel). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 20° (engine) reached at 2200 R.P.M. Breaker arm spring tension is 16 ounces.

Oiling:—Put a few drops of medium oil in the oiler on the side of the distributor housing. Remove rotor button and oil the felt wick in the center of the shaft. Put a small amount of vaseline on the face of the breaker cam under the fiber bumpers of the contact arms.

Mounting:—Distributor is mounted on cylinder head between cylinders 3 and 4. To remove distributor, disconnect manual advance rod and disconnect primary lead. Then remove head with high tension cables intact. Remove set screw in side of distributor mounting and lift distributor straight up.

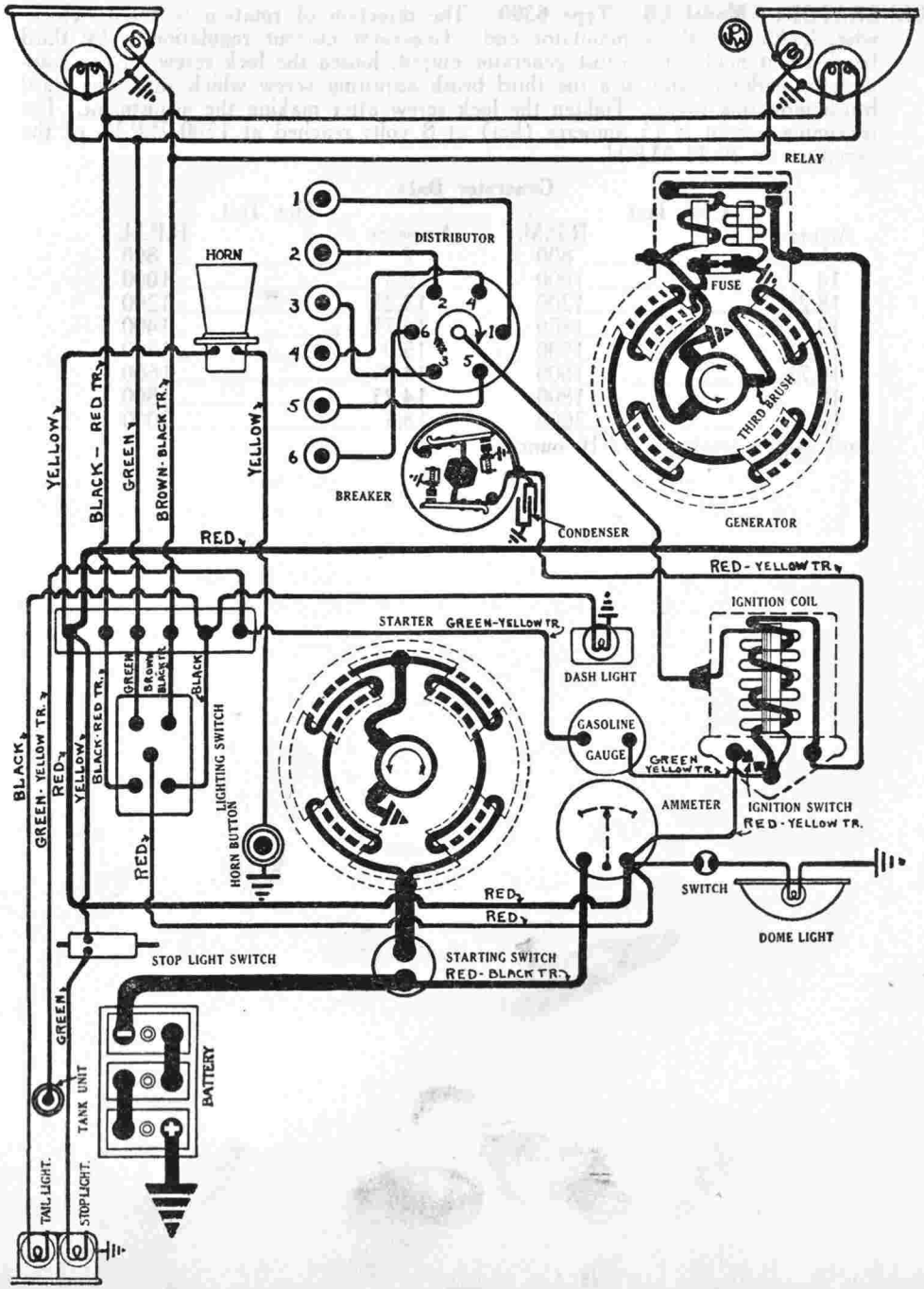
Timing:—Breaker contacts begin to separate with Piston No. 1 before top dead center entering power stroke when flywheel mark 'IGN' is in center of the peephole in the left side of the flywheel housing under the starter. The manual spark lever must be fully advanced. The ignition mark on the flywheel is 4 degrees before top dead center. To set timing, crank engine until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Fully advance spark control lever and continue to crank engine until the flywheel mark is in the center of the peephole. Loosen advance arm clamp screw and rotate distributor until contacts begin to separate. Tighten the clamp screw. With correct setting the backlash of the gears should be sufficient to open and close contacts. If ignition switch is turned on the ammeter will swing from '0' to 'Discharge' as the gears are rocked. Check the synchronization of the contacts to make certain that they open at the same instant.

VALVE TIMING:—INLET VALVES:—Head diameter, 1 21/32 inches; stem diameter, .371 inch; valve length, 5 23/32 inches (over all). Valve lift, 5/16 inch. Tappet clearance, .004-.008 inch (hot). Spring pressure, 75 pounds (valve open). Inlet valves open at top dead center and close 48 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 17/32 inches; stem diameter, .370 inch; valve length, 5 23/32 inches (over all). Valve lift, 5/16 inch. Tappet clearance, .004-.008 inch (hot). Spring pressure, 75 pounds (valve open). Exhaust valves open 50 degrees before lower dead center and close 6 degrees after top dead center.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Gaps are .025 inch.



DODGE

STANDARD SIX (1928)

NORTHEAST GENERATING, STARTING AND LIGHTING SYSTEM
NORTHEAST IGNITION

STARTER:—Model SB Type 6404. Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 100 R.P.M. drawing 165-180 amperes at 5.5 volts. Brush spring tension is 3 pounds. Starter switch mounted on floorboard is Type 20238.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	1700	5.6	120
2.4 "	1500	5.5	140
3.9 "	1200	5.25	180
5.75 "	900	4.9	245
8.25 "	600	4.5	320
11.9 "	300	4.0	425
16 "	Lock	3.1	550

Mounting:—Starter is mounted at left of engine on forward side of flywheel housing by standard S.A.E. No. 1 flange mounting. To remove starter, disconnect cable and remove three flange mounting cap screws. Then pull starter forward and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model LB Type 6390-A. The direction of rotation is counter-clockwise, looking at commutator end. Generator current regulation is by third brush shunt field. To adjust charging rate, turn the slotted adjusting pinion extending through the generator end plate. Turn the pinion in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush mounting plate is held in position by friction washers. The standard charging rate is 14 amperes (hot) reached at 1400 R.P.M. or 25-30 M.P.H.

Generator Data

Cold Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
8	800	6	800
14.5	1000	10.5	1000
17.5	1200	13.25	1200
17.5	1400	13.75	1400
16.75	1600	13.5	1600
15.5	1800	13	1800
14.5	2000	12	2000
12	2400	10.5	2400

Brush spring tension is 12-16 ounces. Shunt field current is 8 amperes at 6 volts. Running as a motor, generator draws 12 amperes at 6 volts. A 6-ampere field fuse is mounted on the top of the generator.

Mounting:—Generator is flange mounted on the right of the engine at the rear of the timing chain case. To remove generator, disconnect lead and remove three flange mounting cap screws. Then pull generator straight to the rear.

Adjustment of Timing Chain Tension. Timing chain is adjusted by shifting generator around the lower flange mounting screw as a pivot. To adjust chain, loosen cap screws and shift generator away from the engine until the timing chain hums when engine is running. Then back up generator until chain operates noiselessly and tighten the screws. The chain should be loose enough to run without noise.

Oiling:—Put a few drops of medium oil in the oiler at each end of the generator every 2000 miles.

RELAY:—Type 20220. Relay is mounted on top of the generator. Contacts close at 600 R.P.M. when generator voltage reaches 6.75 volts, and open when generator voltage drops to 5.75-6.0 volts with a discharge current of 1-2 amperes. Relay contacts separate .020-.025 inch. Air gap is .015 inch with contacts closed.

LIGHTING:—Dodge Brothers Switch. Lighting switch mounted on side of steering column. Head lights are 6-8 volt, 21-21 cp. double filament, Mazda No. 1110. Auxiliary head lights are 6-8 volt, 3 cp. Mazda No. 63. Stop light is 6-8 volt, 15 cp. Mazda No. 87. Dome light is 6-8 volt, 3 cp. Mazda No. 63. Dash and tail lights are 6-8 volt, 3 cp. Mazda No. 63.

FUSES:—Generator field fuse is 6 amperes capacity.

DODGE

VICTORY SIX (1928)

NORTHEAST GENERATING, STARTING AND LIGHTING SYSTEM

NORTHEAST IGNITION

BATTERY:—Willard, Type SJWR-4. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours. Battery is 6 volt, having 13 plates, each 5¾ inches wide, 5¼ inches high and ⅛ inch thick. The negative (—) terminal is grounded. Battery is mounted under front seat on left side.

IGNITION:—Coil Type 19232. Ignition switch is located in coil. Coil is mounted on rear of instrument board. Ignition current is 1.0 amperes at 6 volts with engine running, and 5½ amperes at 6 volts with engine stopped.

Distributor Type 10846. Breaker contacts separate .020 inch. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Double contacts are used, set to open at the same instant. This is important and contacts should be synchronized when ignition is checked. Distributor is semi-automatic. Maximum manual advance is 20° (flywheel). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 20° (engine) reached at 2200 R.P.M. Breaker arm spring tension is 16 ounces.

Oiling:—Put a few drops of medium oil in the oiler on the side of the distributor housing. Remove rotor button and oil the felt wick in the center of the shaft. Put a small amount of vaseline on the face of the breaker cam under the fiber bumpers of the contact arms.

Mounting:—Distributor is mounted on cylinder head between cylinders 3 and 4. To remove distributor, disconnect manual advance rod and disconnect primary lead. Then remove head with high tension cables intact. Remove set screw in side of distributor mounting and lift distributor straight up.

Timing:—Breaker contacts begin to separate with Piston No. 1 before top dead center entering power stroke when flywheel mark 'IGN' is in center of the peephole in the left side of the flywheel housing under the starter. The manual spark lever must be fully advanced. The ignition mark on the flywheel is 4 degrees before top dead center. To set timing, crank engine until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Fully advance spark control lever and continue to crank engine until the flywheel mark is in the center of the peephole. Loosen advance arm clamp screw and rotate distributor until contacts begin to separate. Tighten the clamp screw. With correct setting the backlash of the gears should be sufficient to open and close contacts. If ignition switch is turned on the ammeter will swing from '0' to 'Discharge' as the gears are rocked. Check the synchronization of the contacts to make certain that they open at the same instant.

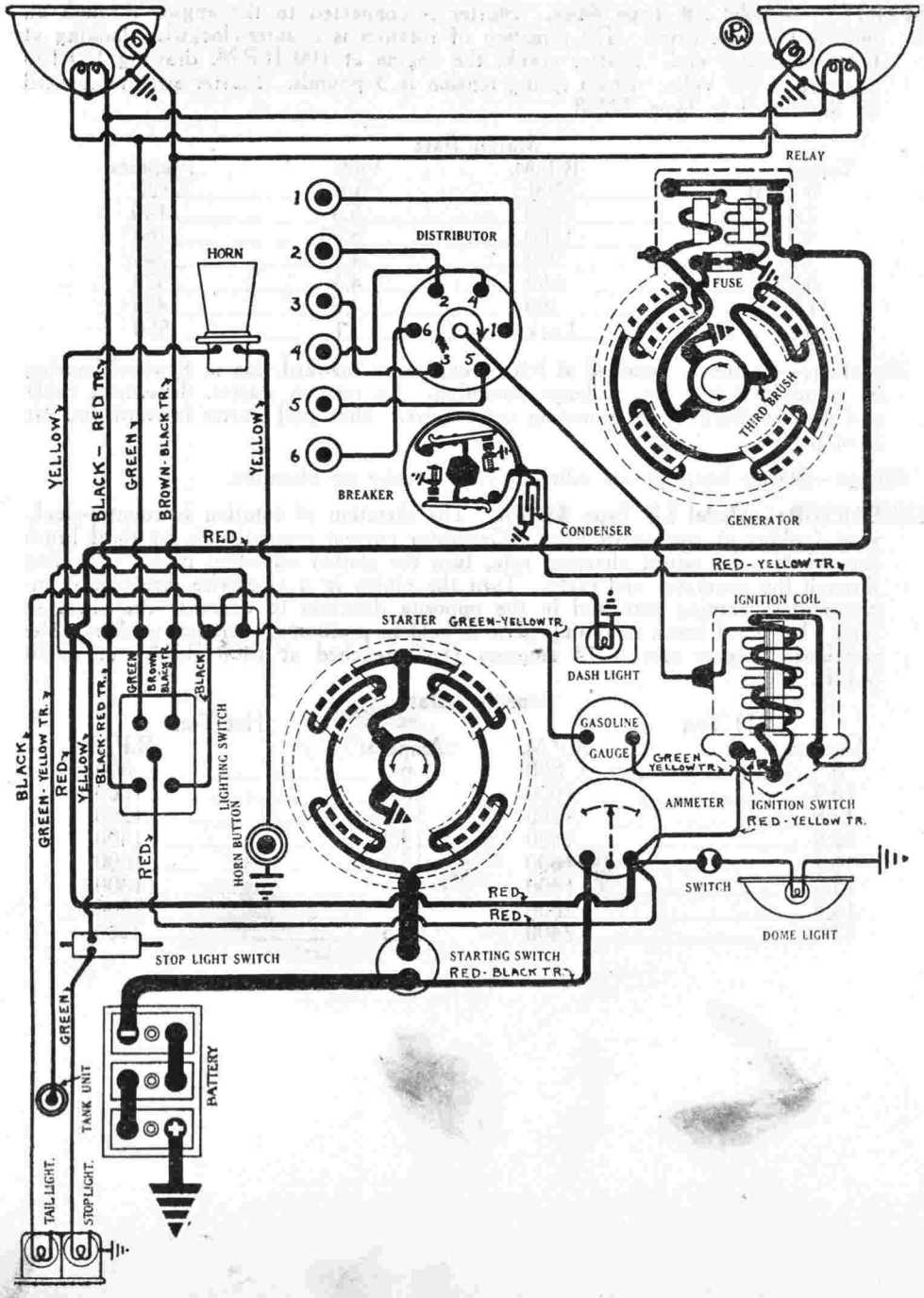
VALVE TIMING:—INLET VALVES:—Head diameter 1 21/32 inches; stem diameter, .371 inch; valve length, 5 23/32 inches (over all). Valve lift, 5/16 inch. Tappet clearance, .004-.008 inch (hot). Spring pressure, 75 pounds (valve open). Inlet valves open at top dead center and close 48 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 17/32 inches; stem diameter, .370 inch; valve length, 5 23/32 inches (over all). Valve lift, 5/16 inch. Tappet clearance, .004-.008 inch (hot). Spring pressure, 75 pounds (valve open). Exhaust valves open 50 degrees before lower dead center and close 6 degrees after top dead center.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Gaps are .025 inch.

STARTER:—Model SB Type 6404. Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 100 R.P.M. drawing 165-180 amperes at 5.5 volts. Brush spring tension is 3 pounds. Starter switch mounted on floorboard is Type 20238.



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DODGE

VICTORY SIX (1928)

NORTHEAST GENERATING, STARTING AND LIGHTING SYSTEM

NORTHEAST IGNITION

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	1700	5.6	120
2.4 "	1500	5.5	140
3.9 "	1200	5.25	180
5.75 "	900	4.9	245
8.25 "	600	4.5	320
11.9 "	300	4.0	425
16 "	Lock	3.1	550

Mounting:—Starter is mounted at left of engine on forward side of flywheel housing by standard S.A.E. No. 1 flange mounting. To remove starter, disconnect cable and remove three flange mounting cap screws. Then pull starter forward and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model LB Type 6390-A. The direction of rotation is counter-clockwise, looking at commutator end. Generator current regulation is by third brush shunt field. To adjust charging rate, turn the slotted adjusting pinion extending through the generator end plate. Turn the pinion in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush mounting plate is held in position by friction washers. The standard charging rate is 14 amperes (hot) reached at 1400 R.P.M. or 25-30 M.P.H.

Generator Data

Cold Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
8	800	6	800
14.5	1000	10.5	1000
17.5	1200	13.25	1200
17.5	1400	13.75	1400
16.75	1600	13.5	1600
15.5	1800	13	1800
14.5	2000	12	2000
12	2400	10.5	2400

Brush spring tension is 12-16 ounces. Shunt field current is 8 amperes at 6 volts. Running as a motor, generator draws 12 amperes at 6 volts. A 6-ampere field fuse is mounted on the top of the generator.

Mounting:—Generator is flange mounted on the right of the engine at the rear of the timing chain case. To remove generator, disconnect lead and remove three flange mounting cap screws. Then pull generator straight to the rear.

Adjustment of Timing Chain Tension. Timing chain is adjusted by shifting generator around the lower flange mounting screw as a pivot. To adjust chain, loosen cap screws and shift generator away from the engine until the timing chain hums when engine is running. Then back up generator until chain operates noiselessly and tighten the screws. The chain should be loose enough to run without noise.

Oiling:—Put a few drops of medium oil in the oiler at each end of the generator every 2000 miles.

RELAY:—Type 20220. Relay is mounted on top of the generator. Contacts close at 600 R.P.M. when generator voltage reaches 6.75 volts, and open when generator voltage drops to 5.75-6.0 volts with a discharge current of 1-2 amperes. Relay contacts separate .020-.025 inch. Air gap is .015 inch with contacts closed.

LIGHTING:—Dodge Brothers Switch. Lighting switch mounted on side of steering column. Head lights are 6-8 volt, 21-21 cp. double filament, Mazda No. 1110. Auxiliary head lights are 6-8 volt, 3 cp. Mazda No. 63. Stop light is 6-8 volt, 15 cp. Mazda No. 87. Dome light is 6-8 volt, 3 cp. Mazda No. 63. Dash and tail lights are 6-8 volt, 3 cp. Mazda No. 63.

FUSES:—Generator field fuse is 6 amperes capacity.

DORRIS

MODEL I (1914) I-A-4 (1915)
MODEL I-A-6 (1916) SERIAL NOS. UNDER 8054
WESTINGHOUSE STARTING AND LIGHTING SYSTEM
WESTINGHOUSE IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. The positive (+) terminal is grounded. There is also a set of dry cells connected in series which can be used for the ignition system.

IGNITION.—The ignition system and generator are combined into one unit. The breaker is operated directly from the armature shaft. The centrifugal weights perform the double duty of closing the breaker contacts and automatically advancing and retarding the spark in relation to the engine speed. When the engine is not running and one of these weights is depressing the fiber bumper, the air gap between the bumper lever and stop is 3/64 inch. This distance must be correct before the contact gap is adjusted. Breaker contacts separate .005 to .006 inch when the contact arm or bumper is resting on the stop. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

Timing.—To time the generator to the engine, first turn the engine until the piston in No. 1 cylinder is on top dead center entering power stroke. Then remove the distributor plate and turn the generator armature back until the mark on the distributor brush holder lines up with the mark on the end bracket. Connect to engine in this position and wire spark plugs to distributor in accordance with the firing order.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps should be .020 to .025 inch.

STARTER.—Starter is connected to the engine through a Bendix drive.

Oiling.—Put several drops of light engine oil in each of the motor oilers every week.

GENERATOR.—Frame No. 280. Generator current regulation is by reverse series field.

Generator Data

Battery Amperes	Total Output	R.P.M.
1	2.2	300
3.6	8	500
7.4	14	1000
9.2	15.5	1500
9.6	16.2	2000
10	17	2500

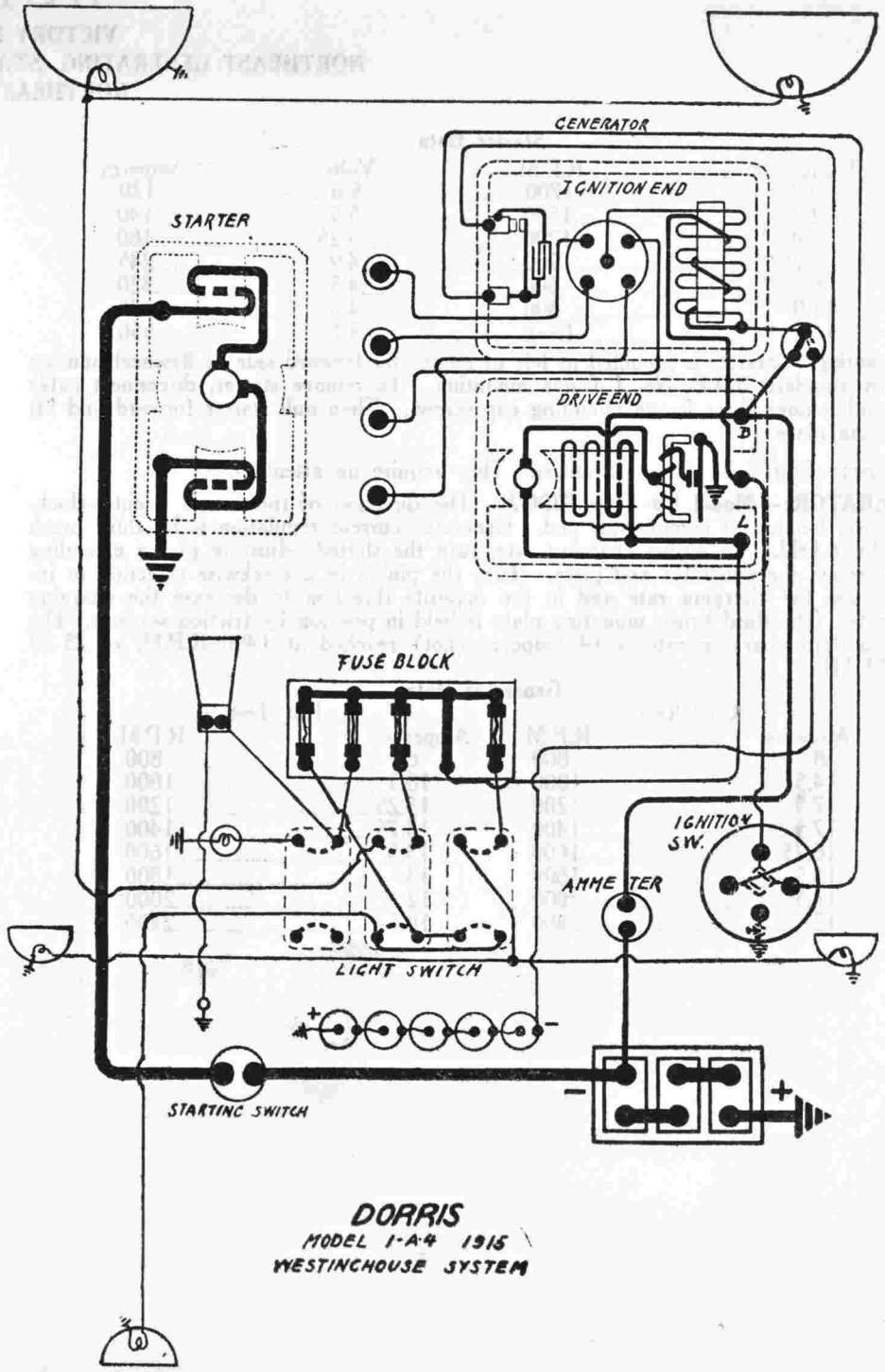
The current for the lights does not pass through the reverse series field, so when the lights are turned on the output automatically increases to supply the extra current used, keeping the charging rate practically constant. Maximum charging rate of 9-10 amperes is reached at 1500 R.P.M. of armature.

Oiling.—Put 4 or 5 drops of light engine oil in the distributor and generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

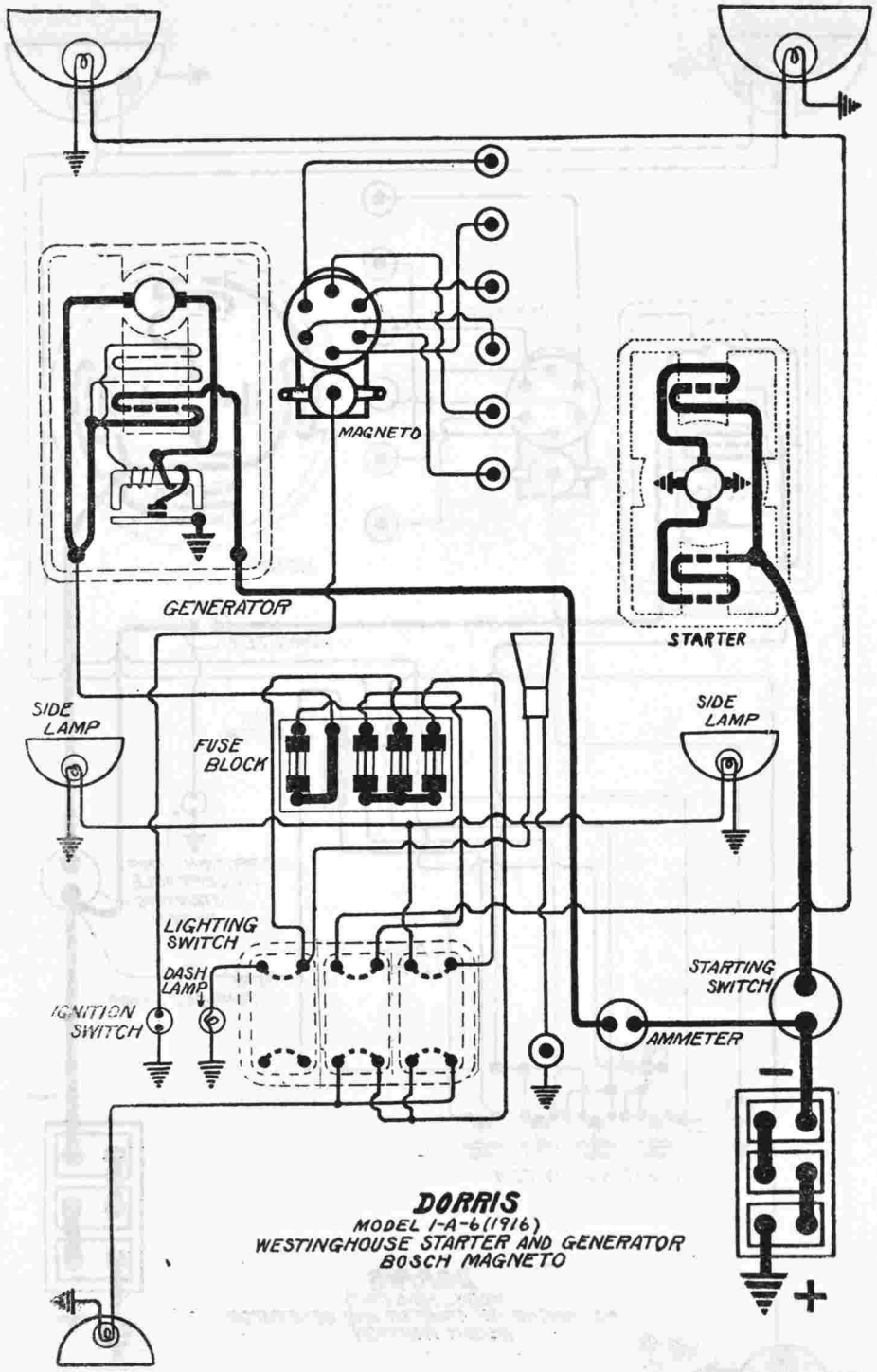
RELAY.—Relay closes at 300 R.P.M. of armature or 8 miles per hour, and opens at 250 R.P.M. or 6 miles per hour. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volts, 15 cp. Dimmer lamps are 6-8 volts, 4 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2-4 cp. All other lamps are 6-8 volts, 4 cp.

FUSES.—Head lamp fuses are 15 ampere. Side lamp fuses are 5 ampere. Dash and tail lamp fuses are 5 ampere.



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DORRIS
MODEL I-A-6 (1916)
WESTINGHOUSE STARTER AND GENERATOR
BOSCH MAGNETO

DORRIS

MODEL IA-6 (1916)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH MAGNETO IGNITION

BATTERY.—Exide, 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Model DU6. Breaker contacts separate .014 to .016 inch. When the condition of the contacts affects the ignition, resurface wtih a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 3 or 4 drops of light engine oil in each of the magneto oilers every month. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER:—Frame No. 315. Starter is connected to the engine through a Bendix drive. The lock torque developed by the starter is 11.5 pound-feet, current being 400 amperes at 4.25 volts. Torque at 1400 R.P.M. is 2 pound-feet, current being 125 amperes at 5.5 volts.

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR.—Model No. 208. Generator current regulation is by reverse series field. Maximum charging rate is 11-15 amperes, reached at 1500 R.P.M. of the armature or 25 miles per hour.

Amperes	Generator Data	R.P.M.
0		425
8		650
11-15		1500

With generator hot, the maximum charging rate reduces to 9-12 amperes. Running freely as a motor, the generator takes 2.5 to 3.5 amperes at 6 to 6.3 volts. The shunt field winding takes 1.5 to 2.5 amperes at 6 to 6.3 volts.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 425-475 R.P.M. of the armature or 8 miles per hour, and opens at 375-425 R.P.M. of the armature or 6 miles per hour. Relay must be adjusted to close when the voltage of the generator reaches 7 to 7.5 volts, battery disconnected. Relay must open when the discharge current from the battery reaches 0-2 amperes. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Side lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

DORRIS

MODEL IB-SIX (1917). MODEL IC-SIX (1918)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH MAGNETO IGNITION

BATTERY.—Exide, 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Model DU6. Breaker contacts separate .014 to .016 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 3 or 4 drops of light engine oil in each of the magneto oilers every month. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model No. 710. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes
0 lb. ft.	4000	40
4 lb. ft.	1000	180
6 lb. ft.	800	230
8 lb. ft.	700	280
14 lb. ft.	Lock	450

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR.—Model No. 208. Generator current regulation is by a reverse series field. Maximum charging rate is 11-15 amperes, reached at 1500 R.P.M. of the armature or 25 miles per hour.

Generator Data

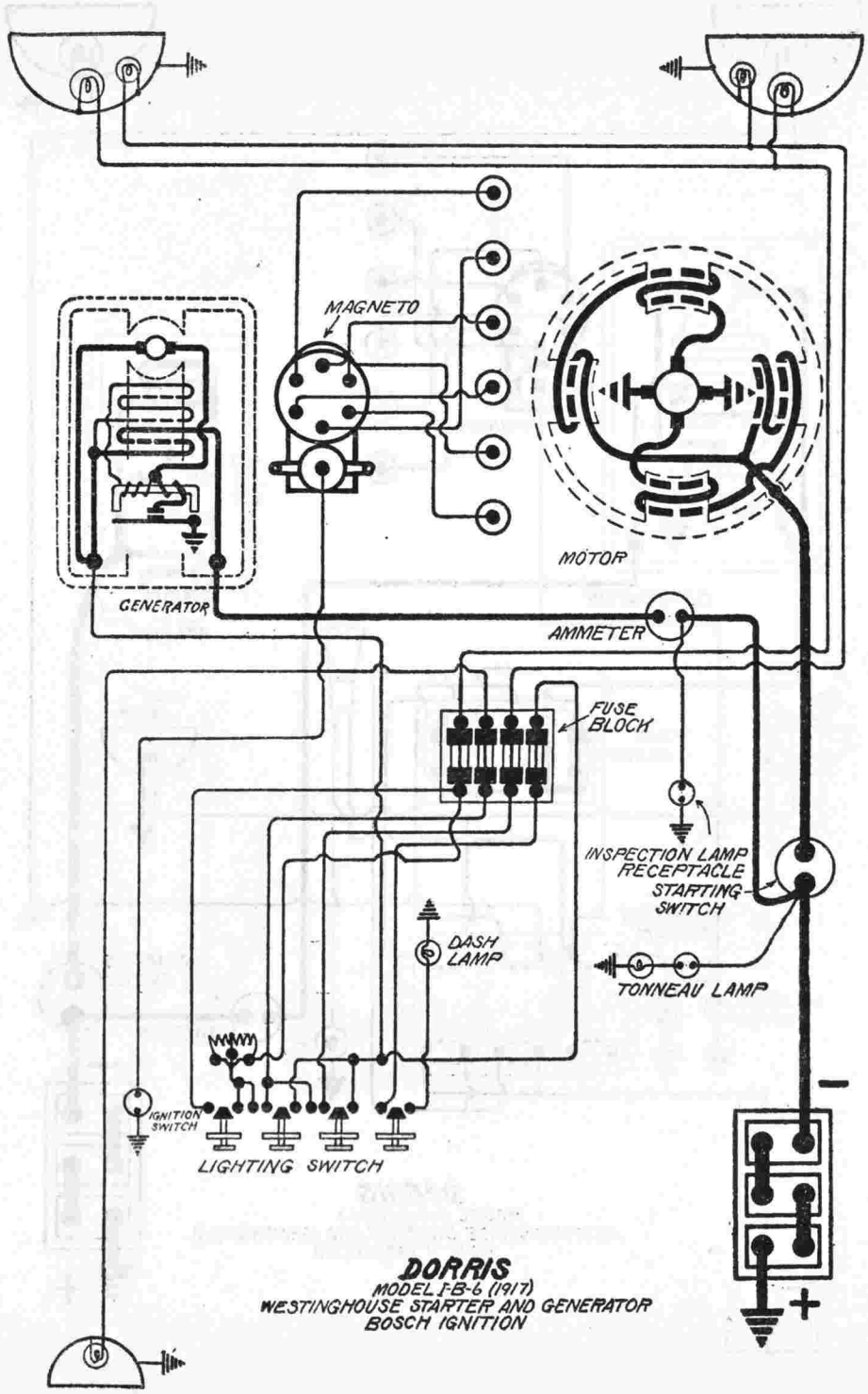
Amperes	R.P.M.
0	425
8	650
11-15	1500

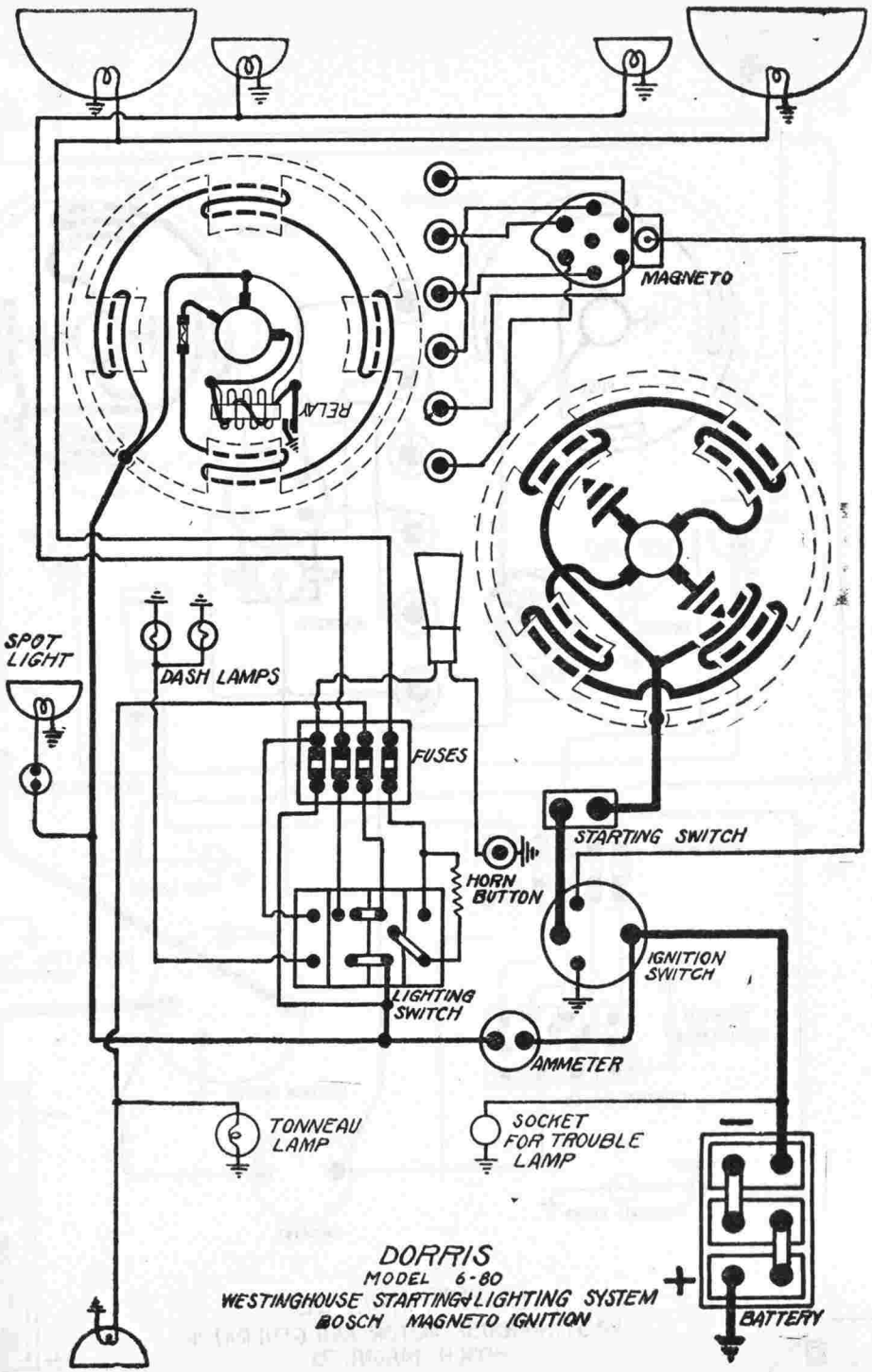
With generator hot, the maximum charging rate reduces to 9-12 amperes. Running freely as a motor, the generator takes 2.5 to 3.5 amperes at 6 to 6.3 volts. The shunt field winding takes 1.5 to 2.5 amperes at 6 to 6.3 volts.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 mies in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 425-475 R.P.M. of the armature or 8 miles per hour, and opens at 375-425 R.P.M. of the armature or 6 miles per hour. Relay must be adjusted to close when the voltage of the generator reaches 7 to 7.5 volts, battery disconnected. Relay must open when the discharge current from the battery reaches 0-2 amperes. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt 15 cp. Side lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.





DORRIS

MODEL 6-80 (1919)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH MAGNETO IGNITION

BATTERY.—Willard, 6 volt, 115 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .014 to .016 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 3 or 4 drops of light engine oil in each of the magneto oilers every month. Put a very small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

TIMING.—Breaker contacts begin to separate when the pison entering power stroke is on top dead center, spark control in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .018 to .023 inch.

STARTER.—Frame No. 751. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes
2.5 lb. ft	1450	140
7.5 lb. ft	1150	200
12.5 lb. ft	650	400
17.5 lb. ft	500	530
21.0 lb. ft	Lock	650

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Frame No. 760. Generator current regulation is by the third brush system. Maximum current output is 15-17 amperes, reached at 1250 R.P.M. of the armature or 16-20 miles per hour.

Generator Data

Amperes	Cold Test	R.P.M.	Amperes	Hot Test	R.P.M.
0		450	0		500
8		675	6		725
12		840	9		850
15-17		1250	12-14		1250
10		2000	7- 8		2000

The cold test readings are obtained with a generator temperature under 95°F. The hot test readings are obtained after the generator has been operated one hour at 1800 R.P.M., charging a half-charged battery. Shunt field current is 2.8 to 3.25 amperes when 6 volts pressure is applied to its terminals. When the generator is operating freely as a motor, current is 3.5 to 5 amperes at 6 to 6.6 volts.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in the generator frame. Relay closes at 500-550 R.P.M. of the armature or 7-9 miles per hour and opens at 450-500 R.P.M. of the armature or 5-7 miles per hour. Adjust the spring tension on the relay armature so that the contacts open with a discharge current of 0-3 amperes. Adjust the air gap between the relay 68 ohms. Clean relay contacts by drawing unglazed paper between them. If badly armature and coil core so that the contacts close when the voltage of the generator reaches 6.2 to 6.5 volts. Air gap between relay armature and coil core is .005 inch. contacts closed. Contacts separate .030 to .035 inch. Resistance of the shunt coil burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash lamps are 6-8 volts, 2 cp. Tonneau lamp is 6-8 volt, 2 cp. Inspection or trouble lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

FUSES.—Fuses are 15 ampere.

DORRIS

MODEL 6-80 (1919-20-21)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH MAGNETO IGNITION

BATTERY:—Willard, Type SJRG-5, 6 volt, 139 ampere-hour. The positive (+) terminal is grounded.

IGNITION:—Type DU-6. Breaker contacts separate .014 to .016 inch. When the condition of the ponts affects the ignition, resurface with a fine, flat jeweler's file or worn sandpaper.

Oiling.—Put 3 or 4 drops of light engine oil in each of the magneto oilers every month. Put a very small amount of vaseline on the fiber bumper of the contact arm, applying with a toohptick. If the car is driven more than 1000 miles in a month, these atentions must be given every 1000 miles.

Timing.—Breaker contacts begin to separate when the piston entering the power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps—Spark pug gaps are .018 to .023 inch.

STARTER.—Frame No. 751. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The brush tension of each brush should be from 2½ to 3½ pounds.

Starter Data

2.5 lb. ft.	1450	140
7.5 lb. ft	1150	200
12.5 lb. ft.	650	400
17.5 lb. ft.	500	530
21.0 lb. ft.	Lock	650

Oiling.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Frame No. 760. Generator current regulation is by the third brush system. Maxiumm current output is 15-17 amperes, reached at 1250 R.P.M. of the armature of 16-20 miles per hour. The direction of rotation is counter-clockwise, looking at the commutator end.

Generator Data

Amperes	Cold Test R.P.M.	Amperes	Hot Test R.P.M.
0	450	0	500
8	675	6	725
12	840	9	850
15-17	1250	12-14	1250
10	2000	7- 8	2000

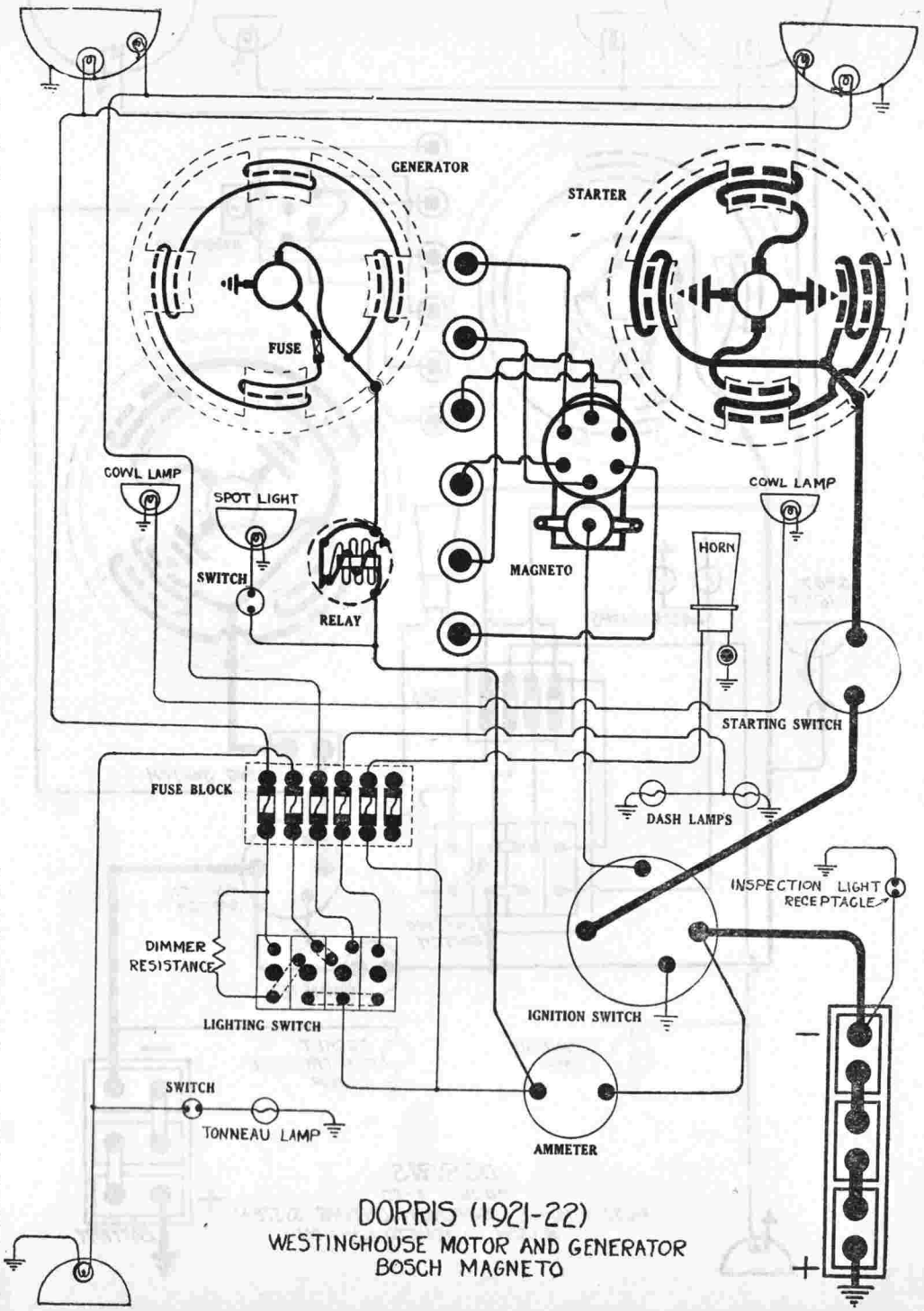
The cold test readings are obtained with a generator temperature under 95° F. The hot test readings are obtained after the generator has been operating 1 hour at 1800 R.P.M., charging a half-charged battery. Shunt field current is 2.8 to 3.25 amperes when 6 volts pressure is applied to its terminals. When the generator is operating freely as a motor, current is 3.5 to 5 amperes at 6 to 6.3 volts. Generator output is adjusted by shifting the third brush. Shifting the third brush in the direction of armature rotation increases the output and in the opposite direction decreases it.

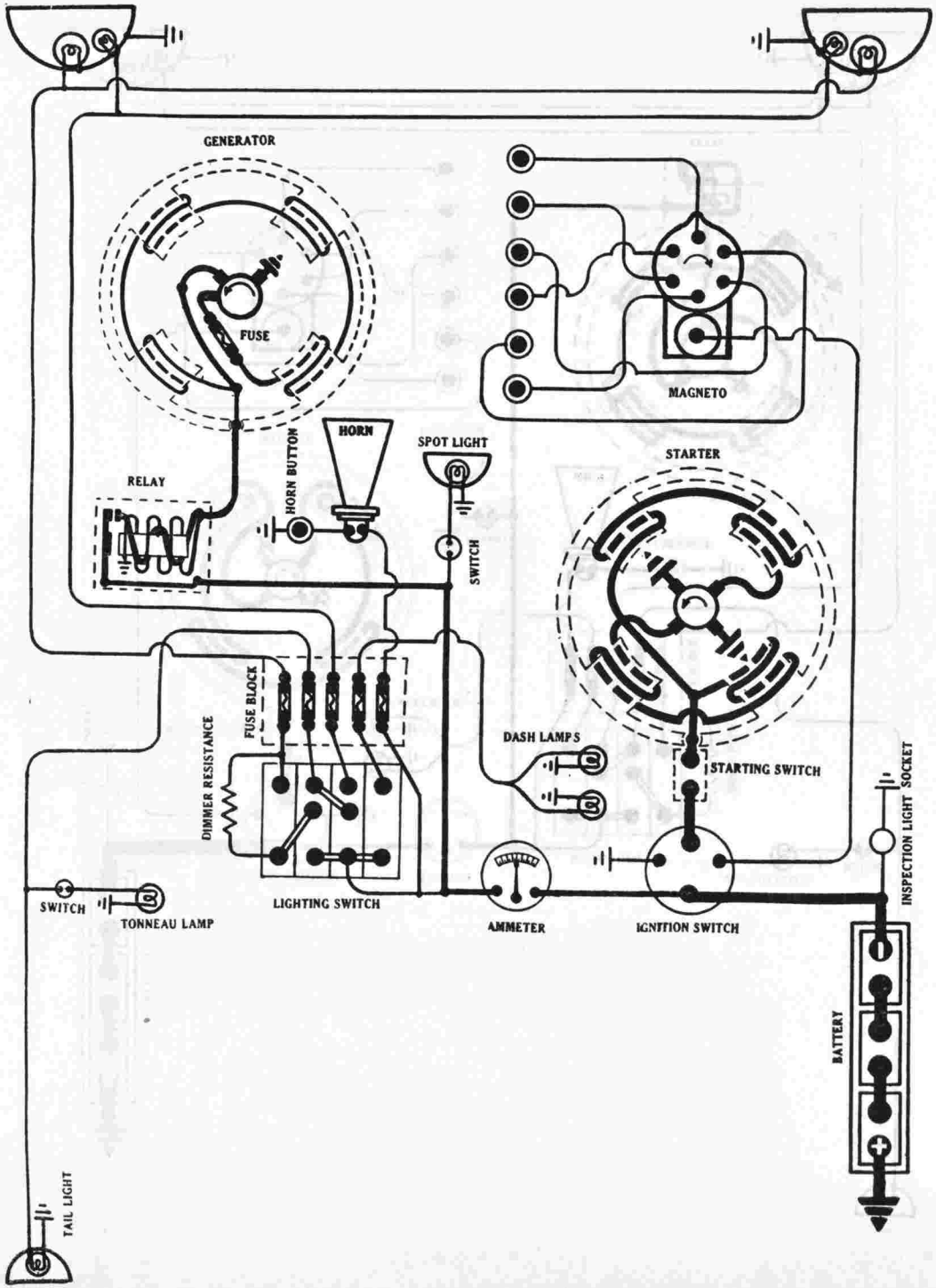
Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the dash. Relay closes at 500-550 R.P.M. of the armature or 7-9 miles per hour and opens at 450-500 R.P.M. of the armature or 5-7 miles per hour. Adjust the spring tension on the relay armature so that the contacts open with a discharge current of 0-3 amperes. Adjust the air gap between the relay armature and coil core so that the contacts close when the voltage of the generator reaches 6.2 to 6.5 volts. Air gap between relay armature and coil core is .005 inch, contacts closed. Contacts separate .030 to .035 inch. Resistance of the shunt coil is 68 ohms. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS:—Head lamps are 6-8 volt, 32 cp. Dimmer lamps are 6-8 volt 4 cp. Cowl, dash, tonneau, tail and inspection lamps are 6-8 volt, 2 cp.

FUSES.—Generator field fuse is 5 amperes. All other fuses are 15 ampere capacity.





DORRIS

MODEL 6-80 (1922-23-24), SERIAL NOS. 9500 UP
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH MAGNETO IGNITION

BATTERY:—Willard, Type SJRN-5. 6 volt, 139 ampere hour.. The positive (+) terminal is grounded.

IGNITION:—Type AT-6. Breaker contacts separate .014 to .016 inch. When the condition of the points affects the ignition, resurface with a fine flat jeweler's file or worn sandpaper.

Oiling:—Put 3 or 4 drops of light engine oil in each of the magneto oilers every month. Put a very small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

Timing.—With the piston on top dead center entering power stroke, set breaker contacts to open 10 deg. early with the spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plug Gaps:—Spark plug gaps are .018 to .023 inch.

STARTER:—Frame No. 751. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The brush tension of each brush should be from 2½ to 3½ pounds.

Starter Data

Torque	R.P.M.	Amperes
2.5 lb. ft.	1450	140
7.5 lb. ft.	1150	200
12.5 lb. ft.	650	400
17.5 lb. ft.	500	530
21.0 lb. ft.	Lock	650

Oiling:—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR:—Frame No. 760. Generator current regulation is by the third brush system. Maximum current output is 15-17 amperes, reached at 1250 R.P.M. of the armature of 16-20 miles per hour. The direction of rotation is counter-clockwise, looking at the commutator end.

Generator Data

Amperes	Cold Test	R.P.M.	Amperes	Hot Test	R.P.M.
0		450	0		500
8		675	6		725
12		840	9		850
15-17		1250	12-14		1250
10		2000	7- 8		2000

The cold test readings are obtained with a generator temperature under 95° F. The hot test readings are obtained after the generator has been operating 1 hour at 1800 R.P.M., charging a half-charged battery. Shunt field current is 2.8 to 3.25 amperes when 6 volts pressure is applied to its terminals. When the generator is operating freely as a motor, current is 3.5 amperes at 6 to 6.3 volts. Generator output is adjusted by shifting the third brush. Shifting the third brush in the direction of armature rotation increases the output and in the opposite direction decreases it.

Oiling:—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY:—Relay is mounted on the dash. Relay closes at 500-550 R.P.M. of the armature or 7-9 miles per hour and opens at 450-500 R.P.M. of the armature or 5-7 miles per hour. Adjust the spring tension on the relay armature so that the contacts open with a discharge of 0-3 amperes. Adjust the air gap between the relay armature and coil core so that the contacts close when the voltage of the generator reaches 6.2 to 6.5 volts. Air gap between relay armature and coil core is .005 inch, contacts closed. Contacts separate .030 to .035 inch. Resistance of the shunt coil is 68 ohms. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. S.C. Dimmer lamps are 6-8 volt, 4 cp. S.C.

DORRIS

MODEL 6-80 (1925-26)

AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

BATTERY.—Willard, Type SJR-5. 6 volt, 135 ampere hour. Starting capacity is 145 amperes for 20 minutes. The lighting capacity is 5 amperes for 26 hours. The positive (+) terminal is grounded.

IGNITION.—Magneto, Model AT-6. Breaker contacts separate .014-.016 inch. They are made of platinum. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or with well worn No. 00 sandpaper.

Battery Ignition.—Coil Model TC-31. Distributor Model TM-662. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file or on a medium hard oilstone. The distributor is of the manual advance type.

Oiling.—Put 3 or 4 drops of light engine oil in the magneto oilers and in the oiler on the side of the distributor housing every month or each 1000 miles if the car is driven more than 1000 miles in month. Place a small bit of vaseline on the fiber bumper of the contact arm and on the face of the breaker cam in the battery distributor every 1000 miles.

Timing.—Breaker contacts begin to separate when the piston entering power stroke reaches a position 10° before top dead center (measured on the flywheel) with the spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .018-.023 inch.

STARTER.—Model 1120. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 1¾-2 pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	6	60
12 lb. ft.	Lock	4	450

Oiling.—Starter bearings are oilless. They require no attention.

GENERATOR.—Model 1243. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the charging rate, loosen the hexagonal headed nut on the generator end plate and shift the third brush mounting bracket. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. Tighten the nut after making the adjustment.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
3	6.75	600	3	6.5	725
7	7.1	700	8	7.5	900
13	7.6	900	10	7.8	1000
17	8	1300	13	8	1350
13	8	1950	11	7.8	2000

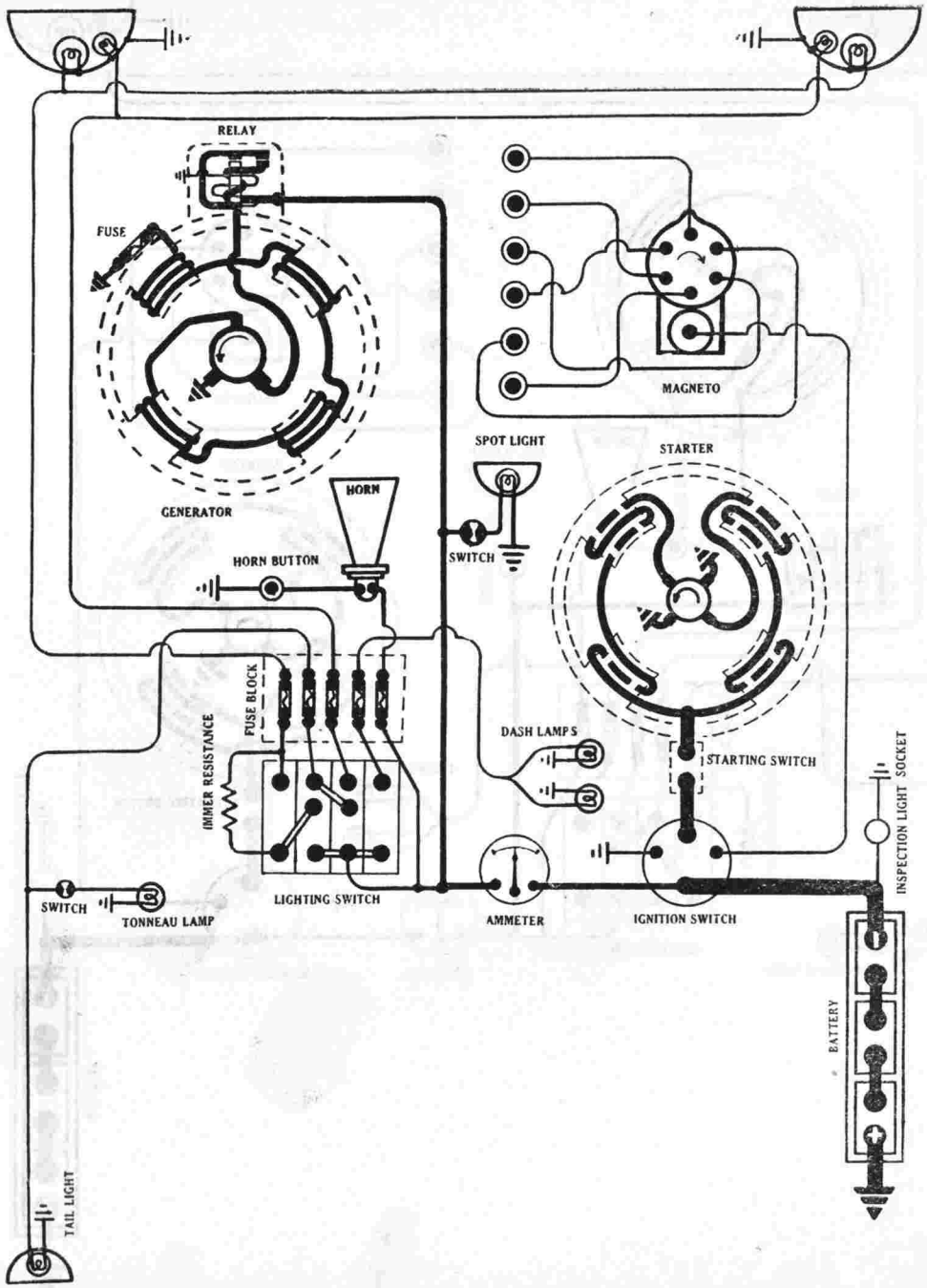
Motoring freely generator draws 6 amperes at 6 volts. Shunt field current is 6.6 amperes at 6 volts.

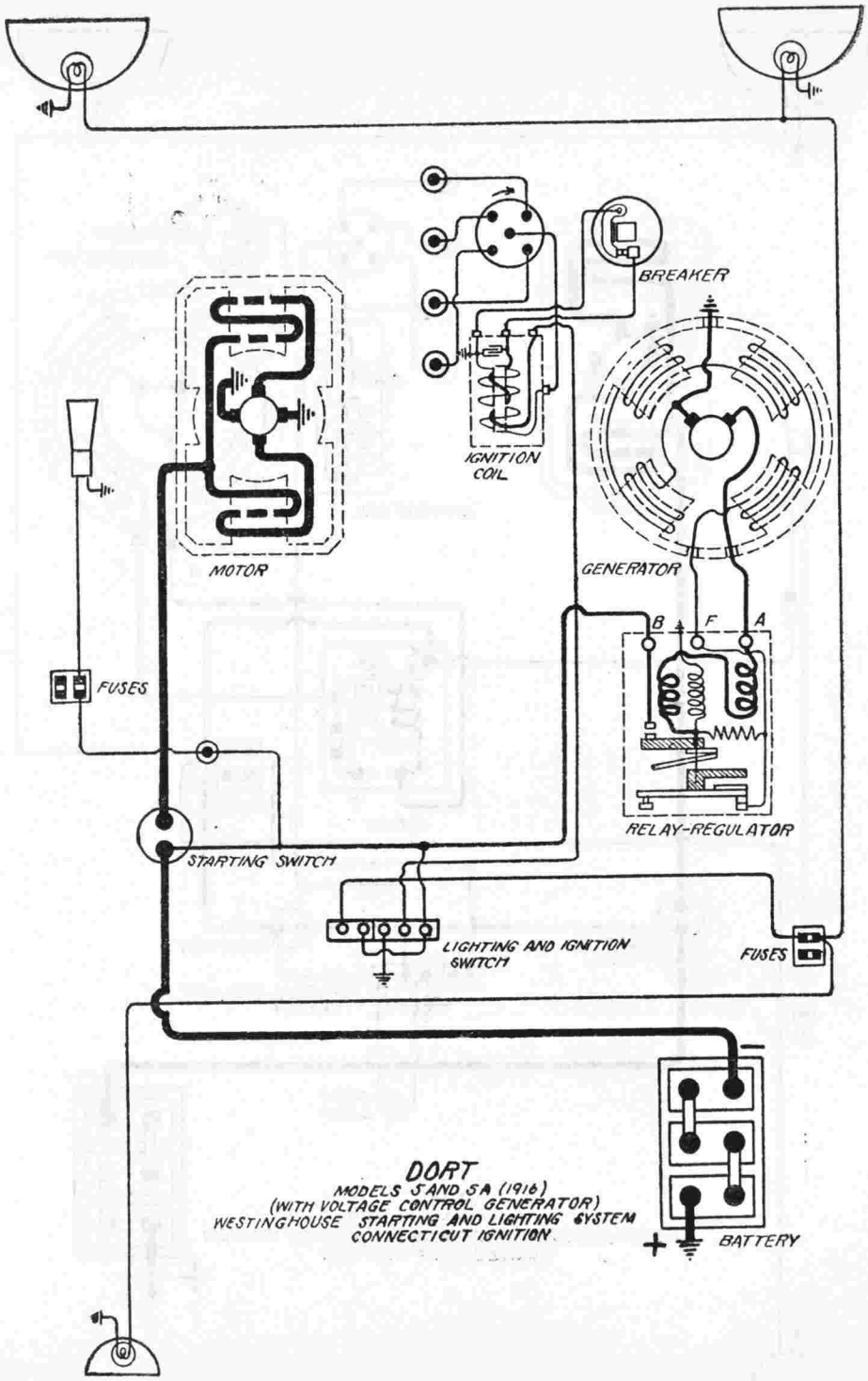
Oiling.—Put 4 or 5 drops of light engine oil in the generator oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY.—Relay is mounted on the generator. Relay contacts close at 500 R.P.M. when the voltage of the generator reaches 6.5-7.5 volts and open at 450 R.P.M. with a discharge current of 0-3 amperes. Contacts separate .015 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING.—Cutler-Hammer Switch. Head lamps are 6-8 volt, 21 cp. S.C. Dimmer lamps are 6-8 volt, 4 cp. S.C. Dash, tonneau, tail, inspection and stop lamps are each 6-8 volt, 4 cp. S.C.

FUSES.—Generator field fuse is 7.5 amperes. Lighting fuses are 15 amperes.





DORT
MODELS 5 AND 5A (1916) (SERIAL NOS. 1413 TO 9749)
MODELS 6 AND 9 (1917) (SERIAL NOS. 9750 TO 24368)
(Using Frame 400-R Generator)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .023 inch. They are made of tungsten. When the condition of the points affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

OILING.—Refill the cup under breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts begin to separate when mark "1-4 DC" on flywheel is 1 inch past indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Frame No. 318. Style 239,409 (1916) or 248,542 (1917). Starter is connected to engine through a Bendix drive. Torque at 1500 R.P.M. is 2 pound-feet. Lock torque is 11.5 pound-feet, current being 400 amperes.

OILING.—Refill starter oil wells with light engine oil every three months.

GENERATOR.—Frame No. 400-R. Style Nos. 225,722 or 239,408 or 245,401. Style No. 245,401 supersedes Style No. 225,772. Generator voltage regulation is by a vibrating regulator. Maximum charging rate is 15-18 amperes, decreasing to 4-6 amperes when battery becomes fully charged.

Generator Data

Battery Charge Current No Lamp Load			Battery Charge Current 7 Ampere Lamp Load		
Volts	Amperes	M.P.H.	Volts	Amperes	M.P.H.
6.5	8	10	6.3	0	12
6.6	8	15	6.5	4	15
7.0	12	20	6.6	6	20
7.0	12	25	6.7	7	25
			6.7	7	30

Above tests are with battery solution of 1.250. The difference in voltage at 1200 R.P.M., no load, and at 1200 R.P.M., 15 ampere load, must not exceed 1.0 volt and must not be less than .7 volt. A greater variation is due to improper or clogged regulator air gaps.

OILING.—Put several drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY-REGULATOR.—Relay and regulator are combined into one unit. Relay closes at 7-10 miles per hour or 575 R.P.M. of armature, and opens at 5-7 miles per hour or 525 R.P.M. of armature. Charging current is 1-3 amperes at closing and the discharge current 0-1 ampere at opening of relay. Regulator is set to limit voltage to 6.6 volts at 15 ampere load or 7.0-7.5 volts at no load, armature revolving at 1200 R.P.M. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 4 cp.

FUSES.—Fuses are 10 ampere.

DORT

MODELS 5 AND 5A (1916)
MODELS 6 AND 9 (EARLY 1917)
(Using Frame 400 Generator)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .025 to .027 inch. They are made of tungsten. When the condition of the points affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

OILING.—Refill the cup under breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts begin to separate when the mark "1-4 DC" on flywheel is 1 inch past indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Frame No. 318. Style 239-409 (1916) or 248-542 (1917). Starter is connected to engine through a Bendix drive. Torque at 1500 R.P.M. is 2 pound-feet. Lock torque is 11.5 pound-feet, current being 400 amperes.

OILING.—Refill starter oil wells with light engine oil every three months.

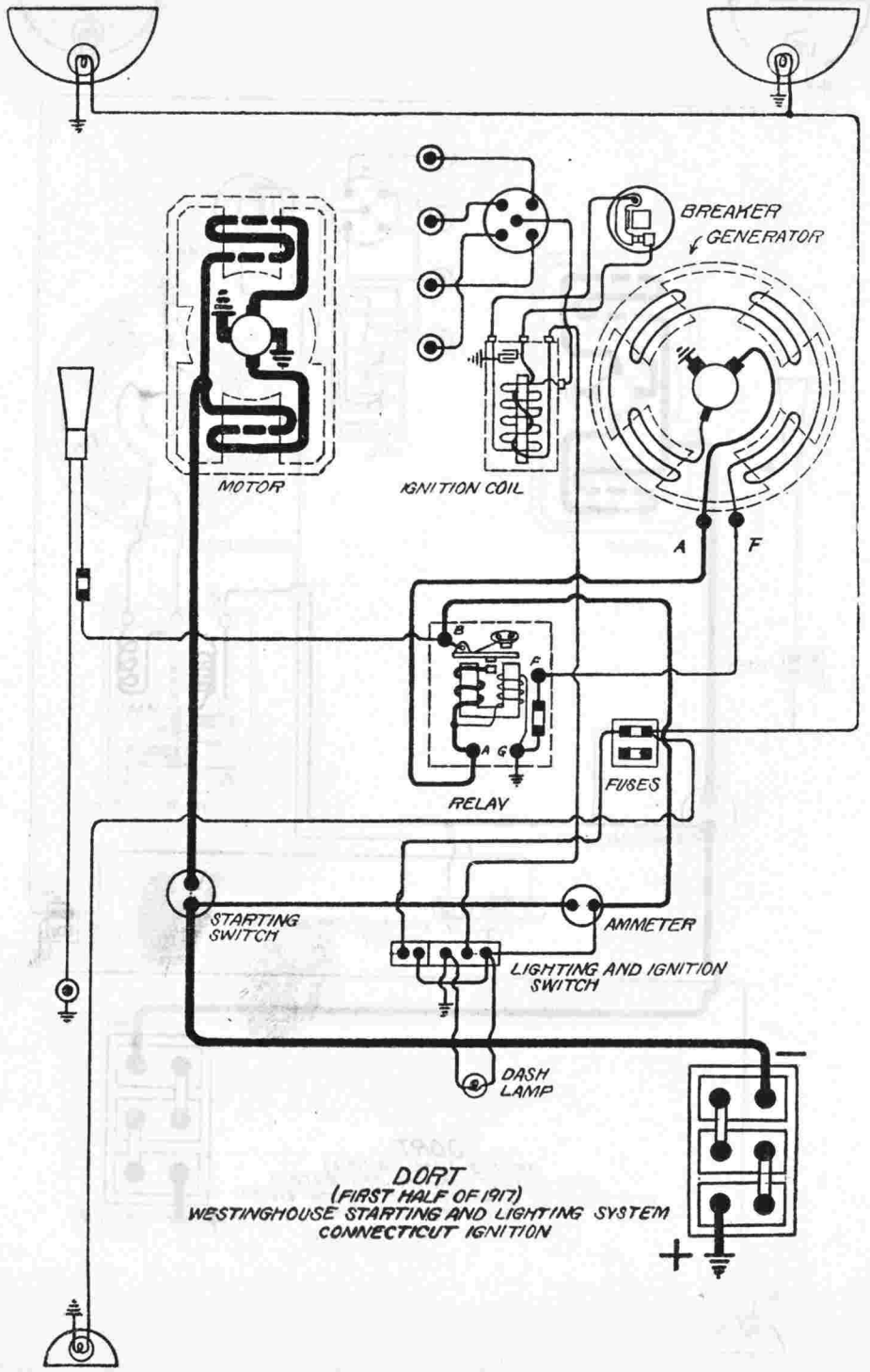
GENERATOR.—Frame No. 400. Style No. 248-089. Generator current regulation is by third brush. Maximum charging current of 12-14 amperes is reached at 20-25 miles per hour. Generator output is 14 amperes at 7.4 volts.

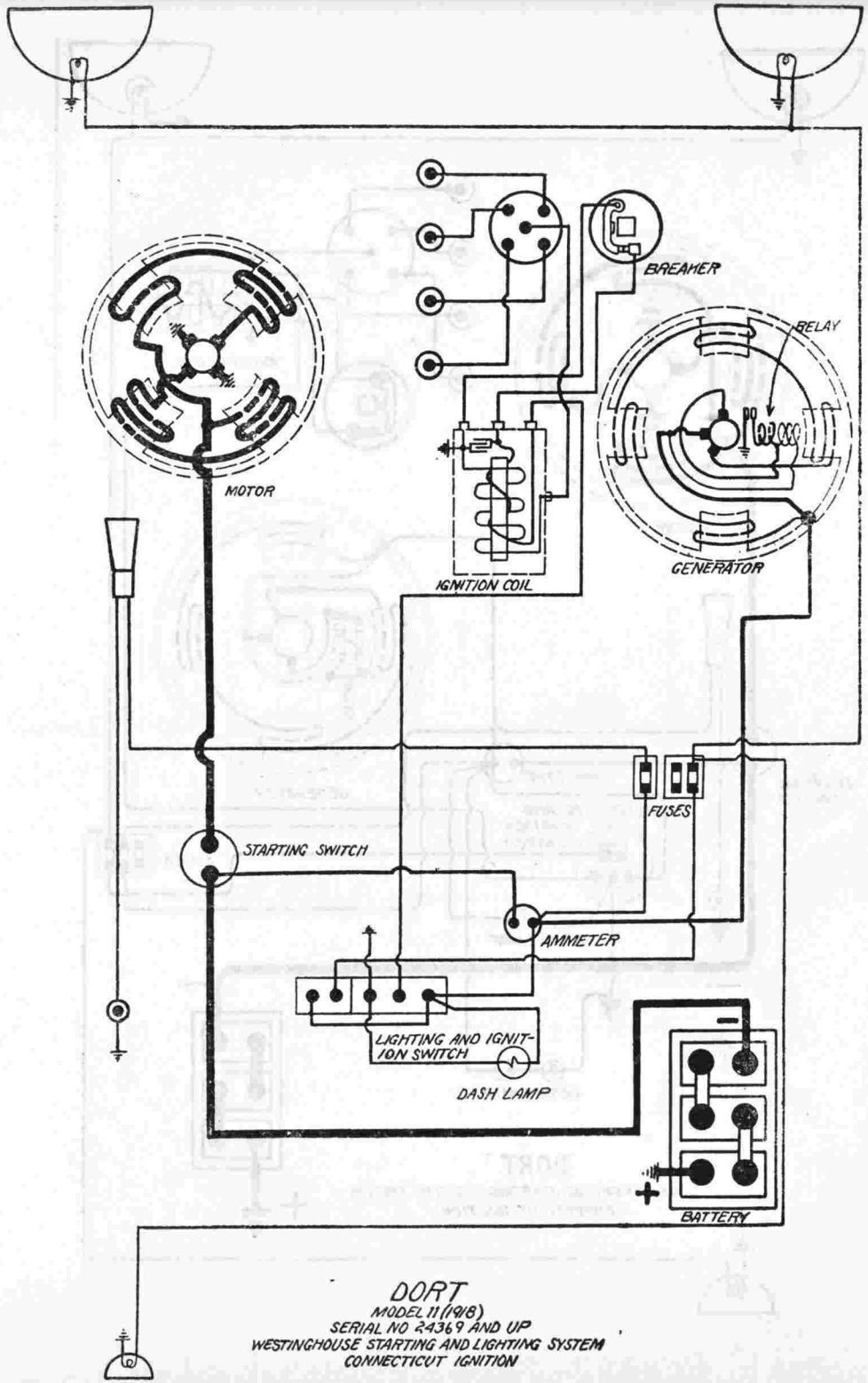
OILING.—Put several drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Relay closes at 7-9 and opens at 5-7 miles per hour. Charging current is .5 to 1.5 amperes at closing and the discharge current 0 to 1 ampere at opening of relay. Contacts separate .013 to .017 inch. Air gap between relay armature (moving member) and coil core is .027 to .030 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 4 cp.

FUSES.—Fuses are 10 ampere.





DORT
MODEL 11 (1918)
SERIAL NO 24369 AND UP
WESTINGHOUSE STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

DORT
MODEL 6, 9, 9S AND 9T (LATE 1917)

MODEL 11 (1918) (SERIAL NOS. 24,369 AND UP)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .023 inch. They are made of tungsten. When the condition of the points affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

OILING.—Refill the cup under breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts begin to separate when the mark "1 and 4DC" on flywheel is 1 inch past indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Frame No. 100. Starter is connected to engine through a Bendix drive. Torque at 1500 R. P. M. of armature is 1¾ pound-feet.. Lock torque, 12 pound-feet current 475 amperes.

OILING.—Put several drops of light engine oil in each of starter oilers every month.

GENERATOR.—Frame No. 760. Generator current regulation is by third brush system. Current output is varied by adjustment of third brush setting. Set the third brush so that at 1100-1500 R. P. M., the maximum output is 15 to 17 amperes at 7½ volts. The cold test readings are obtained with the normal setting of third brush, and a generator temperature under 35° C. (95° F). The hot test readings are obtained after the generator has been opperated one hour at 1800 R. P. M., charging a half-charged battery or its equivalent.

Generator Data

Cold Test

R. P. M.	Generator Output Amperes	Generator Voltage
500	0	6.5
1250	15-17	7.5
1250	12-14	6.5
2500	7-11	6.5-7.5

Hot Test

R. P. M.	Generator Output Amperes	Generator Voltage
1250	12-14	7.5
2500	7-11	6.5-7.5

Field current is 2.8 to 3.25 amperes, 6 volts. Field resistance is 1.9 to 2.25 ohms at 25° C (77° F.).

Field Test, Generator Operating

Cold Test

R. P. M.	Generator Output Amperes	Generator Voltage	Field Current
1250	12-15	7.5	1.55-2.2

Operating freely as a motor, current flow is 3.5 to 5 amperes, 6 to 6.6 volts.

OILING.—Put 5 or 6 drops of ligth engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 500-550 R. P. M. of armature, and opens at 6-8 miles per hour or 450-500 R. P. M. of armature. Charging current is 1 to 2 amperes at closing, and the discharge current 0 to 2 amperes at opening of relay. Air gap between relay armature (moving member) and coil core is .031 inch, contacts separated. Contacts separate .013 to .018 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash lamp is 6-8 volt, 4 cp. Tail lamp is 6-8 volt, 2 cp. On 1917 cars, head lamps are 6-8 volt, 16 cp. Tail lamp is 6-8 volt, 4 cp.

FUSES:—Fuses are 10 ampere.

MODELS 15 AND 17 (1920-21) SERIAL NOS. 24369 UP
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—Willard, Type S.J.W.-3, 6 volt, 95 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .025 inch. They are made of tungsten. When the condition of the points affects the ignitioin, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts begin to separate when top dead center mark on flywheel is 1 inch past indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER:—Frame 33-AB. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 140 R.P.M., current being 250 amperes. Running freely, armature revolves at 4000 R.P.M., current 50 amperes. Lock torque is 12 pound-feet, current 475 amperes at 4 volts. Torque at 1600 R.PM is 1¾ lb.-feet.

Oiling:—Put 4 or 5 drops of light engine oil in each of starter bearing oilers every month.

GENERATOR:—Frame No. 35-AT. Generator current regulation is by third brush system. Current output is varied by adjustment of third brush setting. Set the third brush so that at 1100-1500 R.P.M. the maximum current output is 15 to 17 amperes, at 7½ volts. The cold test readings are obtained with the normal setting of third brush, and a generator temperature under 35°C. (95°F.). The hot test readings are obtained after the generator has been operated one hour at 1800 R.P.M., charging a half-charged battery or its equivalent.

Generator Data

Cold Test

R.P.M.	Generator Output Amperes	Generator Voltage
500	0	6.5
750	8	6.5
1250	15-17	7.5
2500	7-11	6.5-7.5

Hot Test

R.P.M.	Generator Output Amperes	Generator Voltage
1250	12-14	7.5
2500	7-11	6.5-7.5

Field current is 2.8 to 3.25 amperes, 6 volts. Field resistance is 1.9 to 2.25 ohms at 25°C. (77°F.).

Field Test, Generator Operating

Cold Test

R.P.M.	Generator Output Amperes	Generator Voltage	Field Current
1250	15-17	7.5	1.5-2.4

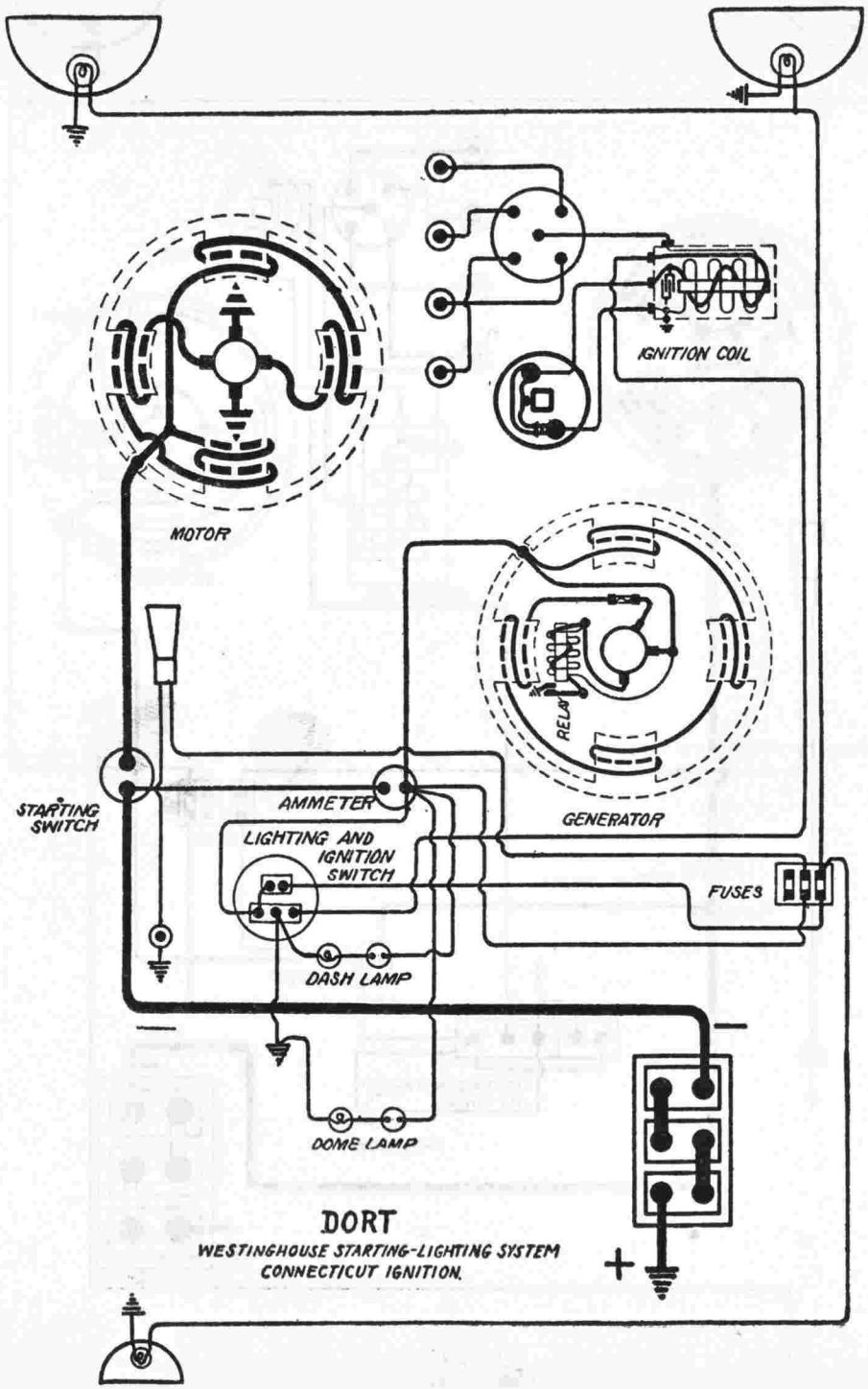
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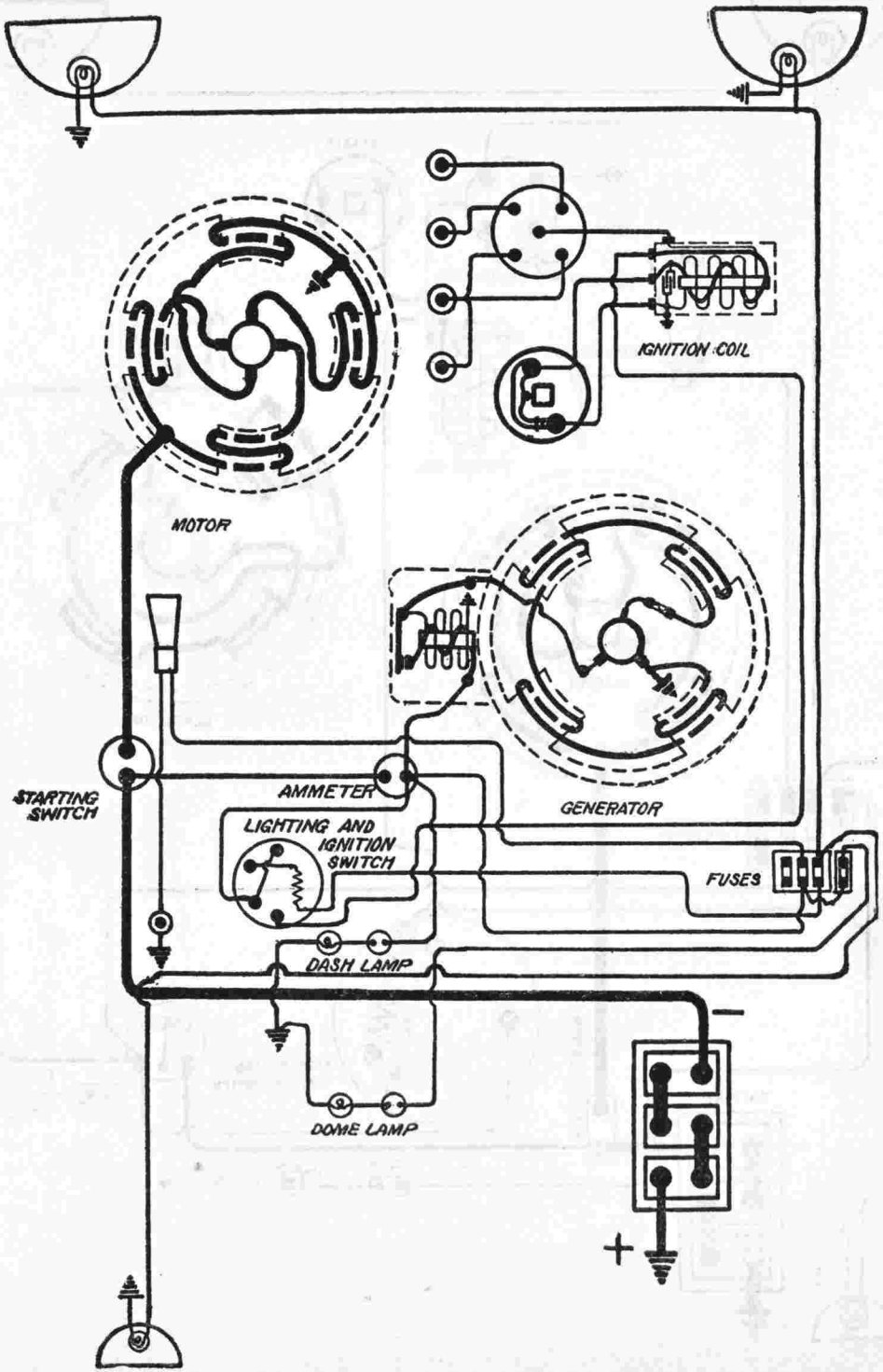
R.P.M.	Generator Output Amperes	Generator Voltage	Field Current
1250	12-15	7.5	1.5-2.2

Operating freely as a motor, current flow is 3.5 to 5 amperes, 6 to 6.6 volts.

OILING.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 500-550 R.P.M. of armature, and opens at 6-8 miles per hour, or 450-500 R.P.M. of armature. Charging current is 1 to 2 amperes at closing, and the discharge current 0 to 2 amperes at opening of relay. Air gap between relay armature (moving member) and coil core is .031 inch, contacts separated. Contacts separate .013 to .018 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.





DORT

MODELS 12, 12-C, 17, 17-S (1921)
MODEL 14-19 (1922)
GRAY & DAVIS GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—U. S. L., Type HDN-311-X, 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model No. 225-Y. Distributor Model No. 15-T. Breaker contacts separate .025 inch. They are made of tungsten. When the condition of the points affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Timing.—Breaker contacts begin to separate when top dead center mark on flywheel is 1 inch past indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—The spark plug gaps are .025 inch.

STARTER.—Model No. 525. The starter is connected to engine by a Bendix drive. The direction of rotation is counter-clockwise, looking at commutator end. Cranks engine at 100-150 R.P.M., taking a current of 100-150 amperes, at 5-5.5 volts.

Starter Test Data

Amperes	Volts	Torque	R.P.M.
35	6.0	0	5000
450	3.5	12 lb. ft.	Lock

Oiling.—Put 4 or 5 drops of light engine oil in each of starter bearing oilers every month.

GENERATOR.—Model No. 636. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. To adjust charging rate, turn pinion screw found between fuses and relay on commutator end plate. To increase the charging rate, turn pinion screw in a clockwise direction (opposite of armature rotation). To decrease the charging rate, turn pinion screw in counter-clockwise direction (direction of armature rotation).

Generator Test Data

Amperes	R.P.M.	M.P.H.
0	450	
5	600	
10	825	
15 (Max.)	1400	18-20
12	2500	

Generator motoring freely takes a current of 3-5 amperes, at 6 volts. The field test draws a current of 2.6 amperes at 6 volts.

RELAY.—Relay closes at 8-10 miles per hour or 500-550 R.P.M. of armature, and opens at 6-8 miles per hour, or 450-500 R.P.M. of armature. Charging current is 1 to 2 amperes at closing, and the discharge current 0 to 2 amperes at opening of relay. Air gap between relay armature (moving member) and coil core is .012-.015 inch, contacts fully closed. Contact gap is .015-.018 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before placing the same into service.

LAMPS.—Head lamps are 6-8 volt, 16 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are each 6-8 volt, 2 cp.

FUSES.—Generator field fuse is 5 ampere. Lighting fuses are 10 ampere.

DORT

MODELS 18 AND 23 (1923) 20 AND 25 (1923)
AMERICAN BOSCH GENERATING, STARTING, AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—U. S. L. Type HDN-311-X, 6 volts, 92 ampere- hour capacity. The starting capacity for 20 minutes is 105 amperes. The lighting capacity is 5 amperes for 18 hours. The positive (+) terminal is grounded.

IGNITION.—Connecticut Battery Ignition, Type 225-Y Breaker contacts separate .025 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone.

Oiling.—Refill grease cup under distributor housing with vaseline or soft cup grease and turn down every month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles.

Timing.—Breaker contacts just begin to separate when piston No. 1 is at top dead center on compression stroke, mark "1 & 4 DC" on flywheel is one inch past indicator. Spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plugs.—Spark plug diameters are 7/8 inch, and the gaps are .030 inch.

STARTER.—Model No. 525. The direction of rotation is counter-clockwise, looking at commutator end. The starter is connected to engine by a Bendix drive. Starter cranks the engine at 100-150 R.P.M. taking a current of 100-150 amperes at 5-5.5 volts.

Starter Test Data

Amperes	Volts	Torque	R.P.M.
35	6.0	0	5000
450	3.5	12 lb.-ft.	Lock

Oiling.—Put 4 or 5 drops of light engine oil into each starter oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

GENERATOR:—Model No. 649,651. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. To adjust charging rate, loosen nut holding the third brush, and move the third brush in a counter-clockwise (direction of rotation) direction to increase the charging rate; and in the opposite (clockwise) direction to decrease the charging rate.

Generator Test Data

Amperes	Hot Test R.P.M.	Volts
0	450	6.9
6	700	7.2
9	900	7.8
10.2 (max)	1300	8.8
9.5	1700	8.0
7.0	2500	7.8

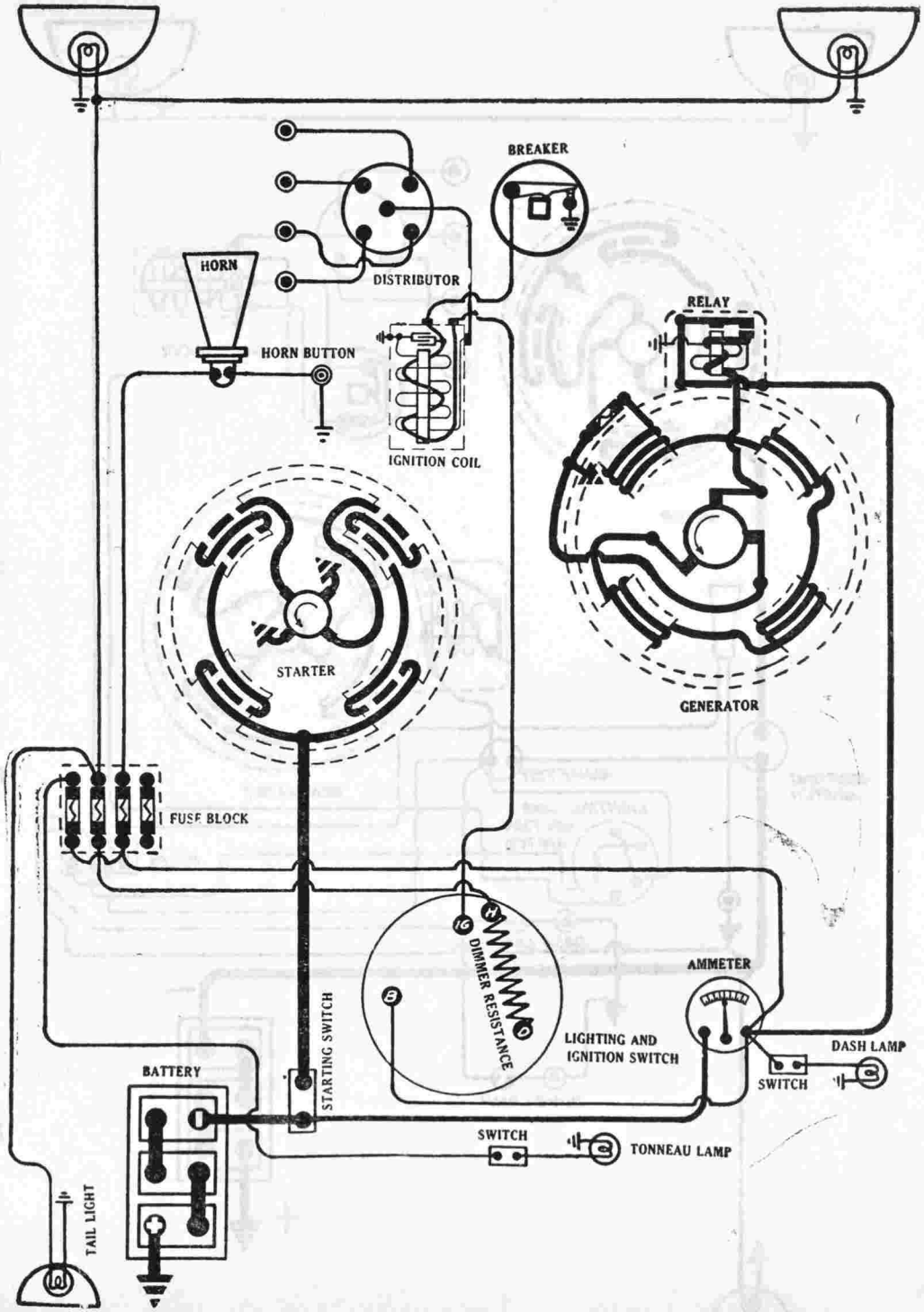
Generator motoring freely, takes a current of 4.0-4.5 amperes, running at 350-450 R.P.M. and the field takes a current of 2.5-3.0 amperes, at 6.3 volts.

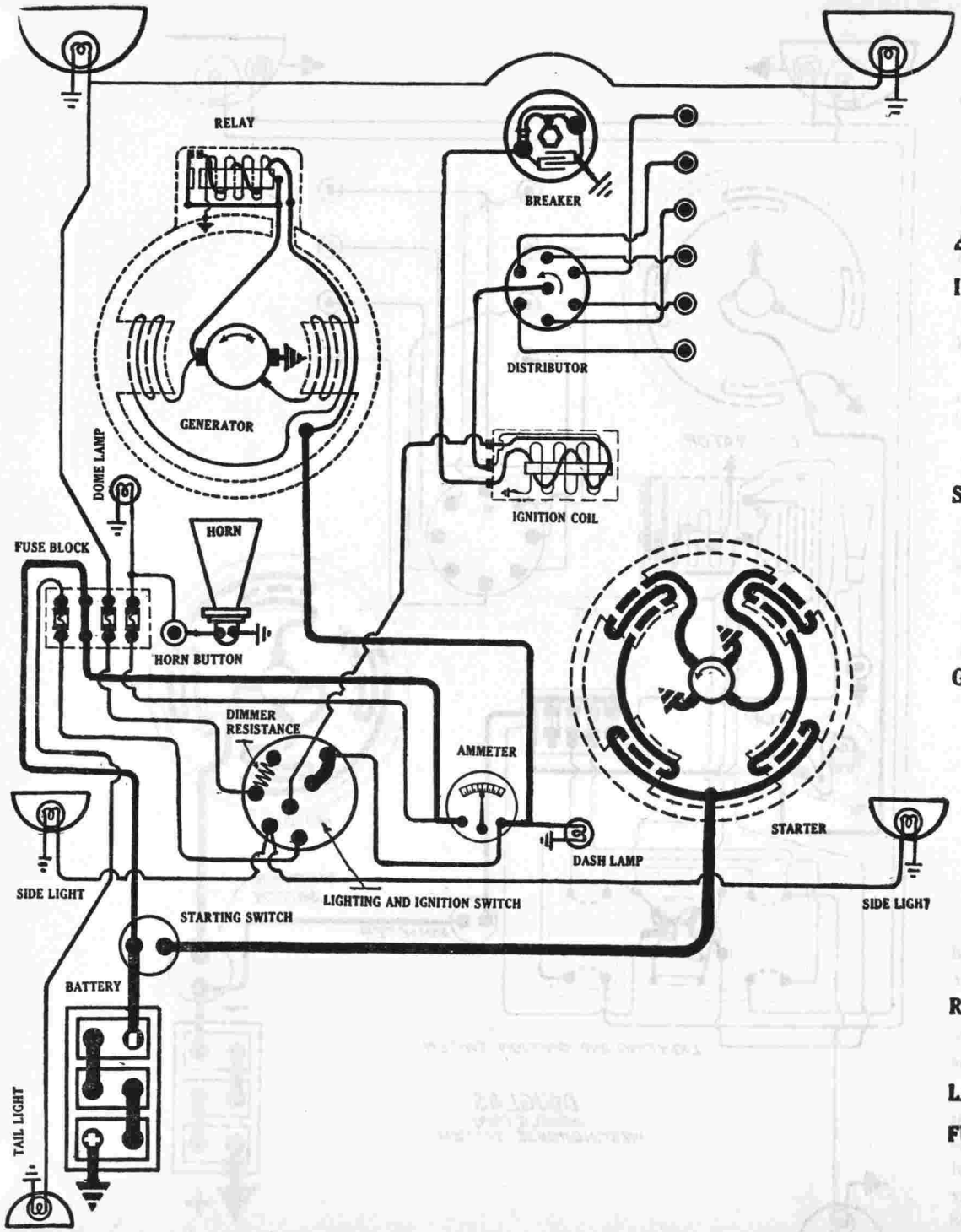
Oiling.—Put 4 or 5 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks this care must be given every 500 miles.

RELAY.—Relay closes at 450-500 R.P.M. or at 8-10 M.P.H. at 6.5-7.5 volts, and opens at 400-450 R.P.M. or 6-8 M.P.H. with a current discharge of 0-2 amperes. The relay contact gaps separate .013-.018 inch, and the air gap between coil core and relay armature is .012-.015 inch.

LIGHTING.—Head lights are each 6-8 volts, 21 cp. Dash and tail lights are each 6-8 volts, 2 cp. Dome light is 6-8 volts, 4 cp. All lamps are of the single contact type.

FUSES.—All fuses are 10 amperes, and generator fuse is 5 amperes.





DORT

MODEL 20-24 (1924-25)
BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH IGNITION

BATTERY.—U. S. L., Type HDN-311-X, 6 volts, 90 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model T-C-20. Breaker contacts separate .023 inch. They are made of tungsten. If condition of points affects ignition, remove and resurface on a hard oilstone.

Oiling.—Put 4 or 5 drops of light engine oil into wick oilers once every month. If car is driven more than 1000 miles, this attention must be given every 1000 miles.

Timing.—Breaker begins to separate when top dead center of No. 1 piston is reached, spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—The spark plug gaps separate .025 inch.

STARTER.—Model G-D-525. The direction of rotation, looking at commutator end of starter, is counter-clockwise. Cranks engine at 150 R.P.M., requiring110 amperes.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft	5000	6	45
12 "	Lock	3.5	450

Maximum resistance is 0.0075 ohms, current being 400 amperes at 3 volts.

Oiling.—Put 4 or 5 drops of light engine oil into starter oilers every month.

GENERATOR:—Model G.D.653 The direction of rotation, looking at commutator end of generator is counter-clockwise. The third brush system is used to regulate the current or voltage. The maximum charging rate is 14 amperes, reached at 1200 R.P.M. of armature or 16 miles per hour of car in high gear.

Generator Test Data

Hot Test		Cold Test	
Amperes	R.P.M.	Amperes	R.P.M.
0	500	0	500
7	660	7.5	660
10	900	11	900
12	1100	13	1100
14	1200	16	1200

Oiing.—Put 4 or 5 drops of light engine oil into generator wick oilers once a month. If car is driven over 1000 miles in a month, this attention must be given every 1000 miles.

RELAY.—The relay is mounted on generator housing, closed at 7 miles per hour or 500 R.P.M. of armature and opens at 7 M.P.H. or 500 R.P.M. of relay armature. Relay contacts separate .013 to .018 inch. The air gap between coil core and relay armature is .031 inch.

LAMPS.—Head lamps are 6-8 volts, 21 cp. A dimmer resistance is used. Dash lamp and tail lamp are 6-8 volts, 2 cp. Dome lamps are furnished with closed cars only.

FUSES.—There are only two fuses, each 10 amperes.

DOUGLAS
MODEL G (1918-19-20)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WESTINGHOUSE IGNITION

BATTERY.—Prest-O-Lite, 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .008 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper. Adjust the distributor brush springs so that the brushes extend ¼ inch from their holders when the distributor cap is removed, retaining them, however, so that they do not fall out. Brushes must move freely in their holders. See that the brushes on the top and bottom of the rotor are in place when installing rotor.

OILING.—Put 2 or 3 drops of light engine oil in the oil cup at the side of the ignition unit every month. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1R, 1L 3R, 3L, 4R, 4L, 2R, 2L.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Frame No. 700. Starter is connected to the engine through a Bendix drive. Torque at 1200 R.P.M. is 2.5 pound-feet. Lock torque is 12.5 pound-feet, current being 400 amperes.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Frame 400. Generator current regulation is by the third brush system. Maximum current output is 14-16 amperes, reached at 1250 R.P.M. of the armature or 20 miles per hour.

Generator Data

Cold Test

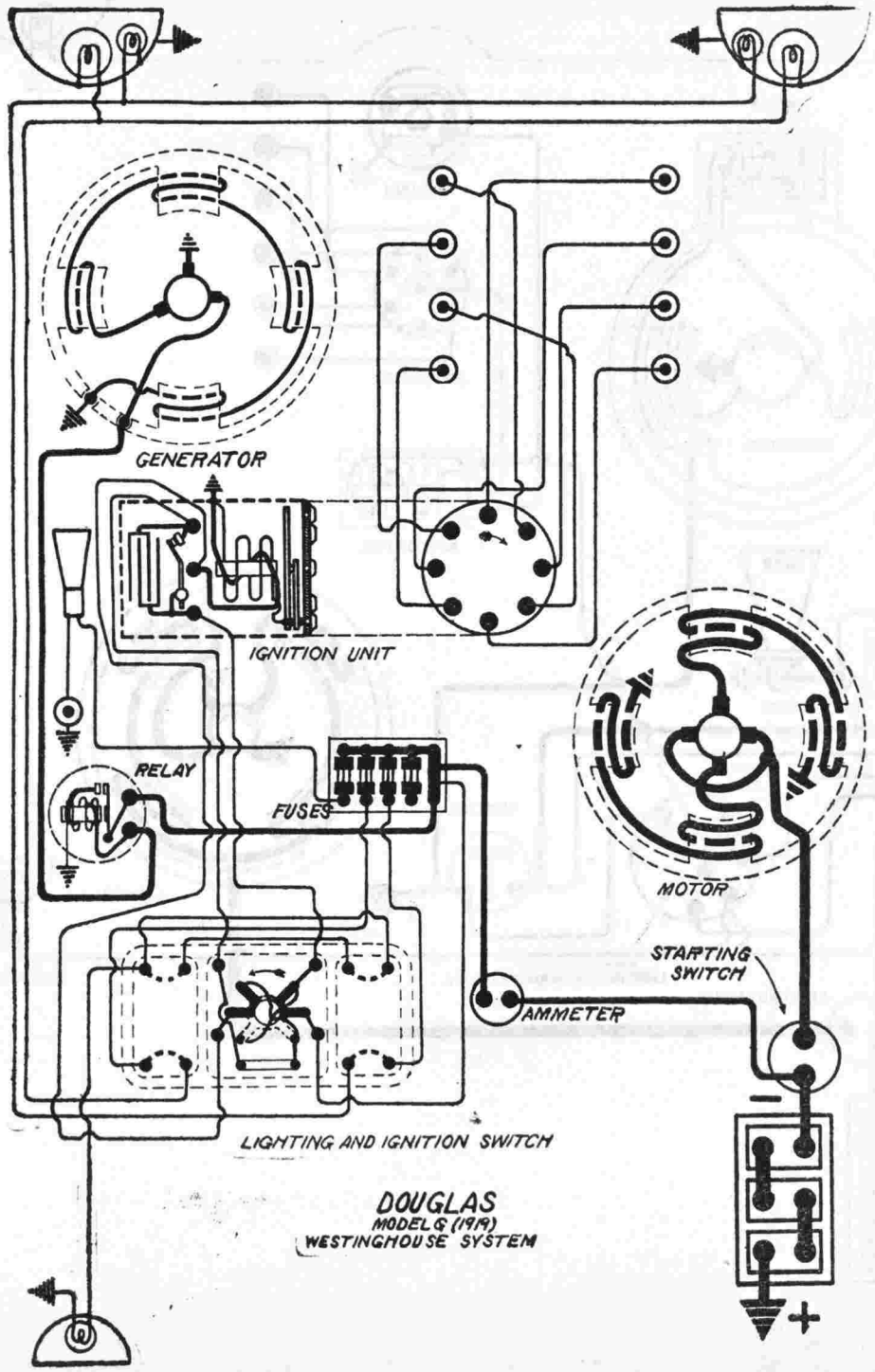
Amperes	R.P.M.	Volts
0	525	6.2
4	675	6.6
8	825	6.8
12	1000	7.1
15	1250	7.2
13	1750	7.2
10	2250	7.0

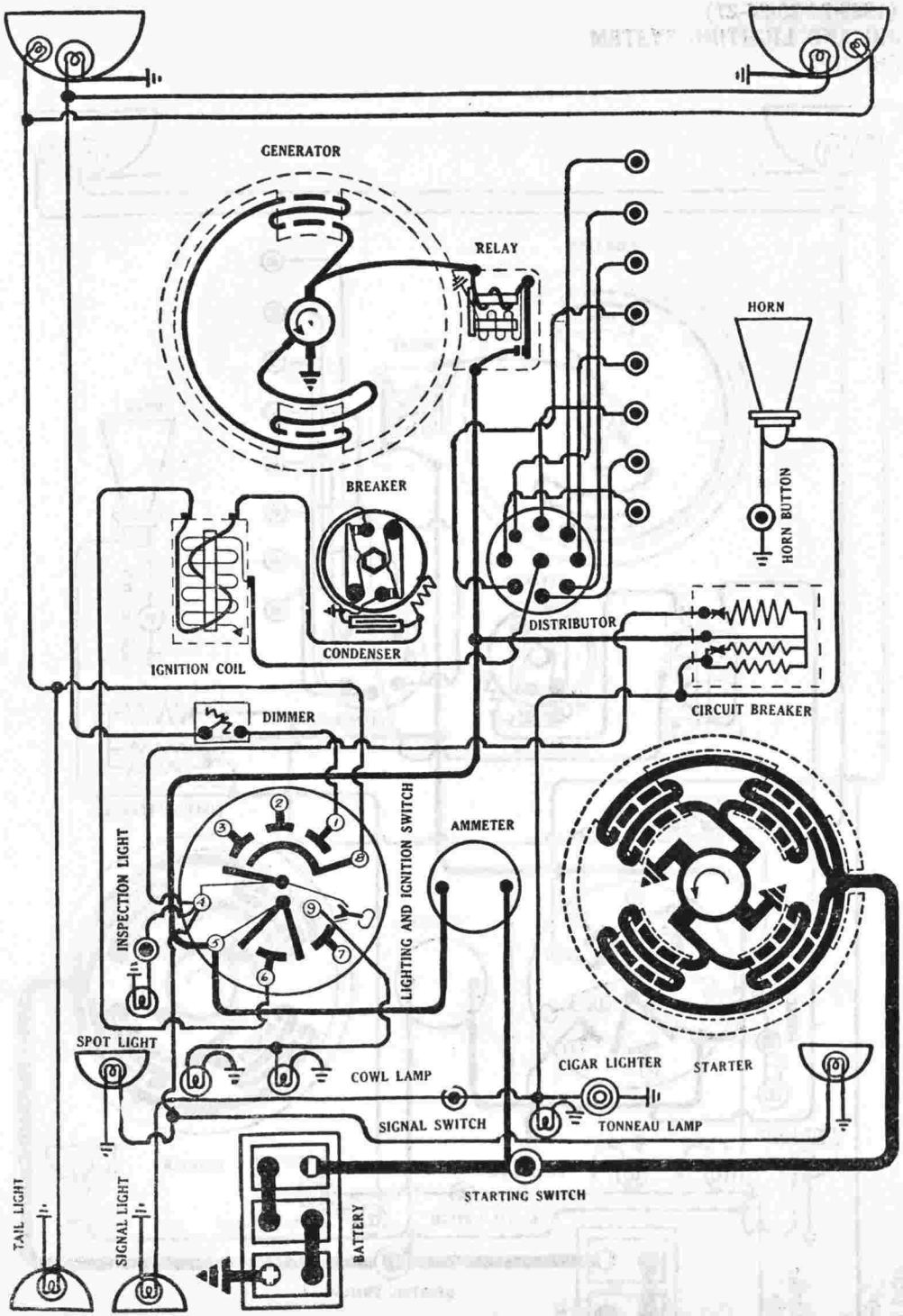
Charging rate may be increased by loosening the three screws holding the third brush plate and moving the plate in the direction of armature rotation. To decrease the charging rate move the third brush plate in the opposite direction.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 7-9 miles per hour or 525-575 R.P.M. of the armature and opens at 5-7 miles per hour or 475-525 R.P.M. of the armature. Charging current is .5 to 1.5 amperes at closing and the discharge current 0 to 1 ampere at the opening of relay contacts. Relay contacts separate .030 inch. Air gap between relay armature and coil core is .020 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 16 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and





DUESENBERG

SERIES 601 (1922)

DELCO GENERATING, STARTING, AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Willard, Type SR-5, 6 volts, 116 ampere-hour capacity. The positive (+) terminal is grounded.

IGNITION.—Coil Model 2135. Distributor Model 15735. The contacts separate .015-.020 inch. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone. Manual advance is 30°. Automatic advance begins at 750 R.P.M. and reaches a maximum of 25° at 2400 R.P.M. The contact arm spring tension should be 16-20 ounces.

Oiling.—Put 8 or 10 drops of light engine oil in distributor oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles. Repack distributor housing with medium soft cup grease up to advance ring and yoke once each season. A very small amount of soft grease or vaseline should be applied to breaker cam every 2000 miles. Apply a very small amount of vaseline to rotor track occasionally during the first 2000 miles until rotor track becomes glazed, then no further attention will be necessary.

Timing.—Breaker contacts begin to separate when piston No. 1 entering power stroke, is ½ inch past top dead center, measured on flywheel, spark control lever and breaker assembly fully retarded. Timing can also be made by locating marks 1:4 on the flywheel through inspection plate on top of flywheel housing. Be sure that piston No. 1 is on compression stroke, contacts begins to separate one-half inch past top dead center measured on flywheel.

Firing Order.—The firing order is 1, 5, 3, 7, 4, 8, 2, 6.

Spark Plugs.—The spark plug diameters are 18 millimeters, gaps are 1/32 inch.

STARTER.—Model No. 200. The direction of rotation is counter-clockwise, looking at commutator end. Starter is connected to engine through a Bendix drive. Motor running free takes 50 amperes at 6 volts. Lock torque is 24 pound-feet at 2.75 volts. The brush tension should be 2¼ to 2¾ pounds on each of the starter brushes.

Oiling.—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month. Once each year saturate the wick in the oiler on the end of the Bendix gear case with light engine oil.

GENERATOR.—Model Nos. 237-242. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation on both models. The maximum charging rate on both models of generators is 17 amperes reached at 1600 R.P.M. of armature. Generator No. 237 is adjusted for current output by loosening the clamp nut on the end of the generator, turning the adjusting screw beneath the cover band, in a clockwise direction to increase the charging rate and in the opposite direction to decrease output. After the adjustment is completed be sure to tighten the clamp nut. Generator No. 242 is regulated by removing the cover band over the generator brushes, exposing the third brush clamp nut. First loosen the clamp nut and move the third brush plate by means of the adjusting handle in a clockwise direction to increase the output, and in a counter-clockwise direction to decrease the charging rate.

Generator Data

Amperes	Hot Test	R.P.M.	Amperes	Cold Test	R.P.M.
3	(Min.)	600	6	(Min.)	600
12		1000	13.5		1000
16-18		1600	19-21		1600
12		2400	13		2400

The brush tension of each of the generator brushes should be 1¼-1¾ lbs.

Oiling.—Fill generator oilers with light engine oil every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Model No. 5745. The relay closes at 7 M.P.H. and opens at 3-4 M.P.H. Relay contact gap separates .025-.035 inch. The air gap between relay armature and coil core is .025-.035 inch, contacts fully closed.

LIGHTING.—Combination Switch No. 1226 is used. Head and spot lamps are 6-8 volts, 21 cp. Dimmer lamp is 6-8 volts, 4 cp. Tail lamp is 6-8 volts, 2 cp. Dash lamp is 6-8 volts, 2 cp.

CIRCUIT BREAKER.—A circuit breaker is used in place of fuses. Circuit breaker begins to operate with a current flow of 25 to 30 amperes, and will continue to function until the current flow does not exceed 15 amperes. The lock-out circuit breaker opens the circuit when the current flow reaches 25-35 amperes. While

DUESENBERG

STRAIGHT EIGHT (1923-24-25-26-27)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Willard, Type SJR-5, 6 volts, 116 ampere-hour capacity. The positive (+) terminal is grounded.

IGNITION:—Coil Model 2135. Distributor Model 15735. The contacts separate .015-.020 inch. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone. Manual advance is 30°. Automatic advance begins at 750 R.P.M. and reaches a maximum of 25° at 2400 R.P.M. The contact arm spring tension should be 16-20 ounces.

Mounting.—Distributor is mounted on the generator. To remove, disconnect manual advance rod and remove three screws holding distributor gear housing on generator. Then remove unit from position.

Oiing:—Put 8 or 10 drops of light engine oil in distributor oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles. Repack distributor housing with medium soft cup grease up to advance ring and yoke once each season. A very small amount of soft grease or vaseline should be applied to breaker cam every 2000 miles. Apply a very small amount of vaseline to rotor track occasionally during the first 2000 miles until rotor track becomes glazed, then no further attention will be necessary.

Timing:—Breaker contacts begin to separate when piston No. 1 entering power stroke is ½ inch past top dead center, measured on flywheel, spark control lever and breaker assembly fully retarded. Timing can also be made by locating marks 1:4 on the flywheel through inspection plate on top of flywheel housing. Be sure that piston No. 1 is on compression stroke, contacts begin to separate one-half inch past top dead center measured on flywheel.

Firing Order:—The firing order is 1-5-3-7-4-8-2-6.

Spark Plugs:—The spark plug diameters are 18 millimeters. Gaps are 1/32 inch.

STARTER:—Model No. 200. The direction of rotation is counter-clockwise, looking at commutator end. Starter is connected to engine through a Bendix drive. Motor running free takes 50 amperes at 6 volts. Lock torque is 24 pound-feet at 2.75 volts. The brush tension should be 2¼-2¾ pounds on each of the starter brushes.

Mounting.—Starter is sleeve mounted at right of engine. To remove, remove tapered point pilot screw and pull starter forward from position.

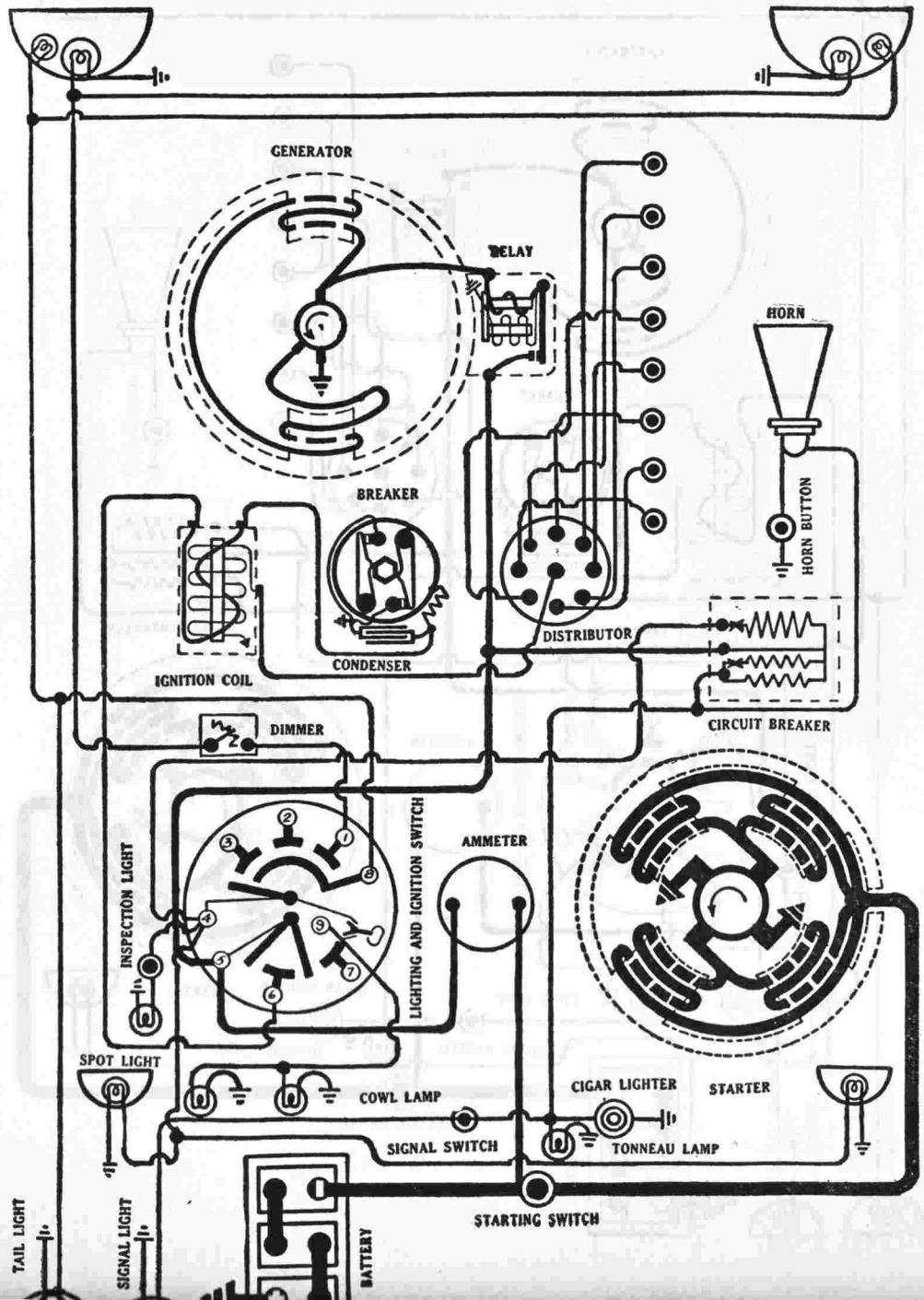
Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month. Once each year saturate the wick in the oiler on the end of the Bendix gear case with light engine oil.

GENERATOR.—Model No. 242. The direction of rotation is clockwise, looking at the commutator end. The third brush system is used for current regulation. The maximum charging rate is 16-18 amperes, reached at 1600 R.P.M. of the armature. To adjust the charging rate, remove the cover band over the commutator and loosen the lock-nut on the end of the generator. Then shift the third brush mounting plate in a clockwise direction (direction of rotation) to increase the charging rate and in the opposite (counter-clockwise) direction to decrease the charging rate.

Generator Test Data

Amperes	Hot Test	R.P.M.	Amperes	Cold Test	R.P.M.
3 (Min.)		*00	6 (Min.)		600
12		1000	13.5		1000
16-18 (Max.)		1600	19-21 (Max.)		1600
12		2400	13		2400

The brush tension of each of the generator brushes should be 1¼-1¾ lbs.



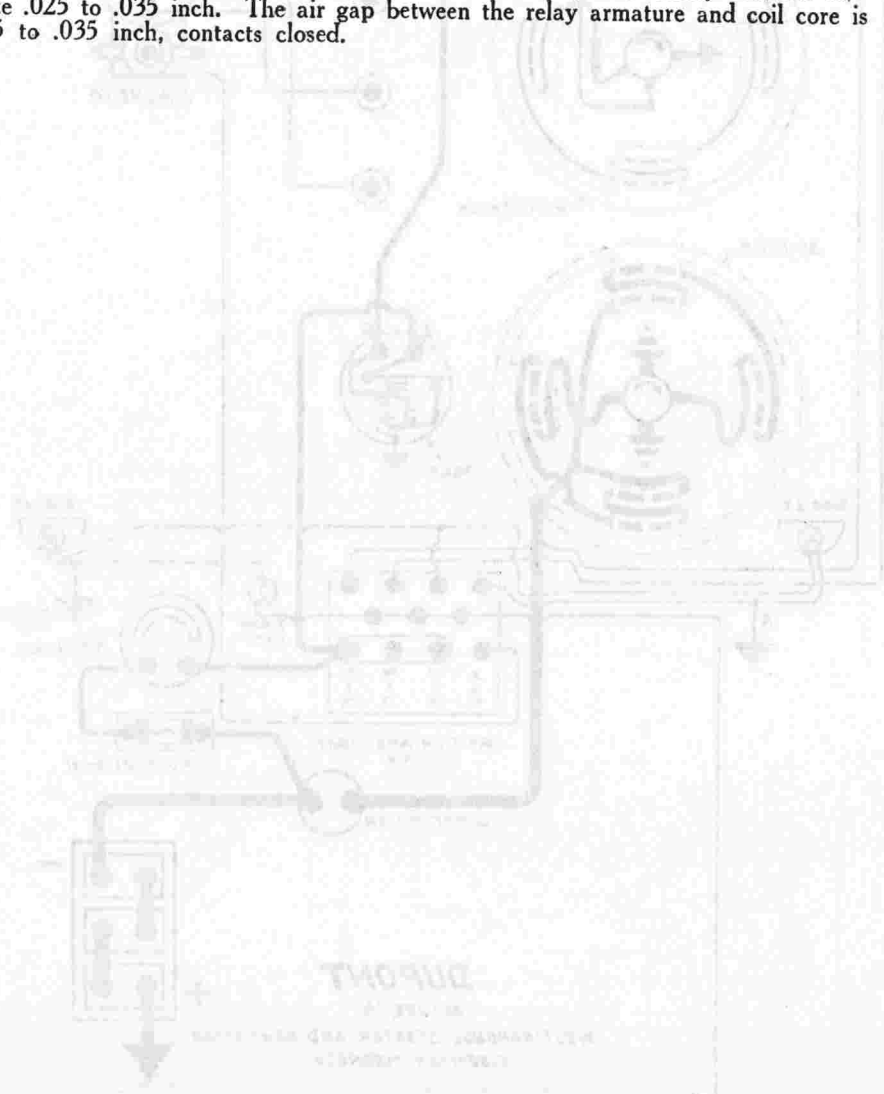
DUESENBERG

STRAIGHT EIGHT (1923-24-25-26-27)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

Mounting.—Generator is mounted at left of engine. To remove, disconnect generator drive coupling and loosen hold-down band. Then lift generator from place.

Oiling:—Fill generator oilers with light engine oil every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY: — Relay contacts close at 7 miles per hour or at 7 to 7½ volts and open at 3-4 M.P.H., with a discharge current of 0-3 amperes. Relay contacts separate .025 to .035 inch. The air gap between the relay armature and coil core is .025 to .035 inch, contacts closed.



LIGHTING:—Combination Switch No. 1226 i sused. Head and spot lamps are 6-8 volts, 21 cp. Dimmer lamp is 6-8 volts, 4 cp. Tail lamp is 6-8 volts, 2 cp. Dash lamp is 6-8 volts, 2 cp.

CIRCUIT BREAKER:—A circuit breaker is used in place of fuses. Circuit breaker begins to operate with a current flow of 25 to 30 amperes, and will continue to function until the current flow does not exceed 15 amperes. The lock-out circuit breaker opens the circuit when the current flow reaches 25-35 amperes. While operating, the current is less than one ampere.

DUPONT

MODEL A (1920-21)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
EISEMANN MAGNETO IGNITION

BATTERY.—Exide, Type 3-XC-15-1, 6 volt, 105 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .015 inch. They are made of platinum. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or well worn No. 00 sandpaper.

Oiling.—Put 2 or 3 drops of light engine oil in the oil wells every month. Put a small amount of vaseline on the fibre bumper of the contact arm ,applying with a toothpick. If the car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

Timing.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control in the fully retarded position.

Firing Order.—The firing order is 1, 2, 4, 3.

Spark Plug Gaps.—The spark plug gaps are .030 inch.

STARTER.—Frame 100. Rotation is counter-clockwise, looking at commutator end. Starter is connected to the engine through a Bendix drive. Lock torque is 12 pound-feet current being 475 amperes at 4 volts. Torque at 1600 R.P.M. is 1.75 pound-feet. Running freely, starter takes 75 amperes, armature revolving at 4000 R.P.M.

Oiling.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR.—Frame No. 150. Rotation is counter-clockwise, looking at commutator end. Generator current regulation is by the third brush system. Maximum current output is 15-16 amperes at 7.5 volts, reached at 1450-1750 R.P.M. of the armature or 15-20 miles per hour.

Generator Data

Amperes	R.P.M.	Volts
0.0	575	6.5
8.5-10.5	1000	7.0-7.5
15.0-16.0	1450-1750	7.5

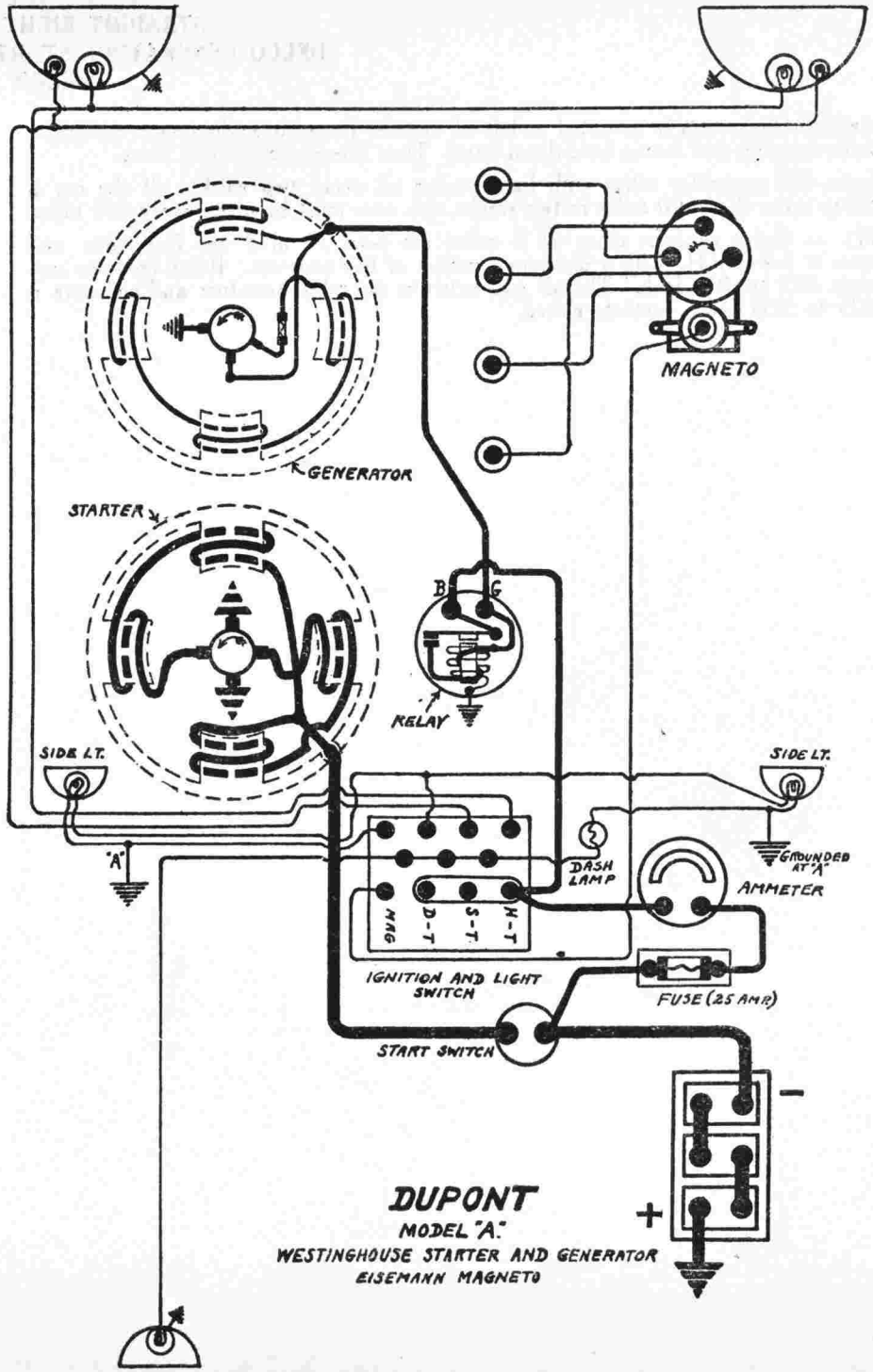
Shunt field winding takes 3.25 to 4 amperes at 6 to 6.3 volts. Move the third brush in a counter-clockwise direction to increase the charging rate, and in a clockwise direction to decrease the charging rate.

Oiling.—Put 5 or 6 drops of light engine oil in the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—The relay is mounted on the dash. Relay closes at 7 miles per hour or 575-600 R.P..M of the armature, and opens at 5 miles per hour or 525-575 R.P.M. of the armature. Adjust the spring tension on the relay armature so that the contacts open with a discharge current of 0-3 amperes. Adjust the air gap between the relay armature and coil core is .005 inch, contacts closed. Contacts separate .030 to .035 inch. Resistance of the shunt coil is 68 ohms. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

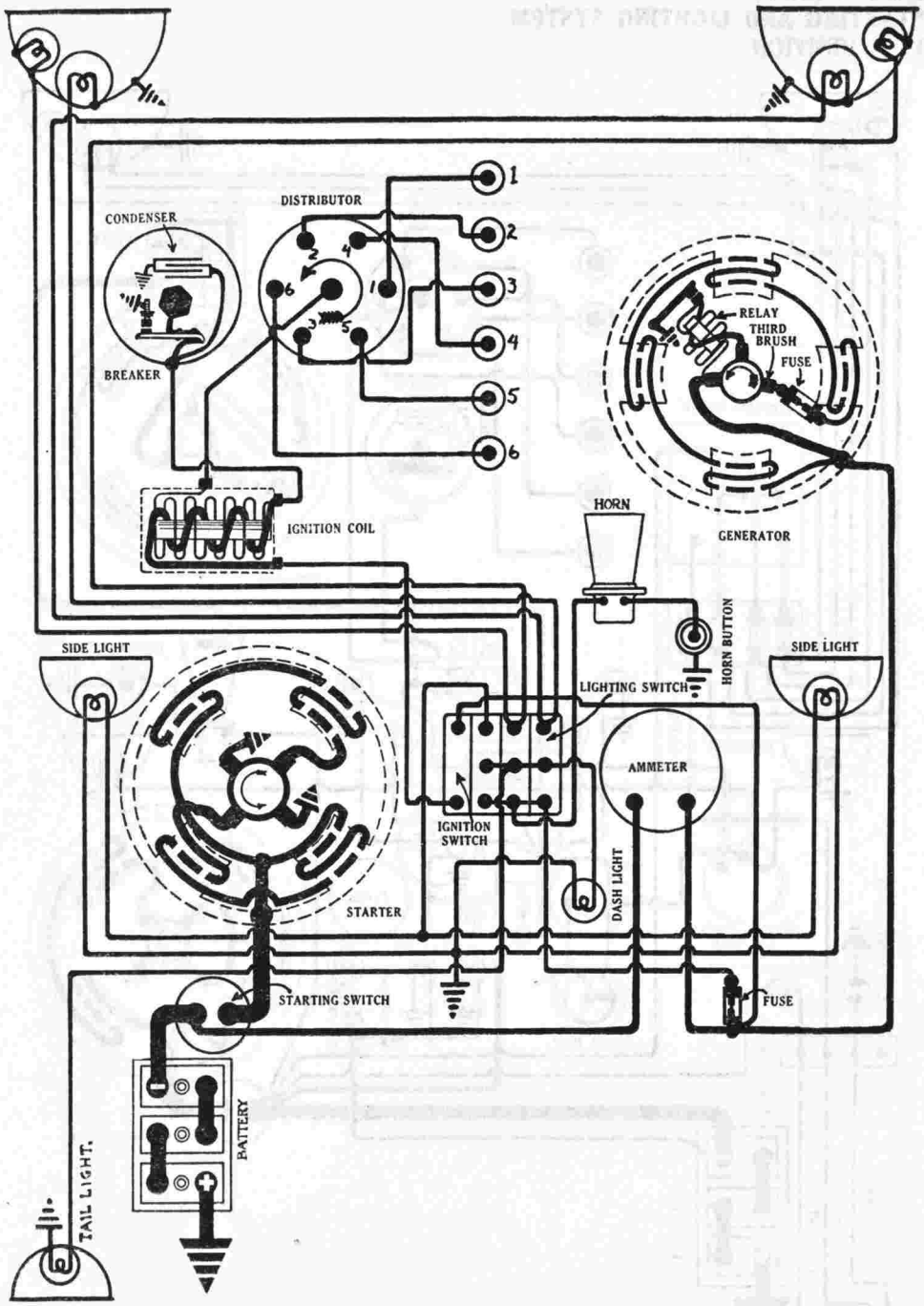
FUSES.—Generator fuse is 5 ampere. Lighting fuse is 25 ampere.



DUPONT

MODEL C (1922-23-24-25)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WESTINGHOUSE IGNITION



BATTERY:—Westinghouse (1922-23-24). Type 6-C-15. 6 volt, 125 ampere hour. **(1924-25) Type 6-OB-13.** 6 volt. Starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 19 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Type S-288761-C. Distributor Type S-250358-C. Breaker contacts separate .012 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone or with a fine flat jeweler's file.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Place a small bit of vaseline on the face of the breaker cam, applying with a toothpick.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual advance lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .031 inch.

STARTER:—Frame 711. Type S-382383. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 2½-3 pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3500-6000	5.5	35-45
17 "	Lock	4	500-575

Oiling:—Put 5 or 6 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR:—Frame 760. Type S-301190. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the charging rate, remove the cover on the generator end plate and loosen the hexagonal headed nut which holds the third brush mounting arm. Then shift the third brush in the direction of armature rotation to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the nut after making the adjustment.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	500	12-14	7.5	1250
8	6.5	750	7-11	7.0	2500
14-17	7.5	1100-1500			
7-11	6.5-7.5	2500			

The shunt field draws 2.5 amperes at 6-6.3 volts. Motoring freely generator draws 3.5-5 amperes at 6-6.3 volts.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Relay contacts close when the voltage of the generator reaches 6.2-6.5 volts and open with a discharge current of 0-3 amperes. Contacts separate .030-.035 inch. Air gap between relay armature and coil core is .005 inch, contacts closed.

LIGHTING:—Cutler-Hammer Switch. Head lamps are 6-8 volt, 21 cp. S.C. Dash and dome lamps are each 6-8 volt, 2 cp. D.C. Dimmer lamps are 6-8 volt, 4 cp. S.C. Tail lamp is 6-8 volt, 2 cp. S.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuse is 15 amperes.

DUPONT

MODEL "D" (1925) E (1927)
AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

BATTERY:—Westinghouse, Type 6-OB-13, 6 volts. Starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 19 hours. The positive (+) terminal is grounded. Battery is mounted under front seat on right side.

IGNITION:—Coil Model TC-30. Distributor Model TM-662. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file. If the points are excessively worn, they should be replaced.

Mounting:—Ignition Coil is mountd on the dash. Distributor is mounted at front of engine on right side. To remove distributor disconnect manual advance lever, breaker lead and high tension cables or remove distributor head. Then remove set screw and lift distributor from place.

Oiling:—Fill the oiler on the side of the distributor housing with light engine oil every month or each 1000 miles if the car is driven more than 1000 miles in a month. Put one drop of oil on the breaker arm pivot pin and place a small bit of heavy grease on the face of the breaker cam every month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are about .025 inch.

STARTER:—Model 930. Starter is connected to the engine through a Bendix drive. The direction of location is counter-clockwise, looking at the commutator end. Starter brush tension is 1¾-2 pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lbs. ft.	4000	6	35-45
12 "	Lock	3.4	450

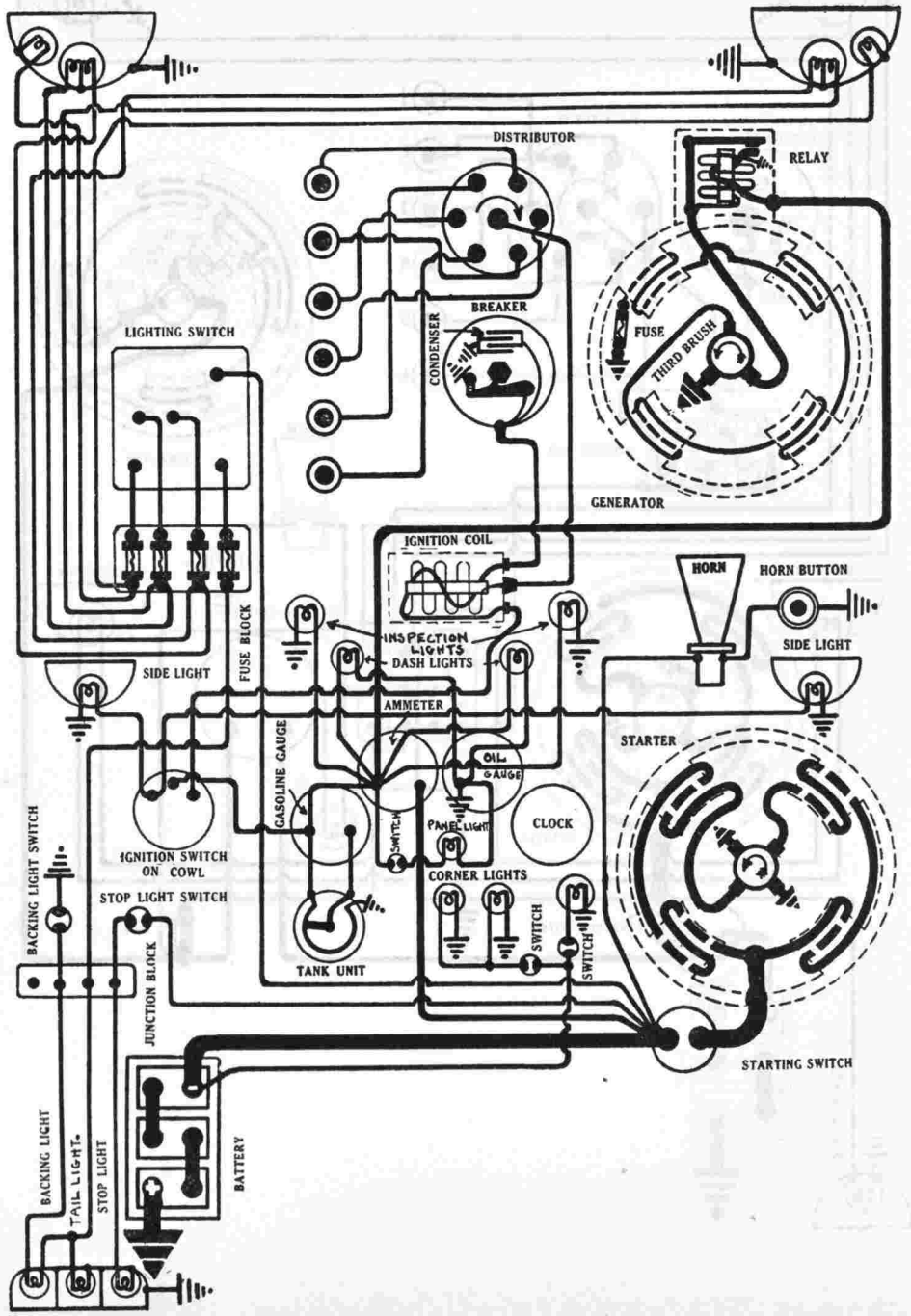
Mounting:—Starter is mounted at rear of engine on right side. To remove starter disconnect starter cable and remove three flange mounting bolts. Then slide starter from place.

Oiling:—Starter bearings are of the oilless type. They require no attention.

GENERATOR:—Model 1047. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the charging rate, shift the third brush mounting plate by turning the small screw on the generator end plate. On later cars, a special Bosch key must be inserted in a hole on the generator end plate to shift the brush. Shifting the third brush in a counter-clockwise direction increases the charging rate. The third brush may be shifted by hand if the commutator cover band is removed.

Generator Data

Cold Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
0	500	0	600
7	800	4	800
12	1200	8.5	1200
13.5	1600	10	1600
12.8	2000	9.5	2000
9	3000	6.5	3000



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DUPONT

MODEL "D" (1925-26) E (1927)

AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM

AMERICAN BOSCH IGNITION

The shuntfield current is 3-4 amperes at 6 volts. Motoring freely generator draws 6 amperes at 6 volts. Generator brush tension is 1¼ pounds each.

Mounting:—Generator is mounted on right side of engine. To remove generator disconnect generator lead and drive coupling. Then remove four mounting bolts and lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Relay is mounted on top of the generator. Relay contacts close at 500 R.P.M. or 6-8 M.P.H. when the voltage of the generator reaches 6.5-7.5 volts and open at 450 R.P.M. or 5-6 M.P.H. with a discharge current of 0-2 amperes. Contacts separate .015 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING:—Head lamps are each 6-8 volt, 21 cp. S.C. Dimmer lamps are 6-8 volt, 4 cp. S.C. Cowl lamps are 6-8 volt, 2 cp. D.C. Dash, tonneau, dome, corner and inspection lamps are each 6-8 volt, 2 cp. D.C. Stop, backing and tail lamps are 6-8 volt, 2 cp. S.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuses are 15 amperes.

DURANT

MODEL A-22 (1923-24-25-26)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM.

AUTO-LITE IGNITION.

BATTERY: — **U. S. L. Type 3-HVX-5X,** 6 volt 92 ampere hour. Startiig capacity is 105 amperes for 20 minutes. Lighting capacity is 5 amperes for 18.2 hours. The negative (-) terminal is grounded.

IGNITION:—Coil Model No. IG-4013. Distributor Model No. IG-4018-A. Breaker contacts separate .020-.024 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone.

OILING: — Put 4 or 5 drops of light engine oil in the distributor wick oiler every two weeks or each 250 miles.

TIMING: — Breaker contacts begin to separate when piston No. 1 on compression stroke is on top dead center with the spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER: — The firing order is 1-2-4-3.

SPARK PLUGS: — Spark plug diameters are 7/8 inch. Gaps are .027 inch.

STARTER: — **Model MF-1096.** Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The starter cranks the engine at 140 R. P. M. taking 115 amperes at 5 volts.

Starter Data.

Torque	R. P. M.	Volts.	Amperes
2 lb. ft.	1265	5	175.
5 "	735	5	305
8 "	315	5	425
10 "	Lock.	4	500

The pressure of the starter brushes on the commutator should be from 1¾ to 2½ pounds each.

OILING: — Self-oiling graphite bronze bearings are used. They require no attention.

GENERATOR: — **Model GH-1036.** The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To increase the charging rate shift the third brush in the direction of armature rotation (counter-clockwise) and in the opposite direction to decrease the charging rate. The maximum charging rate of 16 amperes is reached at 2400 R. P. M. of the generator armature or 31.5 M. P. H., car speed in high gear.

Generator Data.

Cold Test (77°F.)			Hot Test (230°F.)		
Amperes.	Volts.	R. P. M.	Amperes.	Volts.	R. P. M.
0	6.6	650	0	6.9	760
4	7.2	880	4	7.3	1050
10	7.8	1320	10	7.6	1600
16	8.3	2400	13.9	7.9	2560
12.	8.0	3820	12.	7.8	3650

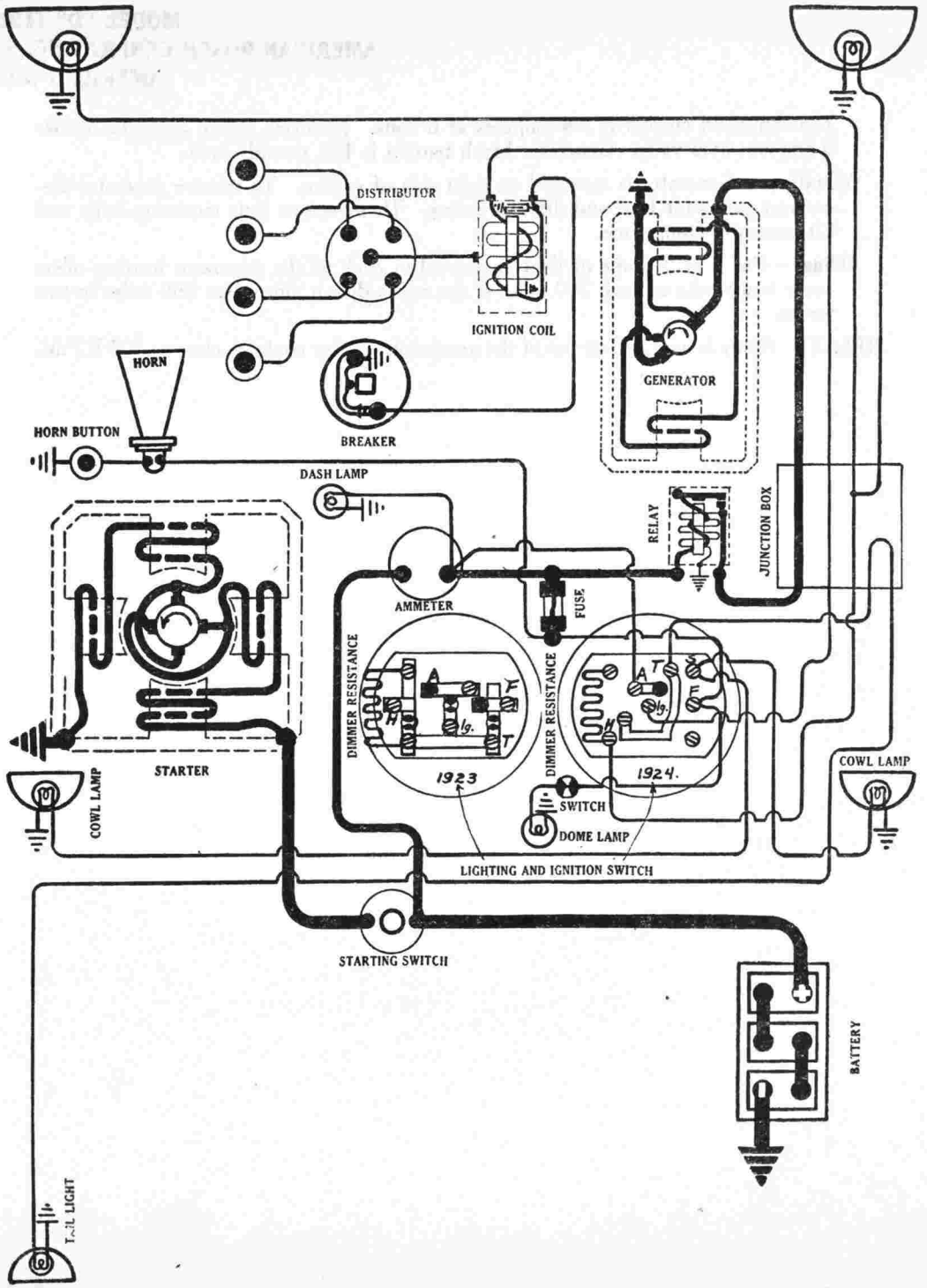
The pressure of the main brushes on the commutator should be 1¼ to 1¾ pounds each. The third brush pressure should also be 1¼ to 1¾ pounds.

OILING: — Put 4 or 5 drops of light engine oil in the oil cup on the commutator end of the generator every two weeks or each 500 miles. The drive end of the generator is oiled by the splash from the gears.

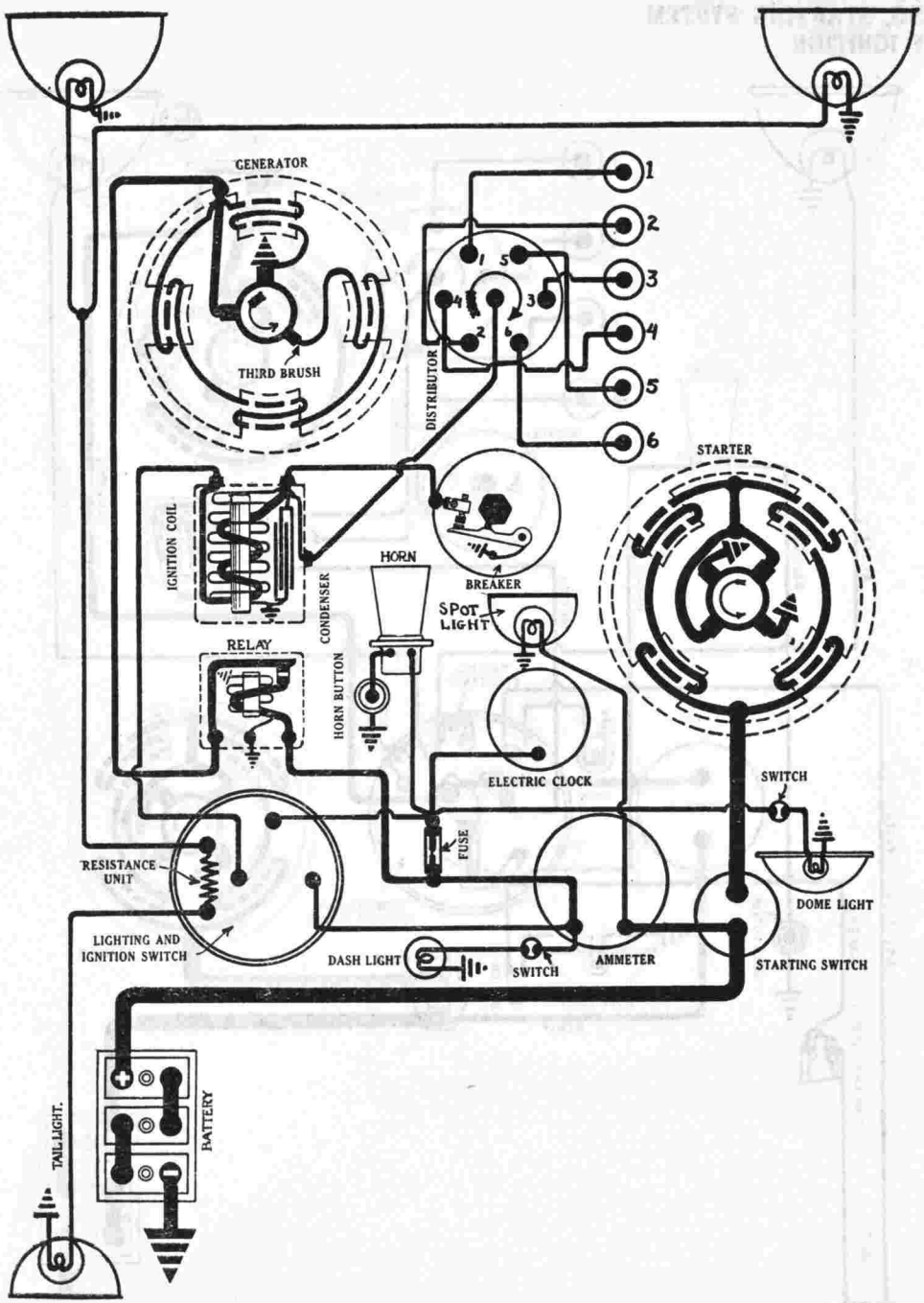
RELAY:—Model CB-1072. The relay closes at 675 R.P.M. of the generator when the voltage reaches 7 to 7.5 volts and opens with a discharge current of 0 to 2 amperes. Relay contacts separate .020 inch. The air gap between the relay armature and coil core is .010 inch, contacts closed.

LIGHTING: — **Nagel Combination Switch.** Head lamps are 6-8 volt, 21 cp. S. C. Dome lamp is 6-8 volt, 4 cp. S. C. Dash and tail lamps are 6-8 volt. 2 cp. D. C and S.C. Side lamps (used after 1923 cars) are 6-8 volt, 2 cp. S.C.

FUSES: — Lighting circuit fuse is 20 ampere. No generator fuse is used.



MODELS B-22 (1922), B-23 (1923)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION



BATTERY:—U. S. L. Type 3-CVX-6X. 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 115 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 21.2 hours.

IGNITION:—Coil Model IG-4001. Distributor Model IG-4020. Breaker contacts separate .020-.024 inch. Resurface contacts with a fine flat contact file or on a medium hard oilstone.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every week or every 250 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual control lever and breaker assembly in the fully retarded position. To set timing, crank engine until piston reaches top dead center on compression stroke (the upstroke with both valves closed). Then fully retard spark control lever. Loosen the set screw on the side of the shaft and lift distributor until gear is free. Then turn cam until contacts begin to separate. Remesh the gears and tighten the set screw. Connect the segment directly opposite the rotor to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are S.A.E. 7/8-18. Gaps are .027 inch.

STARTER:—Model MN-4001. The starter is connected to the engine through a Bendix drive. Direction of rotation is counter-clockwise, looking at commutator end. Brush spring tension is 1¼-1½ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	6	60
.6 "	2700	5.5	100
2.9 "	1500	5.0	200
5.5 "	850	4.5	300
8.2 "	410	4.0	400
17.5 "	Lock	4.0	600

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the drive end of the starter every two weeks or each 500 miles.

GENERATOR:—Model GJ-4009. Direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush shunt field. To adjust generator output, remove the commutator cover band and loosen the nut holding the third brush. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the nut after making the adjustment. Maximum charging rate is 16 amperes at 8 volts reached at 1600 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	600	0	6.5	600
2	6.6	675	2	7.2	750
5	7.0	780	5	7.4	900
10	7.3	940	10	7.7	1200
14	7.7	1300	12.5	—	1600
16	8.0	1600	11.5	—	2400
15	—	2400			

Motoring generator draws 5 amperes at 6 volts. Shunt field current is 2 amperes at 6 volts. Brush spring tension is 1¼-1½ pounds each.

Oiling:—Put 4 or 5 drops of light engine oil in the generator oilers every 500 miles or each two weeks.

RELAY:—Model CB-1072. Relay is mounted on the dash. Relay contacts close at 8 M.P.H. or 600 R.P.M. when the generator voltage reaches 6.5-7 volts and open at 7 M.P.H. or 500 R.P.M. with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is 2 amperes. Relay contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Connecticut Switch Model 183-2Y. Head lights are 6-8 volt, 21 cp. S.C. Dimming is by resistance on switch. Dash light is 6-8 volt, 3 cp. D.C. Tail light is 6-8 volt, 3 cp. S.C. Spot light is 6-8 volt, 21 cp. S.C. Dome light is 6-8 volt, 6 cp. S.C.

FUSES: Lighting [illegible] on dash is 20 amperes

DURANT

STAR FOUR MODEL M-2 (1928) SERIAL NUMBERS 1000 UP
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L., Type 3-CVX-5X7, 6 volt, 11 plates. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 96 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 16.8 hours. Battery is mounted under front floor boards on right frame member.

IGNITION:—Coil Model IG-4066. Coil is mounted on the generator at the right of the engine. Ignition current is 1½-2 amperes at 6 volts with engine running and 4½-5 amperes at 6 volts with engine stopped.

Distributor Model IGB-4010-A. Breaker contacts separate .020-.025 inch. Set contact gap by loosening lock nut on stationary contact stud and turning up stud until proper gap is secured with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is full automatic. Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 11 degrees (engine) reached at 2400 R.P.M. Breaker arm spring tension is 16-20 ounces.

Mounting:—Distributor is mounted on rear of generator at right of engine. To remove distributor, disconnect primary lead and remove head with cables intact. Then loosen clamp screw on side of shaft housing and lift distributor from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor every 500 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 13 degrees or four teeth on the flywheel before top dead center with the breaker assembly in the fully retarded position. To set timing, crank engine over until piston No. 1 enters compression stroke (the upstroke with both valves closed). Continue to crank engine until a point on the flywheel 4 teeth before the top dead center mark is opposite the indicator line directly over the crankshaft in the center of the engine. The piston will then be 13 degrees before top dead center in firing position. Loosen the clamp screw under the distributor housing and rotate distributor until contacts begin to open. Tighten the clamp screw and make certain that the segment opposite the rotor is connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-3-4-2.

Spark Plugs:—Spark plug diameters are ⅞-18 S.A.E. Gaps are .025 inch.

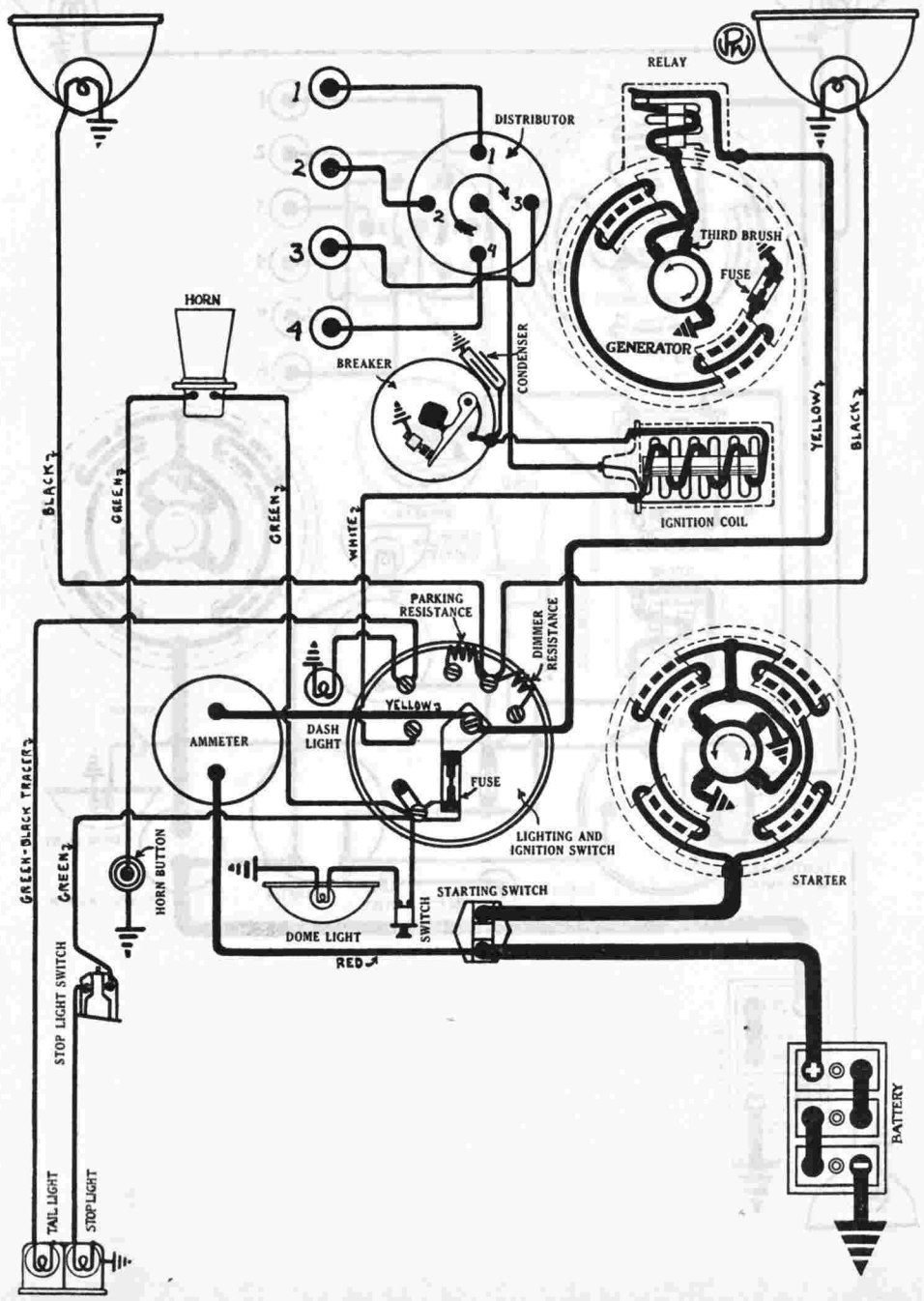
VALVE TIMING:—Specifications:—Head diameter, 1½ inches; stem diameter, .371 inch; stem length, 5¼ inches. Valve lift, 5/16 inch. Spring pressure, 78½ pounds (valve open). Tappet clearance, .006 inch (hot). Valve stem guides are removable. Oversize valve stems are made.

Timing:—Inlet valves open 4 degrees after top dead center and close 46 degrees after lower dead center. Exhaust valves open 41 degrees before lower dead center and close 1 degree after top dead center.

STARTER:—Model MZ-4012. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 2½-3 pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	50
1.5 "	1800	5.2	150
2.5 "	1325	5.0	200
5.0 "	740	4.5	300
7.6 "	220	4.0	400
12.2 "	Lock	4.0	550



DURANT

STAR FOUR MODEL M-2 (1928) SERIAL NUMBERS 1000 UP
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

Mounting:—Starter is cradle mounted at right of engine. To remove starter, disconnect cable and remove mounting clamp band. Then lift starter from place.

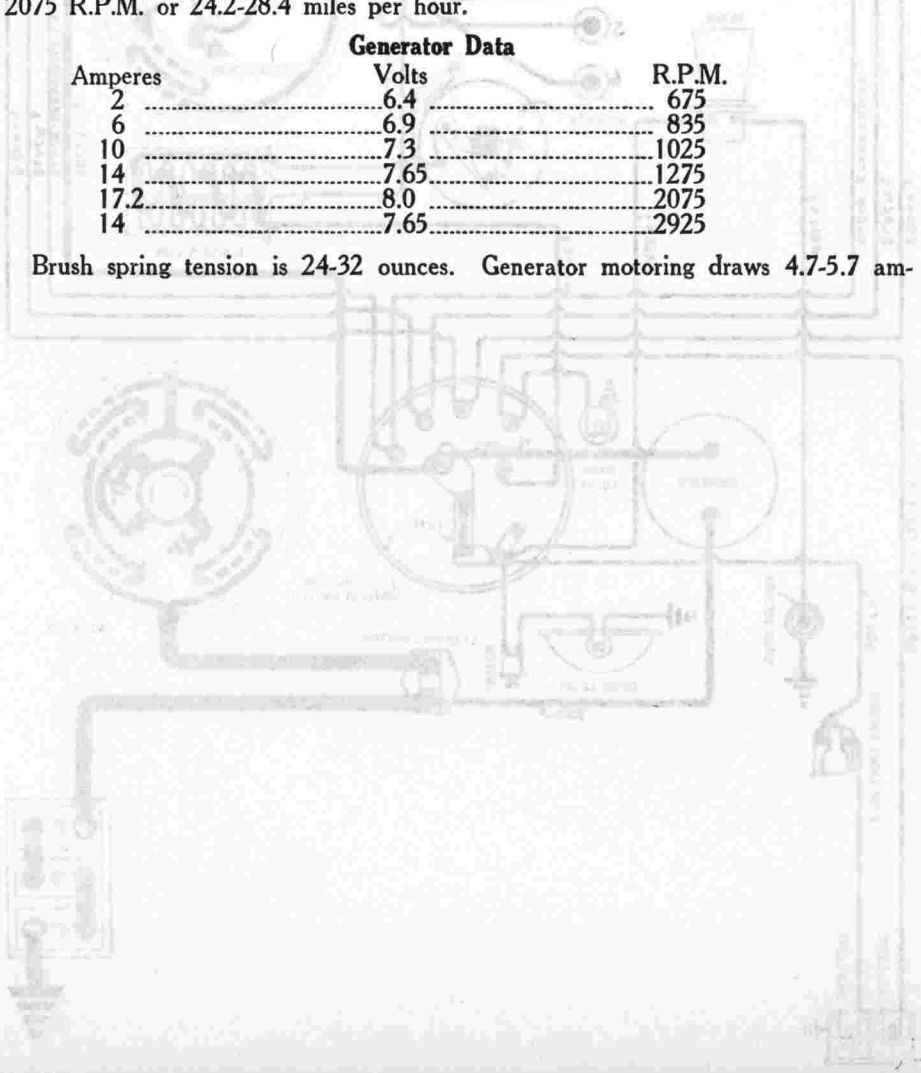
Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GAL-4105. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen commutator cover band and shift third brush and mounting plate by tapping on the mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any position by friction between the mounting stud and the end plate. Maximum charging rate is 16-17 amperes (cold) at 8 volts reached at 2075 R.P.M. or 24.2-28.4 miles per hour.

Generator Data

Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	835
10	7.3	1025
14	7.65	1275
17.2	8.0	2075
14	7.65	2925

Brush spring tension is 24-32 ounces. Generator motoring draws 4.7-5.7 amperes at 6 volts. Shunt field current is 4.2 amperes at 6 volts. A five ampere field fuse is mounted on top of the generator.



Mounting:—Generator is flange mounted on right of engine on rear of timing chain case. To remove generator, disconnect all ignition wiring or remove coil and distributor. Then remove flange mounting cap screws and pull generator to rear. Lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every 250 miles. Every 5000 miles remove the oilwell and clean out all old oil and grease. Refill with light oil. The drive end bearing is oiled by splash from the chain case.

RELAY:—Model CB-4007. Relay is mounted on the generator. Relay closes at 675 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Clum Lighting Switch. Switch is mounted on the steering column. Head lights are 6-8 volt, 21 cp. S.C. Mazda No. 1129. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dash, tail and dome lights are 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Generator field fuse is 5 amperes. Lighting fuse on switch is 20 amperes.

DURANT

MODEL 55 (1928) SERIAL NUMBERS 1000 UP
CONTINENTAL 14L ENGINE
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L., Type 3-CVX-5X7, 6 volt, 11 plates. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 96 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 16.8 hours. Battery is mounted under front floor boards on right frame member.

IGNITION:—Coil Model IG-4066. Coil is mounted on the generator at the right of the engine. Ignition current is 1.5-2 amperes at 6 volts with engine running and 4.5-5 amperes at 6 volts with engine stopped.

Distributor Model IG-4067-A. Breaker contacts separate .020-.025 inch. Set contact gap by loosening lock nut on stationary contact stud and turning up stud until proper gap is secured with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is full manual control. Maximum manual advance is 25 degrees.

Mounting:—Distributor is mounted on rear of generator at right of engine. To remove distributor, disconnect primary lead and manual advance rod and remove head with cables intact. Then loosen clamp screw on side of shaft housing and lift distributor from place.

Oiling:—Put 4 or 5 drops of light oil in the oiler on the side of the distributor every 500 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark lever fully retarded. To set timing, crank engine over until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully retard spark lever. Continue to crank engine until piston reaches top dead center when the dead center mark on the flywheel will be in line with the indicator line directly above the crankshaft in the center of the engine block. Then loosen clamp screw and rotate distributor until the contacts begin to open. Tighten the clamp screw and make certain that the segment opposite the rotor is connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Gaps are .025 inch.

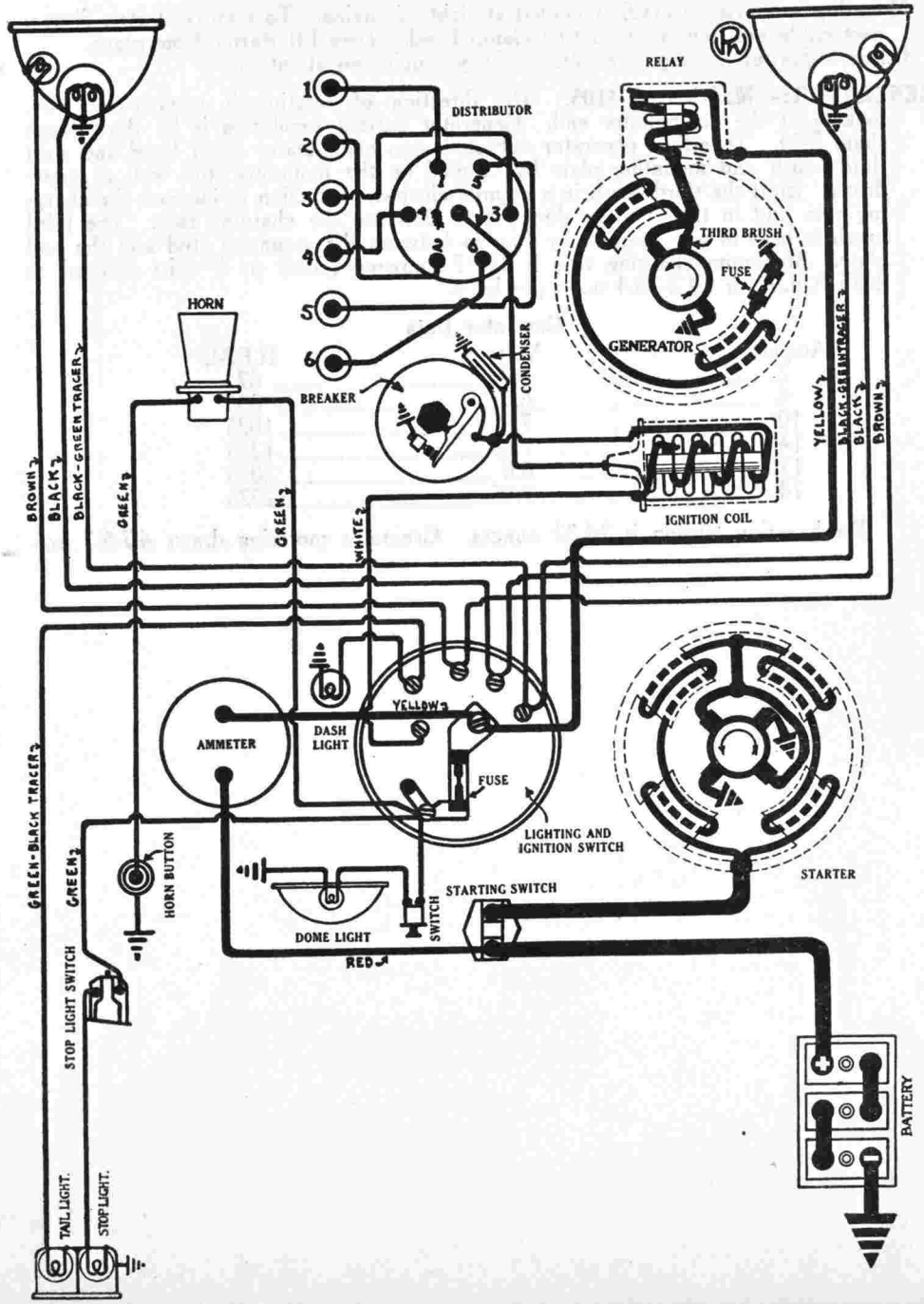
VALVE TIMING:—INLET VALVES:—Head diameter, 1 7/16 inches; stem diameter, .371 inch; stem length, 5 17/32 inches. Valve lift, 5/16 inch. Spring pressure, 77.5 pounds (valve open). Tappet clearance, .006 inch (hot). Inlet valves open 4 degrees after top dead center and close 46 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 5/16 inches; stem diameter, .371 inch; stem length, 5 17/32 inches. Valve lift, 5/16 inch. Spring pressure, 77.5 pounds (valve open). Tappet clearance, .006 inch (hot). Exhaust valves open 41 degrees before lower dead center and close 1 degree after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

STARTER:—Model MZ-4012. The direction of rotation is counter-clockwise, looking at the commutator end. Starter is connected to the engine through a Bendix drive. Brush spring tension is 2.5-3 pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	50
1.5 "	1800	5.2	150
2.5 "	1325	5.0	200
5.0 "	740	4.5	300
7.6 "	220	4.0	400
12.2 "	Lock	4.0	550



DURANT

MODEL 55 (1928) SERIAL NUMBERS 1000 UP
CONTINENTAL 14L ENGINE
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

Mounting:—Starter is cradle mounted at right of engine. To remove starter, disconnect cable and remove mounting clamp band. Then lift starter from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GAL-4107. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove commutator cover band and shift third brush and mounting bracket by tapping on mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any position by friction between the mounting stud and the end plate. With standard car setting the maximum charging rate is 14 amperes (cold) reached at 1450 R.P.M. or 25 miles per hour.

Generator Data

Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	635
10	7.3	1025
14	7.65	1275
17.2	8.0	2075
14	7.65	2925

Brush spring tension is 24-32 ounces. Generator motoring draws 4.7-5.7 amperes at 6 volts. Shunt field current is 4.2 amperes at 6 volts. A five ampere field fuse is mounted on top of the generator.

Mounting:—Generator is mounted at right of engine on rear of timing chain case. Water pump is driven by extension of generator shaft. To remove generator, disconnect all ignition wiring or remove distributor and ignition coil. Disconnect water pump coupling and remove flange mounting cap screws. Then pull generator to rear and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every 500 miles.

RELAY:—Model CB-4007. Relay is mounted on the generator. Contacts close at 675 R.P.M. when the generator voltage reaches 7-7.5 volts and open wtih a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Clum Lighting Switch. Switch is mounted on the instrument board. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base) Mazda No. 1110. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dash, tail and dome lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63. The second 21 cp. filament in the head lights is used instead of dimming.

FUSES:—Generator field fuse is 5 amperes. Lighting fuse on switch is 20 amperes capacity.

DURANT

MODEL 65 (1928) SERIAL NUMBERS 1000 UP
CONTINENTAL 15L ENGINE
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L., Type 3-HVX-6X7, 6 volt, 13 plates. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 127 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 23.4 hours. Battery is mounted under front floor boards on right frame member.

IGNITION:—Coil Model IG-4066. Coil is mounted on generator at right of engine. Ignition current is 1.5-2 amperes at 6 volts with engine running and 4.5-5 amperes at 6 volts with engine stopped.

Distributor Model IGB-4008-B. Breaker contacts separate .020-.025 inch. Set contact gap by loosening lock nut on stationary contact stud and turning up stud until proper gap is secured with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 500 R.P.M. of engine. Maximum automatic advance is 18 degrees (engine) reached at 3350 R.P.M. A Shaler ignition lock is used.

Mounting:—Distributor is mounted on rear of generator at right of engine. To remove distributor, disconnect manual advance rod and remove head with cables intact. Remove Shaler lock. Then loosen clamp nut on side of shaft mounting and lift distributor from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor shaft every 500 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 3 degrees on the flywheel before top dead center with the manual spark lever fully retarded. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully retard spark lever. Continue to crank engine until the piston reaches a position approximately one tooth on the flywheel before top dead center. The top dead center mark on the flywheel will be almost one tooth before the indicator on the right front of the flywheel case. Then loosen clamp screw in timing arm and rotate distributor until contacts begin to separate. Tighten the clamp screw and make certain that the segment opposite the rotor is connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S. A. E. Gaps are .025 inch.

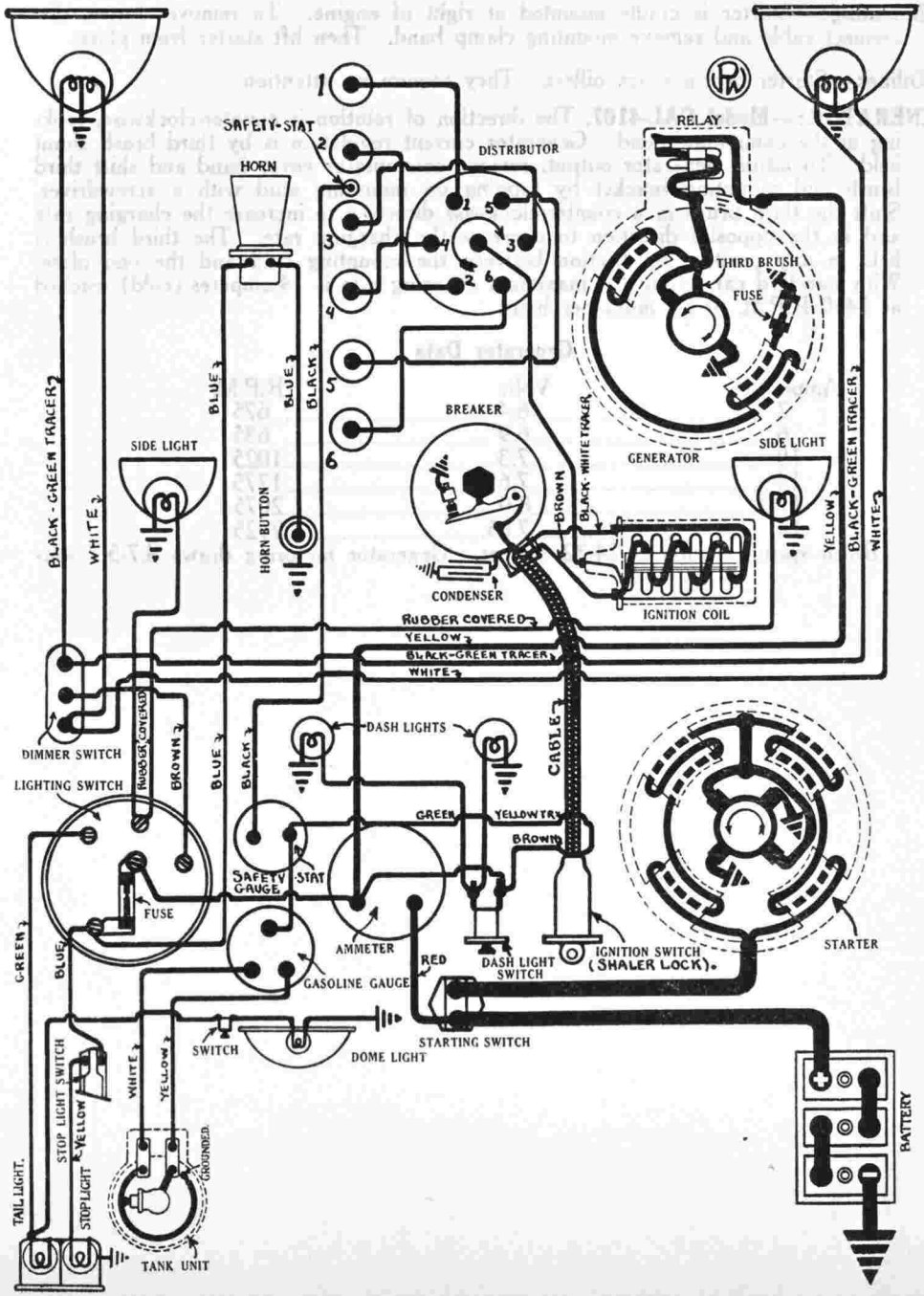
VALVE TIMING:—INLET VALVES:—Head diameter, 1 7/16 inches; stem diameter, .371 inch; stem length, 5 17/32 inches; valve lift, 5/16 inch. Spring pressure, 77.5 pounds (valve open). Tappet clearance, .006 inch (hot). Inlet valves open 4 degrees after top dead center and close 46 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 5/16 inches; stem diameter, .371 inch; stem length, 5 17/32 inches; valve lift, 5/16 inch. Spring pressure, 77.5 pounds (valve open). Tappet clearance, .006 inch (hot). Exhaust valves open 41 degrees before lower dead center and close 1 degree after top dead center. Valve stem guides are removable. Oversize valves are not made.

STARTER:—Model MZ-4001. The direction of rotation is counter-clockwise, looking at the commutator end. Starter is connected to the engine through a Bendix drive. Brush spring tension is 2.5-3 pounds.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	50
1.5 "	1800	5.2	150
2.5 "	1325	5.0	200
5.0 "	740	4.5	300
7.6 "	220	4.0	400
12.2 "	Lock	4.0	550



DURANT

MODEL 65 (1928) SERIAL NUMBERS 1000 UP
CONTINENTAL 15L ENGINE
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel case. To remove starter, disconnect cable and remove flange mounting cap screws. Then pull starter forward and lift from place.

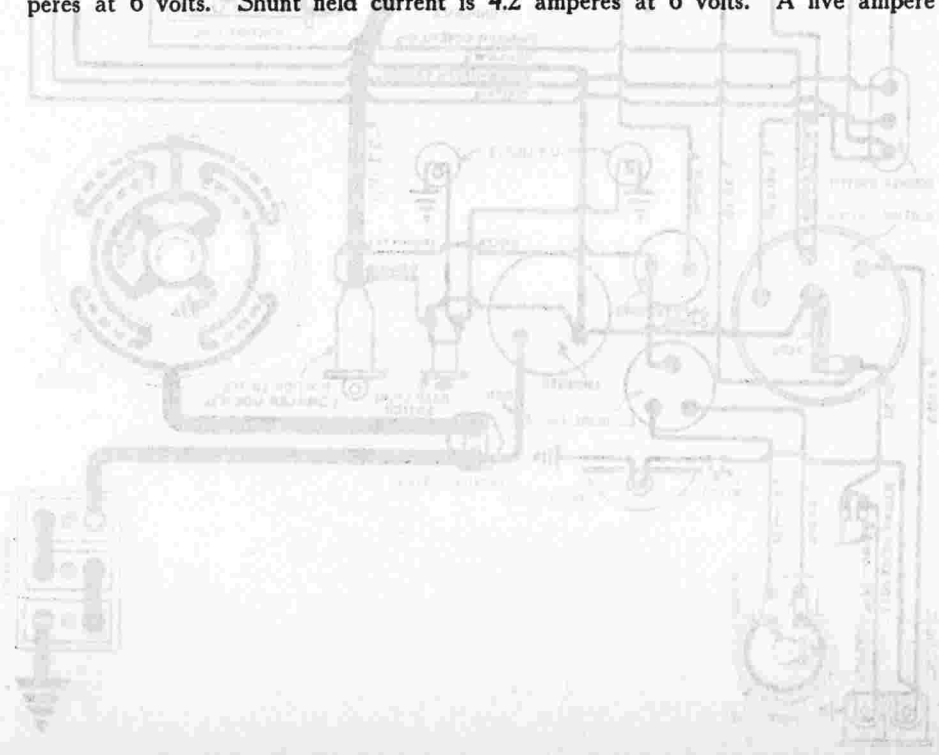
Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GAL-4104. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove commutator cover band and shift third brush and mounting plate by tapping on the mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any position by friction between the mounting stud and the end plate. The maximum charging rate is 16-17 amperes (cold) at 8 volts reached at 2075 R.P.M. or 24.4-28.7 miles per hour.

Generator Data

Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	835
10	7.3	1025
14	7.65	1275
17.2	8.0	2075
14	7.65	2925

Brush spring tension is 24-32 ounces. Generator motoring draws 4.7-5.7 amperes at 6 volts. Shunt field current is 4.2 amperes at 6 volts. A five ampere field fuse is mounted on the end plate.



Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect all ignition wiring or remove distributor and ignition coil. Then remove flange mounting cap screws and pull generator to rear.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every 500 miles. The drive end bearing is oiled by splash from the chain case.

RELAY:—Model CB-4007. Relay is mounted on the generator. Contacts close at 10 M.P.H. or 675 R.P.M. when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Clum Lighting Switch. Lighting switch is mounted on the instrument board. A Delco-Remy dimmer switch mounted on the toeboard is used to control the head light filaments. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Side lights (or auxiliary head lights when used) are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dash, dome and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Generator field fuse is 5 amperes. Lighting fuse on switch is 20 amperes capacity.

DURANT

MODEL 75 (1928) SERIAL NUMBERS 1000 UP
CONTINENTAL 15U ENGINE
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L., Type 3-HVX-6X7, 6 volt, 13 plates. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 127 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 23.4 hours. Battery is mounted under front floor boards on right frame member.

IGNITION:—Coil Model IG-4066. Coil is mounted on generator at right of engine. Ignition current is 1.5-2 amperes at 6 volts with engine running and 4.5-5 amperes at 6 volts with engine stopped.

Distributor Model IGB-4008-A. Breaker contacts separate .020-.025 inch. Set contact gap by loosening lock nut on stationary contact stud and turning up stud until proper gap is secured with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 20 degrees (engine) reached at 2800 R.P.M. A Shaler ignition lock is used.

Mounting:—Distributor is mounted on rear of generator at right of engine. To remove distributor, disconnect manual advance rod and remove head with cables intact. Then remove Shaler lock. Loosen clamp nut on side of shaft mounting and lift distributor from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor every 500 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark lever fully retarded. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully retard spark lever. Continue to crank engine until piston reaches top dead center when the dead center mark on the flywheel will be opposite the indicator on the flywheel case. Then loosen clamp screw on timing arm under distributor and rotate distributor until contacts begin to open. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 18 MM. metric. Gaps are .025 inch.

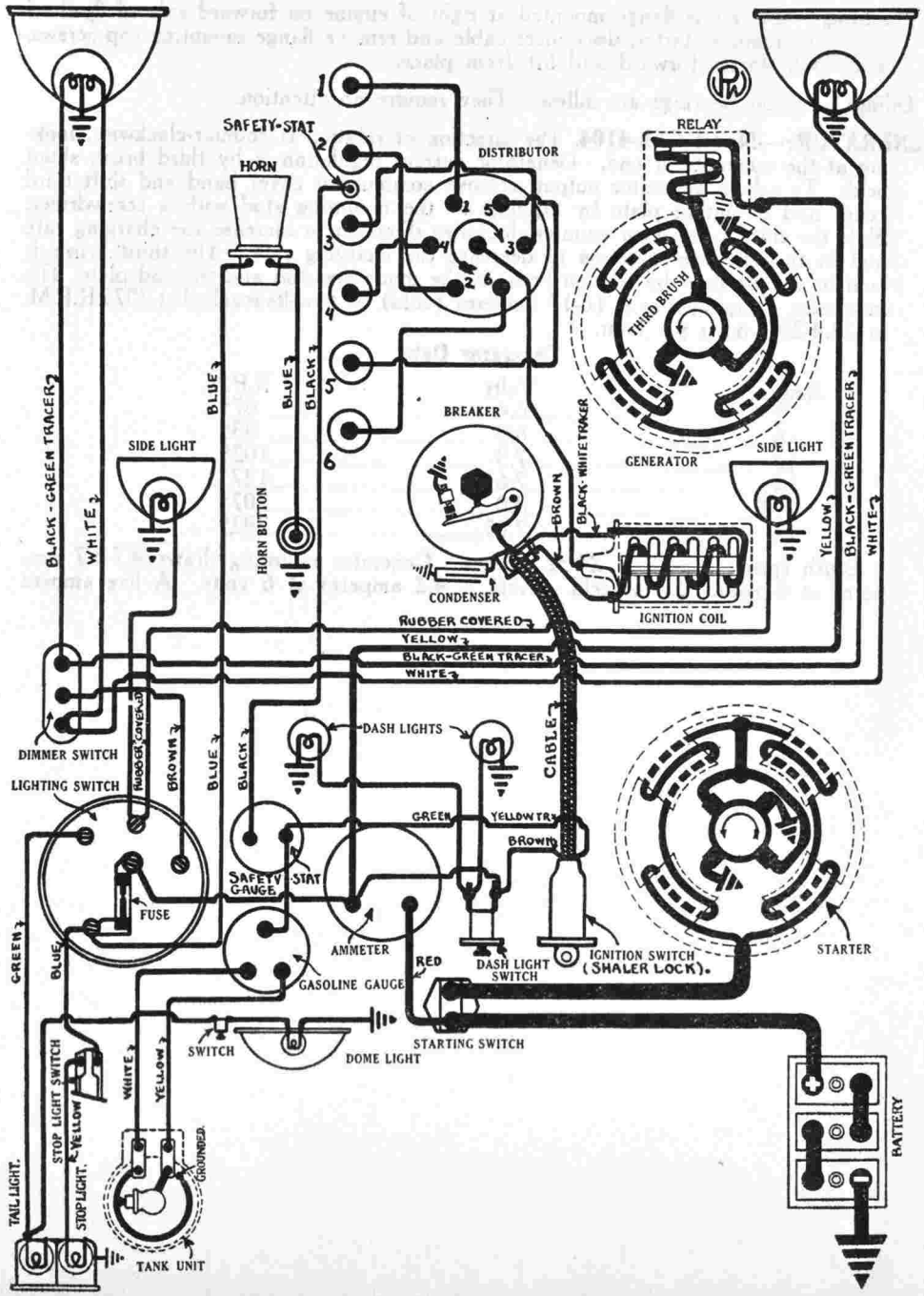
VALVE TMING:—Specifications:—Head diameter, 1⅝ inches; stem diameter, .371 inch; stem length, 5 45/64 inches; valve lift, 5/16 inch. Spring pressure, 103 pounds (valve open). Tappet clearance, .008 inch (hot). Valve stem guides are removable. Oversize valve stems are not made.

Timing:—Inlet valves open 5 degrees after top dead center and close 45 degrees after lower dead center. Exhaust valves open 40 degrees before lower dead center and close 5 degrees after top dead center.

STARTER:—Model MAD-4101. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush spring tension is 1¾-2¼ pounds.

Starter Data

Torque	R.P.M.	Volts	Amperes
.3 lb. ft.	2750	5.5	100
2.8 "	1360	5.0	200
5.7 "	800	4.5	300
8.7 "	400	4.0	400
15.2 "	Lock	3.6	760



DURANT

MODEL 75 (1928) SERIAL NUMBERS 1000 UP
CONTINENTAL 15U ENGINE
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

Mounting:—Starter is flange mounted on right of engine on forward side of flywheel case. To remove starter, disconnect cable and remove 3 flange mounting cap screws. Pull starter forward and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GAK-4101. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush and mounting plate by tapping on the mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any position by friction between the mounting stud and the end plate. Maximum charging rate is 16 amperes at 8 volts reached at 1550 R.P.M. or 23-30 miles per hour.

Generator Data

Amperes	Volts	R.P.M.
2	6.6	560
6	6.9	675
10	7.3	875
14	7.65	1000
16.8	8.0	1525
14	6.65	2025

Brush spring tension is 24-32 ounces. Generator motoring draws 6 amperes at 6 volts. Shunt field current is 4.5 amperes at 6 volts. No field fuse is used.

Mounting:—Generator is flange mounted on right of engine on rear of timing chain case. To remove generator, disconnect all ignition wiring or remove coil and distributor. Then disconnect water pump drive coupling and take out flange mounting cap screws. Pull generator to rear and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at each end of the generator every 500 miles.

RELAY:—Model CB-4007. Relay is mounted on the generator. Contacts close at 11 M.P.H. or 550 R.P.M. when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Clum Lighting Switch. Lighting switch is mounted on the instrument board. A Delco-Remy dimmer switch mounted on the toeboard is used to control the head lights. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Auxiliary head lights (or side lights when used) are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dash, tail and dome lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Lighting fuse on switch is 20 amperes capacity.

EARL

MODEL 40 (1922-23-24)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—U. S. L. Type, HDN, 313X, 6 volts, 95 ampere hour. The positive (+) terminal is grounded.

IGNITION.—Connecticut, Model 16-C. Breaker contacts separate .018 to .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Timing.—Breaker contacts begin to separate when piston No. 1 before top dead center, 2¾ inch measured on flywheel, and spark control lever and breaker assembly fully advanced.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER.—Model MG-1013. Starter is connected to engine by a Bendix drive. The direction of rotation is counter-clockwise, looking at commutator end. Motor running free at 4000 R.P.M., taking 40-60 amperes, 6 volts. Cranking engine at 125 R.P.M., requiring 150 amperes, 5 volts.

Starter Data

Torque	R.P.M.	Amperes
2 lb. ft.	1280	135
4 lb. ft.	900	210
6 lb. ft.	600	275
8 lb. ft.	400	335
10 lb. ft.	180	390
18 lb. ft.	Lock	650

Oiling.—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month.

GENERATOR.—Model GJ-1013. Generator current regulation is by third brush system. The direction of rotation is counter-clockwise, looking at the commutator end. The maximum charging rate is 16-18 amperes at 7-7.5 volts.

Generator Data

Cold Test. (25°C)			Hot Test (75°C)		
Amperes	Volts	R. P. M.	Amperes	Volts	R. P. M.
2	6.25	575	2	6.95	700
6	6.4	700	6	7.1	875
10	6.55	900	10	7.25	1200
14	6.7	1250	12	7.35	1650
15.5	6.8	1700	12	7.35	1850

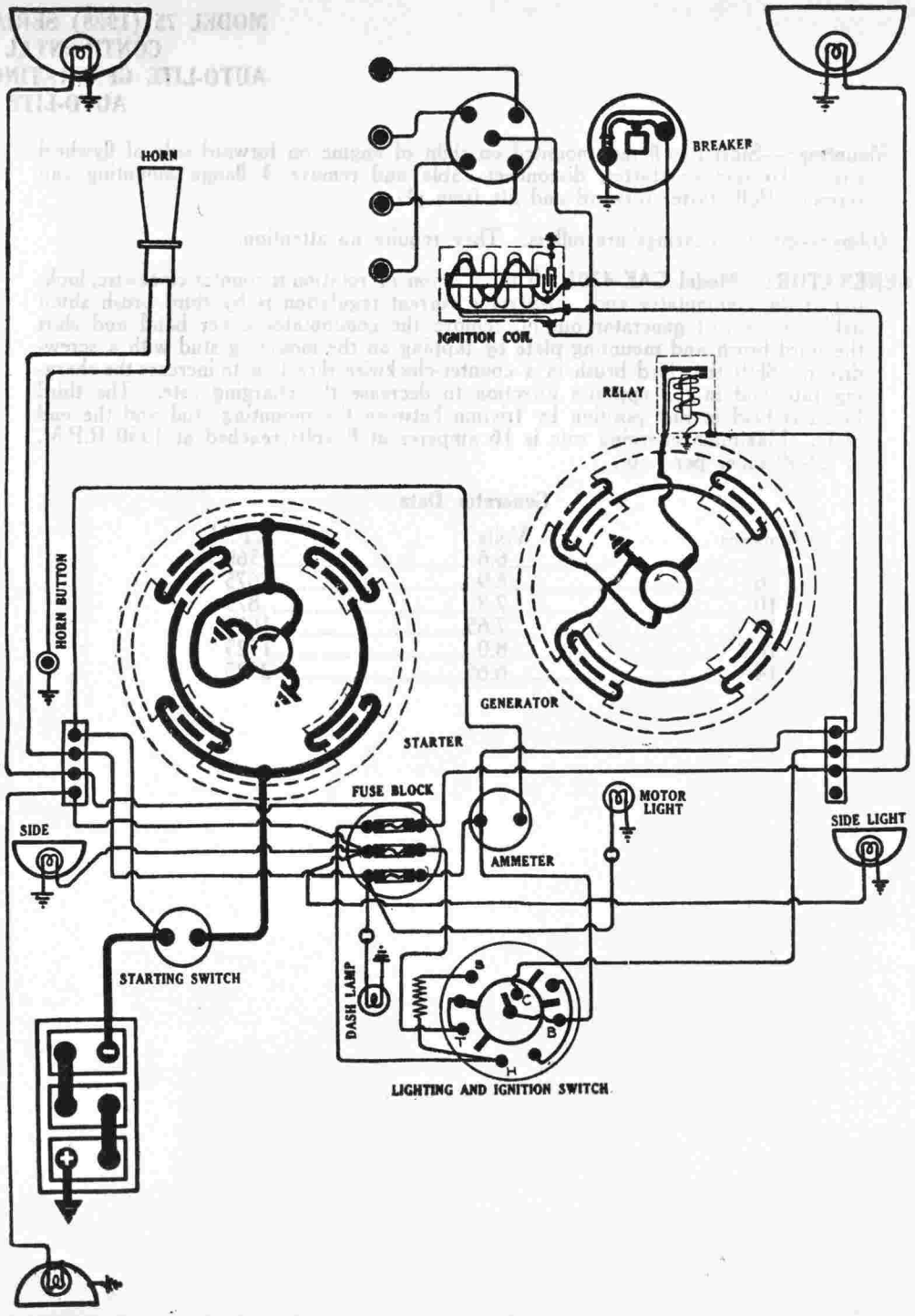
OILING.—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

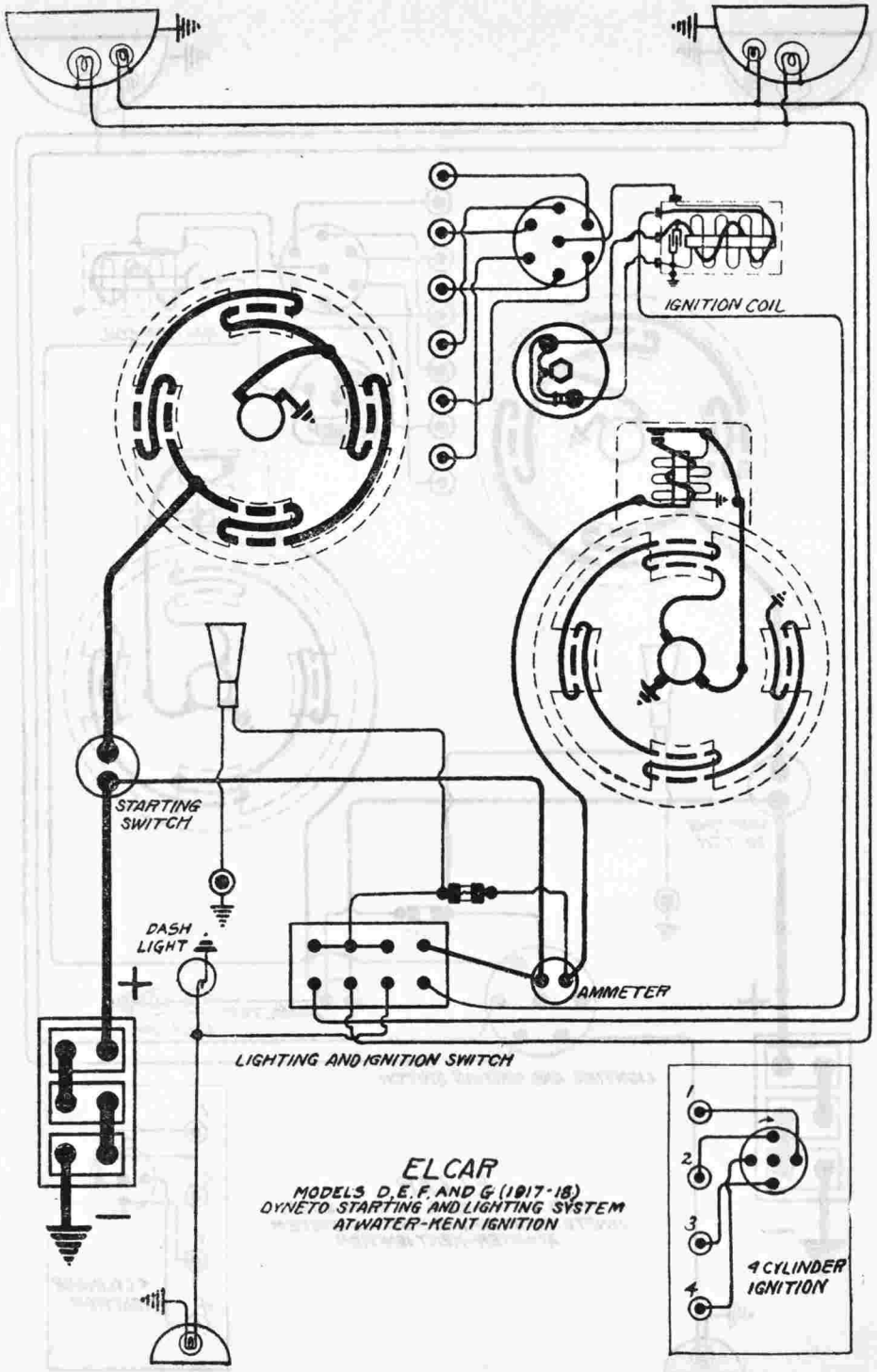
RELAY.—Relay closes when the voltage of the generator reaches 6.5 to 7 volts and opens when there is a discharge of from 0 to 2 amperes. Relay contacts separate .030 to .045 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp., SC. Dash lamp is 6-8 volt, 2 cp. D. C. Side and tail lamps are 6-8 volts, 2 cp., S.C. Motor lamp, 6-8 volts, 2 cp., D.C.

FUSES.—Fuses are 20 ampere.

COMBINATION SWITCH.—Briggs and Stratton, No. 2267.





Elcar

Models D, E, F and G (1917-18)
Dyneto Starting and Lighting System
Connecticut Ignition

Battery.—Battery is 6 volt, 85 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts should separate about .020 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order of the four cylinder cars is 1, 3, 4, 2. The firing order of the six cylinder cars is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be .025 inch to .030 inch.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Starter.—Starter is connected to the engine through a Bendix drive. Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited armature or field coils or commutator bars will cause high current and low speed during the cranking operation.

Oiling.—Saturate the wick at the commutator end of motor with light engine or machine oil and put a few drops of light engine oil in the driving end bearing every month.

Generator.—Generator current regulation is by third brush system. Relay should close at about 7 miles per hour. The maximum generator output should be about 11 amperes with machine hot or 13 amperes with machine cold, reached at about 16 miles per hour. This rate should reduce to 9-10 amperes at about 40 miles per hour. Clean relay contacts by drawing a piece of unglazed paper between them. If burned or pitted, resurface them with a piece of well worn No. 00 sand paper, drawing a piece of unglazed paper between them, to remove all grit, before again putting into service.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 15 cp. Dimmer lamps are 6-8 volts, 4 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.

Fuse.—Fuse is 15 ampere.

ELCAR

MODELS D-4, E-4, G-4, D-6, E-6 AND G-6 (1919)
DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER-KENT IGNITION

BATTERY.—Battery is 6 volt, 85 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Type CC. Breaker contacts separate .006 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Every two weeks remove the distributor cap and rotor and put 4 or 5 drops of light engine oil in the oil hole exposed. Put a small amount of vaseline on the cam, applying with a toothpick. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order of the 4 cylinder cars is 1, 3, 4, 2. The firing order of the 6 cylinder cars is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Starter is connected to the engine through a Bendix drive.

OILING.—Put 4 or 5 drops of light engine oil in rear starter bearing oiler every month. Every three months remove the cap at front end and saturate the felt packing with light engine oil.

GENERATOR.—Generator current regulation is by third brush system. Maximum current output of 14 amperes is reached at 16-18 miles per hour or 1500 R.P.M. of armature.

Generator Data

Amperes	M.P.H.	Volts
0	7- 9	6.4
5	9-10	6.6
10	12-14	6-8
12-14	16-18	7.8
8	40-45	6.7

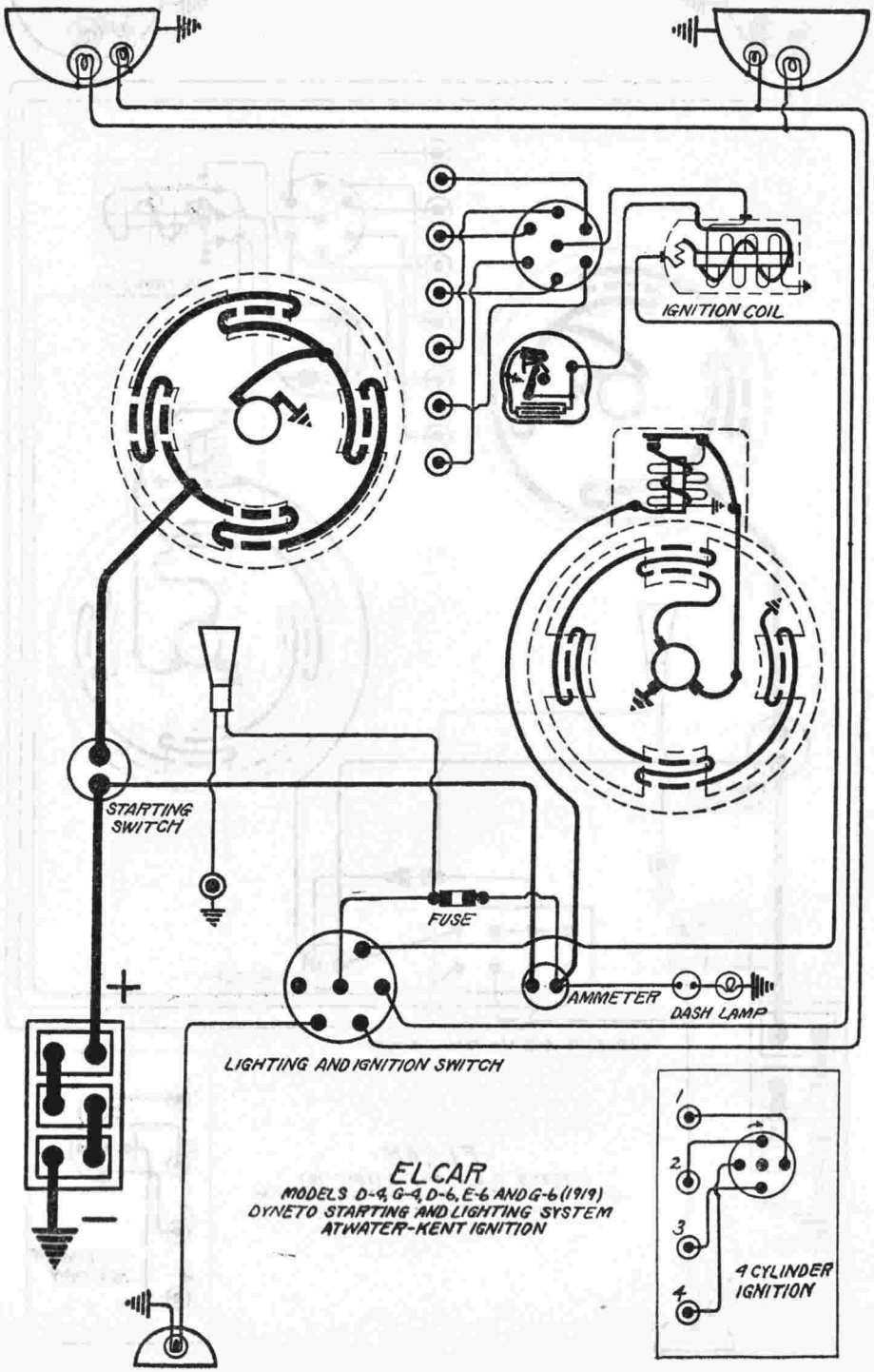
Charging rate may be varied by adjusting third brush setting. To increase charging rate, remove the leather plug from commutator end-plate, loosen the set screw and move in a counter-clockwise direction (looking at commutator end). Move third brush in a clockwise direction to decrease charging rate. Shunt field current is 3.5 amperes at 6.5 volts.

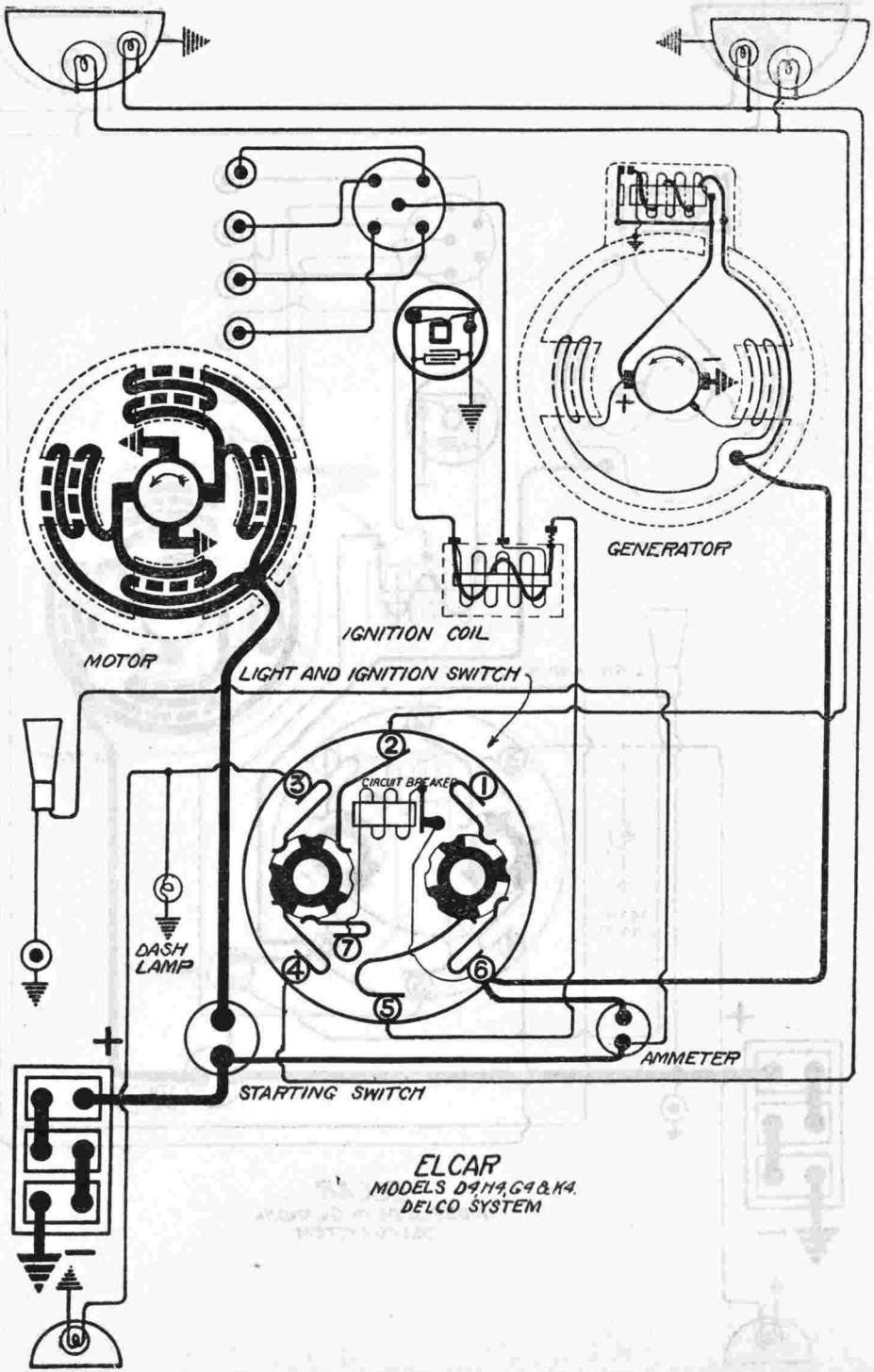
OILING.—Put 4 or 5 drops of light engine oil in each of generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour, or 450-500 R.P.M. of armature, and opens at 6-8 miles per hour or 400-450 R.P.M. of armature. Relay contacts separate 3/32 inch. Air gap between relay armature (moving member) and coil core is 1/8 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Fuse is 15 ampere.





ELCAR

MODELS D-4, G-4, AND K-4 (1920-21-22)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Willard, Type SJRG-3, 6 volt, 90 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2159. Distributor Model No. 5214. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING: — Put 8 or 10 drops of light engine oil in the oiler at the side of the distributor head every two weeks. Put a small amount of vaseline on the cam, applying with a toothpick. If the track of the rotor button is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1⅜ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS: — Spark plug diameters are ⅞ inch. Gaps are .030 inch.

STARTER.—Model No. 177. Starter is connected to the engine through a Bendix drive.

Oiling.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month. Remove the plug in the reduction gear case and inject soft cup grease every six months.

GENERATOR.—Model No. 176. Rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Maximum charging rate is 11-15 amperes, reached at 1200 R.P.M. of the armature or 16-20 miles per hour.

Amperes	Generator Data	R.P.M.
Neutral		550
4		800
8		1000
11-15		1200
11-14		2000

Charging rate is varied by the adjustment of the third brush setting. To move the third brush, loosen the three screws holding the bearing retainer plate on the commutator end and shift the plate. Move in a counter-clockwise direction to increase the charging rate, or in the opposite direction to decrease the charging rate. Tighten the adjusting screws and reseat the brush after making the adjustment. Maximum charging rate must not exceed 16 amperes.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes at 550-600 R.P.M. of the armature or 7-8 miles per hour, and opens at 500-550 R.P.M. of the armature or 5-6 miles per hour. Relay contacts separate .046 to .062 inch. Air gap between the relay armature and coil core is .020 to .035 inch, contacts closed. To adjust relay connect a voltmeter between the positive (+) generator brush and ground. Then slowly speed up the generator and adjust the relay spring tension by turning the thumb nut until the contacts close when the voltmeter indicates 7.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Tail lamp is 6-8 volt, 3 cp. Dash lamp is 6-8 volt, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start the vibrator. While vibrating the current is 3-5 amperes.

ELCAR

MODELS D-6, H-6, G-6 AND K-6 (1920-21-22)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—(1920) Willard, 6 volt, 90 ampere hour **(1921) Willard Type SJRN-5** 6 volt, 110 ampere hour, The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2159. Distributor Model No. 5207. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 4 or 5 drops of light engine oil in the oiler at the side of the distributor head every two weeks. Put a small amount of vaseline on the cam, applying with a toothpick. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1⅜ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS: — Spark plug diameters are ⅞ inch. Gaps are .030 inch.

STARTER:—Model 164 or 181. Starter is connected to engine through a Bendix drive. Lock torque is 28 lb. ft. at 4 volts, the current being 525 amperes. Running free the starter takes 36 amperes at 6 volts. The tension of each of the starter brushes should be 2¼-2¾ pounds.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month. Remove the plug in the reduction gear case and inject soft cup grease every six months.

GENERATOR.—Model No. 165. Rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Maximum charging rate is 11-15 amperes, reached at 1200 R.P.M. of the armature or 16-20 miles per hour.

Amperes	Generator Data	R.P.M.
Neutral		550
4		800
8		1000
11-15		1200
11-14		2000

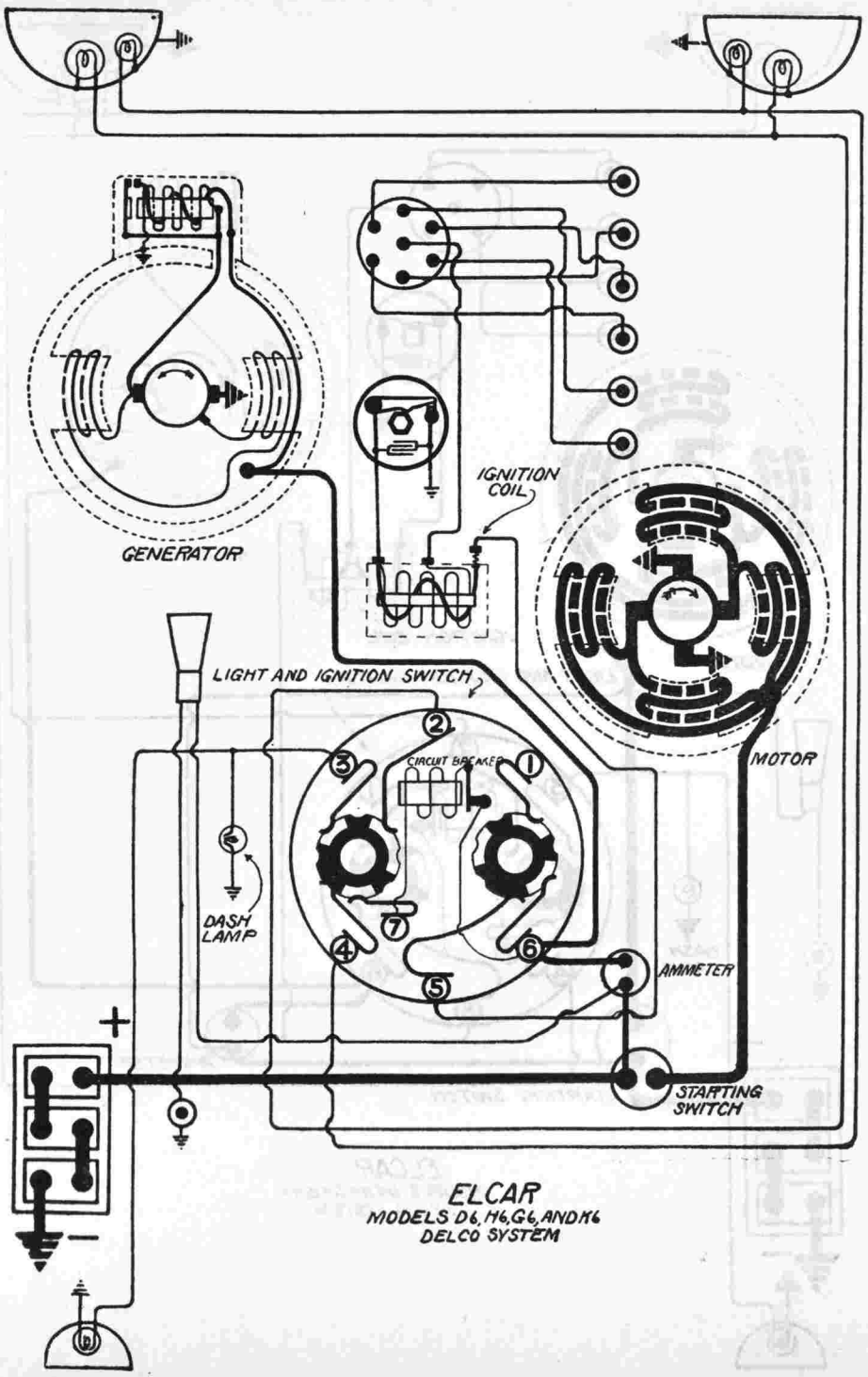
Charging rate is varied by the adjustment of the third brush setting. To move the third brush, loosen the three screws holding the bearing retainer plate on the commutator end and shift the plate. Move in a counter-clockwise direction to increase the charging rate, or in the opposite direction to decrease the charging rate. Tighten the adjusting screws and reseat the brush after making the adjustment. Maximum charging rate must not exceed 16 amperes.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes at 550-600 R.P.M. of the armature or 7-8 miles per hour, and opens at 500-550 R.P.M. of the armature or 5-6 miles per hour. Relay contacts separate .046 to .062 inch. Air gap between the relay armature and coil core is .020 to .035 inch, contacts closed. To adjust relay connect a voltmeter between the positive (+) generator brush and ground. Then slowly speed up the generator and adjust the relay spring tension by turning the thumb nut until the contacts close when the voltmeter indicates 7.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

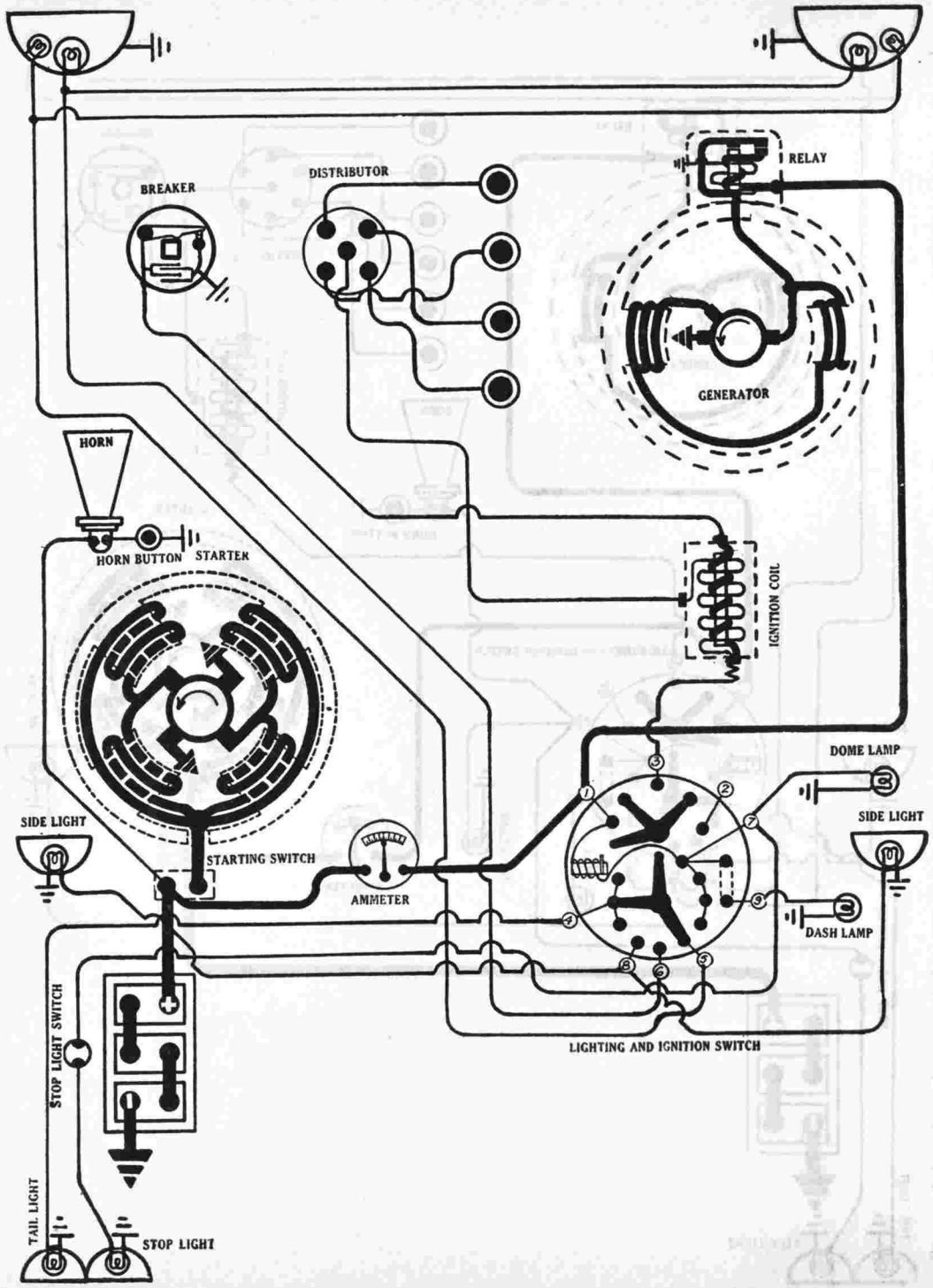
LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Tail lamp is 6-8 volt, 3 cp. Dash lamp is 6-8 volt, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start the vibrator. While vibrating, the current is 10-15 amperes.



ELCAR

MODEL 4-40 (1923-24).
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION



BATTERY: — Willard, Type SW-4. 6 volt, 90 ampere-hour. The negative (—) terminal is grounded.

IGNITION: — Coil Model No. 2178. Distributor Model No. 5261. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at the side of the distributor head every two weeks. Put a small amount of vaseline on the cam, applying with a toothpick. If the track of the rotor button is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING: — Breaker contacts begin to separate when piston No 1 reaches top dead center on compression stroke when the flywheel marking "1-4" is under the indicator with the spark control lever and the breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-3-4-2.

Spark Plug Gaps:—Spark plugs diameters are 7/8 inch. Gaps are .030 inch.

STARTER: — Model No. 263. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Lock torque is 12 lb. ft. at 2.75 volts. Running free the starter takes 50 amperes at 6 volts. The tension of each of the starter brushes should be 2¼-2¾ pounds.

OILING: — Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles.

GENERATOR: — Model No. 265. Rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Maximum charging rate is 11-15 amperes, reached at 1200 R.P.M. of the armature or 16-20 miles per hour.

Amperes	Generator Data	R.P.M.
Neutral		550
4		800
8		1000
11-15		1200
11-14		2000

To adjust the charging rate, loosen the commutator cover band and shift the third brush mounting plate by means of the handle attached. Move the third brush in the direction of armature rotation (counter-clockwise) to increase the charging rate and in the opposite direction to decrease the charging rate. The maximum charging rate must not exceed 17-19 amperes.

OILING: — Put 4 or 5 drops of light engine oil in the oiler at the commutator end of the generator every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY:—Relay is mounted on the generator frame. Relay closes at 550-600 R.P.M. of the armature or 7-8 miles per hour, and opens at 500-500 R.P.M. of the armature or 5-6 miles per hour. Relay contacts separate .046 to .062 inch. Air gap between the relay armature and coil core is .020 to .035 inch, contacts closed. To adjust relay connect a voltmeter between the positive (+) generator brush and ground. Then slowly speed up the generator and adjust the relay spring tension by bending the long brass stop until the contacts close when the voltmeter indicates 6.75 to 7.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit and adjust before against putting into service.

LAMPS: — Head lamps are 6-8 volt, 21 cp. S. C. Dimmer lamps are 6-8 volt, 4 cp. S. C. Stop lamp is 6-8 volt, 15 cp. S. C. Dome lamp is 6-8 volt 4 cp. S. C. Dash lamp is 6-8 volt, 2 cp. D. C. Tail, tonneau and side lamps are each 6-8 volt, 2 cp. S. C.

CIRCUIT BREAKER:—A circuit breaker mounted on the back of the switch takes the place of fuses. A current of 25-30 amperes will start this device vibrating. While vibrating, the current is 10-15 amperes.

ELCAR

MODEL 6-60 (1923-24)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Willard, Type SJR-3, 6 volt, 100 ampere hour. The negative (—) terminal is grounded.

IGNITION: — Coil Model No. 2178. Distributor Model No. 5256. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at the side of the distributor head every two weeks. Put a small amount of vaseline on the cam, applyinng with a toothpick. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing:—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1⅜ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .030 inch.

STARTER:—Model No. 181. Starter is connected to the engine through a Bendix drive. Lock torque is 28 lb. ft. at 4 volts, the current being 525 amperes. Running free the starter takes 36 amperes at 6 volts. The tension of each of the starter brushes should be 2¼-2¾ pounds.

Oiling:—Put 5 or 6 drops of light engine oil in each of the starter oilers every month. Remove the plug in the reduction gear case and inject soft cup grease every six months.

GENERATOR:—Model No. 258. Rotation is counter- clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Maximum charging rate is 11-15 amperes, reached at 1200 R.P.M. of the armature, or 16-20 miles per hour.

Generator Data

Amperes	R.P.M.
Neutral	550
4	800
8	1000
11-15	1200

To adjust the charging rate, loosen the generator cover band and shift the third brush mounting plate by means of the handle attached. Shift the third brush in the direction of armature rotation (counter-clockwise) to increase the charging rate and in the opposite direction to decrease the charging rate. The maximum charging rate should not exceed 17 amperes. The tension of each of the generator brushes should be 1¼-1¾ pounds.

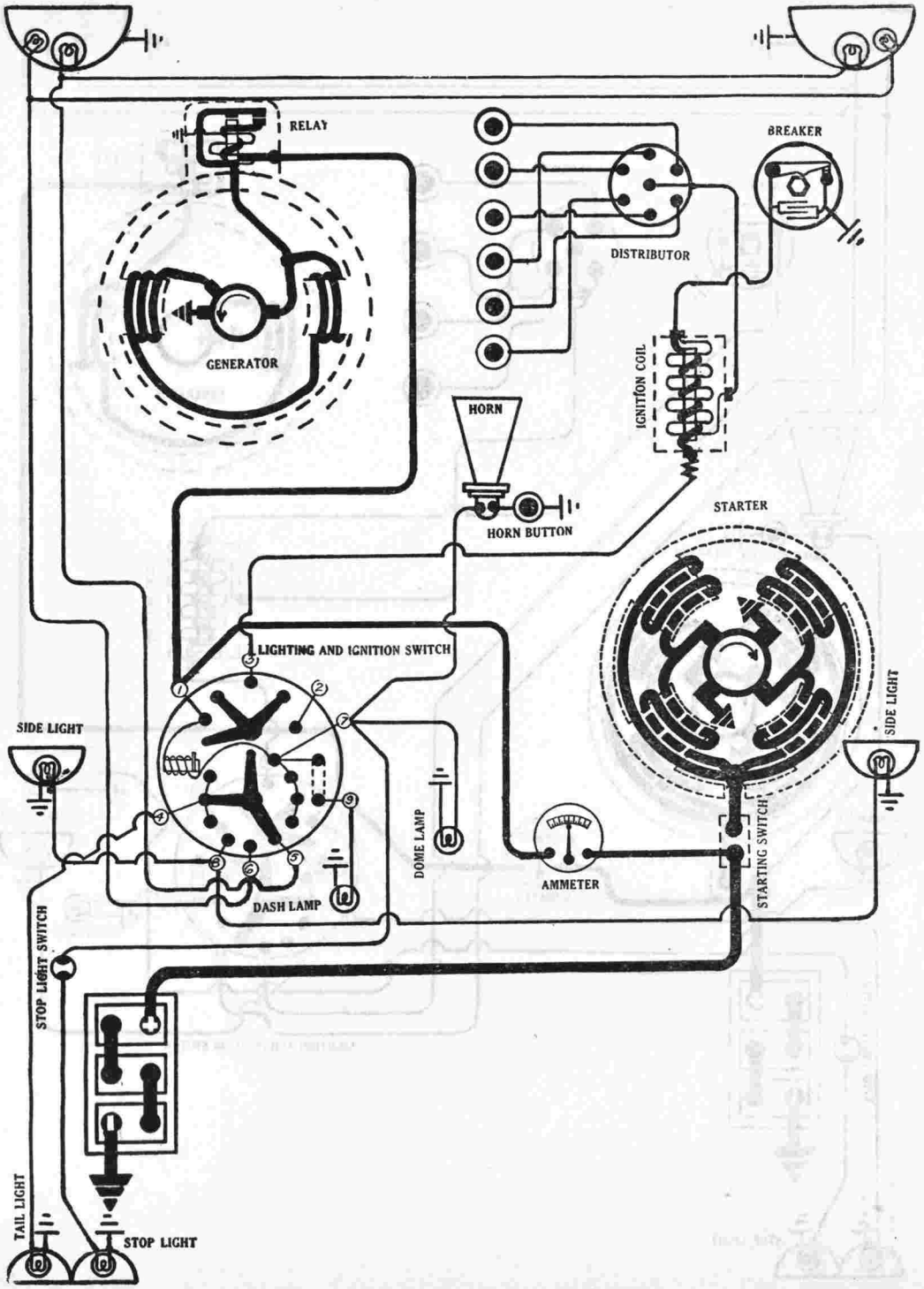
Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY:—Relay is mounted on the generator frame. Relay closes at 550-600 R.P.M. of the armature or 718 miles per hour, and opens at 500-550 R.P.M. of the armature or 5-6 miles per hour. Relay contacts separate .046 to .062 inch. Air gap between the relay armature and coil core is .025 to .035 inch, contacts closed. To adjust relay connect a voltmeter between the positive (+) generator brush and ground. Then slowly speed up the generator and adjust the relay spring tension by bending the long brass stop until the relay contacts close when the voltmeter indicates 6.75-7.5 volts. Clean relay contacts by drawing unglazed paper paper. Remove all grit and adjust before again putting into service.

paper. Remove all grit and adjust before again putting into service.

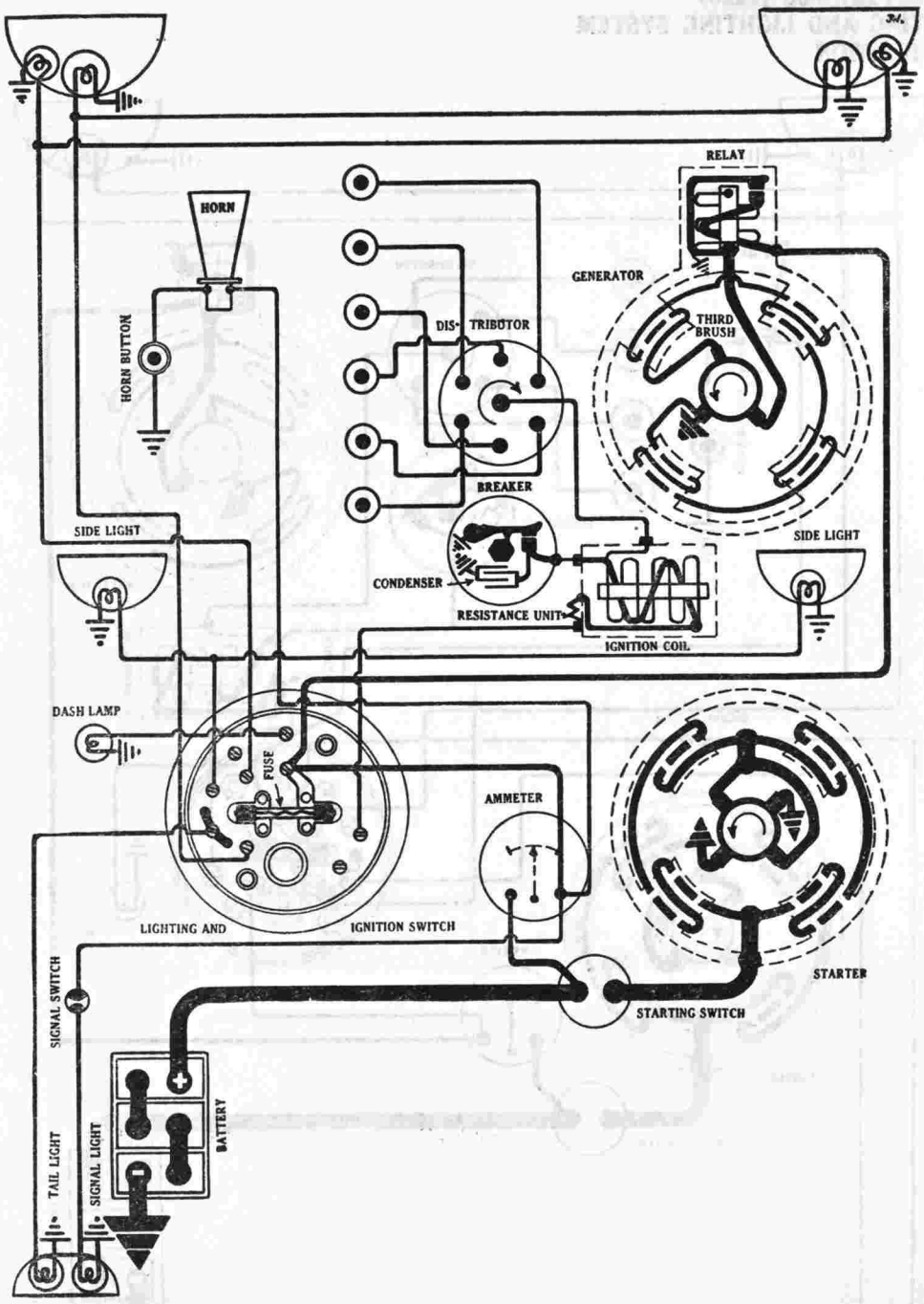
LAMPS: — Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Stop lamp is 6-8 volt, 15 cp. Dash, tail and side lamps are each 6-8 volt, 2 cp.

CIRCUIT BREAKER:—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start the vibrator. While vibrating, the current is 10-15 amperes.



ELCAR

MODEL 6-50, 6-55 (1924-25)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION



BATTERY.—Willard, Type XR-13. 6 volt, 90 ampere hour. Starting capacity is 98 amperes for 20 minutes. Lighting capacity is 5 amperes for 18 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model IG-4047. Distributor Model IG-4039-A. Breaker contacts separate .018-.022 inch. They are made of tungsten. When the condition of the contacts affects the ignition remove and resurface on a medium hard oilstone or with a fine, flat jeweler's file.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

Timing.—Breaker contacts begin to separate when piston No. 1 reaches top dead center on compression stroke with the spark control lever in the fully retarded position. At this point the dead center mark UDC-1:6 will be opposite the indicator on the flywheel housing.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER.—Model MG-4003. Starter is connected to the engine by means of a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	6	50
1 "	2250	5.5	100
3.4 "	1175	5	200
6.1 "	520	4.5	300
7.6 "	220	4.25	350
18 "	Lock	5	600

Oiling.—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR.—Model GP-4007. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the generator output, loosen the commutator cover band and the hexagonal headed nut holding the third brush mounting arm and shift the third brush. Shifting the brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. Tighten the nut after making the adjustment.

Generator Data

Cold Test (77° F.)			Hot Test (167° F.)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M
0	7	375	0	6.5	475
4	7.2	500	4	6.8	640
8	7.4	650	7	7.4	800
12	7.8	875	10	7.6	1200
15	7.9	1225	10.6	7.8	1540
16	8	1600	8.2	7.8	2400
13	7.8	2400			

Motoring freely, generator draws 4 amperes at 6 volts. Shunt field current is 3 amperes at 6 volts.

RELAY.—Relay contacts close when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .015-.020 inch, contacts closed.

LIGHTING.—Clum Switch Model 10365. Head lamps are 6-8 volt, 21 cp. S. C. Dimmer lamps are 6-8 volt, 4 cp. S. C. Dash and tail lamps are 6-8 volt, 2 cp. S. C.

FUSES.—Lighting fuses are 20 amperes.

ELCAR

MODELS 4-45, 4-55 (1924-25) 4-55 (1926)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY.—1924-25. Willard, Type XR-13. 6 volt, 90 ampere hour. Starting capacity is 98 amperes for 20 minutes. Lighting capacity is 5 amperes for 18 hours. The negative (—) terminal is grounded. **1926 U. S. L. Type XY-13.** 6 volt. Starting capacity is 86 amperes for 20 minutes. Lighting capacity is 5 amperes for 17 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model IG-4047. Distributor Model IG-4051-A. Breaker contacts separate .018-.022 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file or on a medium hard oilstone.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

Timing.—Breaker contacts begin to separate when piston No. 1 reaches top dead center on compression stroke with the spark control lever and breaker assembly in the fully retarded position. At this point the flywheel marking "1-4" will be opposite the indicator on the flywheel housing.

Firing Order.—The firing order is 1-3-4-2.

Spark Plugs.—Spark plug diameters are ⅞ inch. Gaps are .030 inch.

STARTER. (1924-25) Model MG-4004. Starter is connected to engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	6	50
1 "	2250	5.5	100
3.4 "	1175	5	200
6.1 "	520	4.5	300
7.6 "	220	4.25	350
18 "	Lock	5	600

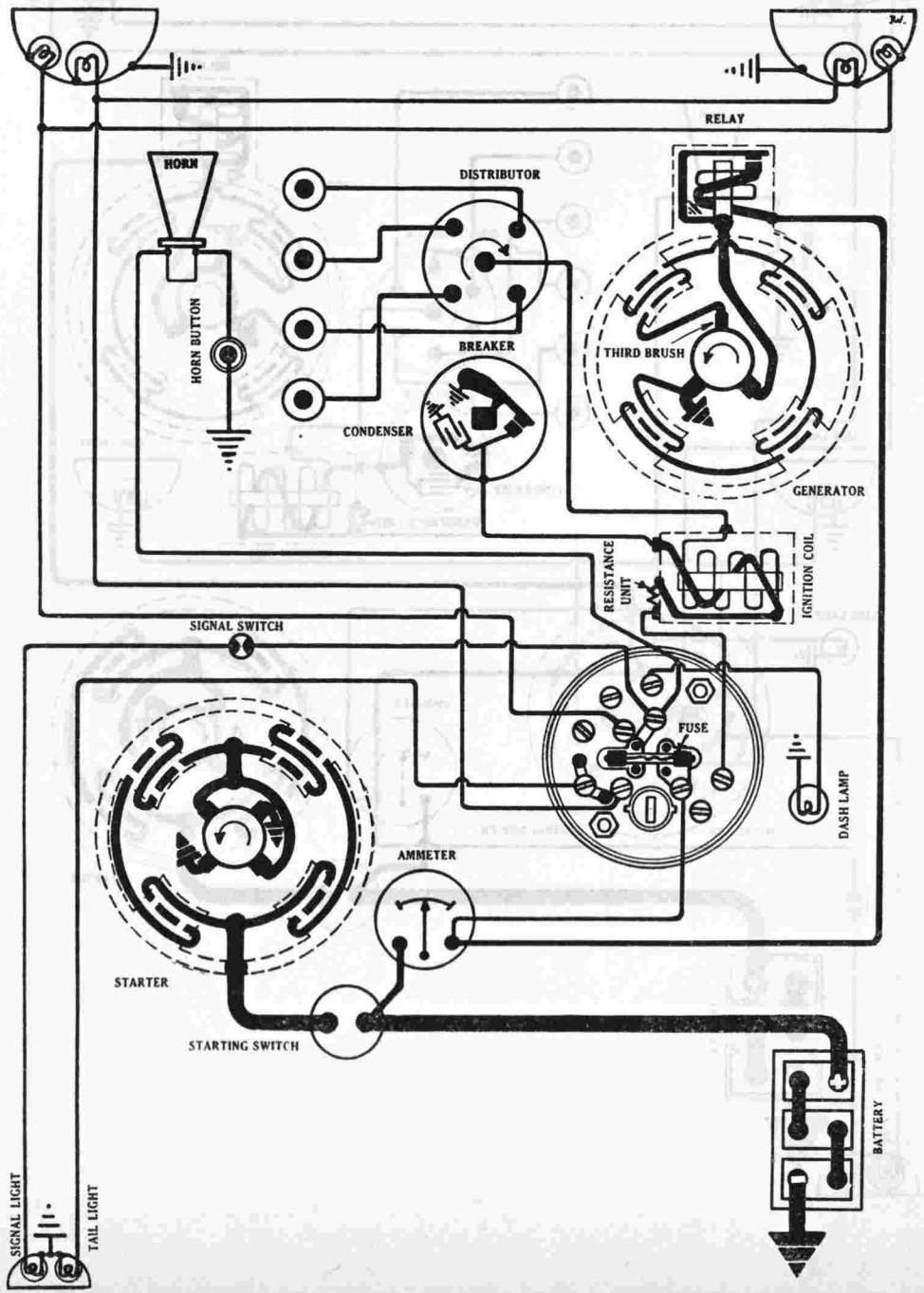
STARTER.—(1926) Model MN-4107. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	6	60
.6 "	2700	5.5	100
2.9 "	1500	5	200
5.5 "	850	4.5	300
8.2 "	410	4	400
17.5 "	Lock	4	600

Oiling.—Put 4 or 5 drops of light engine oil in the starter bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR.—Model GJ-4101. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, loosen the commutator cover band and shift the third brush after loosening the hexagonal headed nut holding the third brush mounting arm. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. Tighten the nut after making the adjustment.



ELCAR

MODELS 4-45, 4-55 (1924-25) 4-55 (1926)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

Generator Data

Cold Test (77° F.)			Hot Test (167° F.)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.8	500	0	6.8	600
4	7	580	4	7.3	740
8	7.6	650	8	7.8	950
12	8	950	11	8	1200
16.5	8.4	1700	12.7	8.2	1700
15	8.3	2400	11.5	8.1	2400

Motoring freely, generator draws 4-5 amperes at 6 volts. Shunt field current is 2.2 amperes at 6 volts.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY.—Relay contacts close when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-2 amperes. Contacts separate .025-.035 inch. Air gap between relay armature and coil core is .015-.020 inch, contacts closed.

LIGHTING.—Clum Switch Model 10355. Head lamps are 6-8 volt, 21 cp. S. C. Dimmer lamps are 6-8 volt, 4 cp. S. C. Dash and tail lamps are each 6-8 volt, 2 cp. S. C.

ELCAR

MODEL 6-65 (1925-26)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY.—U. S. L. Type XY-13. 6 volt. Starting capacity is 86 amperes for 20 minutes. Lighting capacity is 5 amperes for 17 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model IG-4047. Distributor Model IG-4039-A. Breaker contacts separate .018-022 inch. They are made of tungsten. When the condition of the contacts affects the ignition remove and resurface on a medium hard oilstone or with a fine, flat jeweler's file.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

Timing:—Breaker contacts begin to separate when piston No. 1 reaches top dead center on compression stroke with the spark control lever in the fully retarded position. At this point the dead center mark UDC-1:6 will be opposite the indicator on the flywheel housing.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER.—Model MN-4102. Starter is connected to the engine by means of a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	6	60
.6 "	2700	5.5	100
2.9 "	1500	5	200
5.5 "	850	4.5	300
8.2 "	410	4	400
17.5 "	Lock	4	600

Oiling:—Put 4 or 5 drops or light engine oil in each of the starter bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR.—Model GJ-4110. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the generator output, loosen the commutator cover band and the hexagonal headed nut holding the third brush mounting arm and shift the third brush. Shifting the brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. Tighten the nut after making the adjustment.

Generator Data

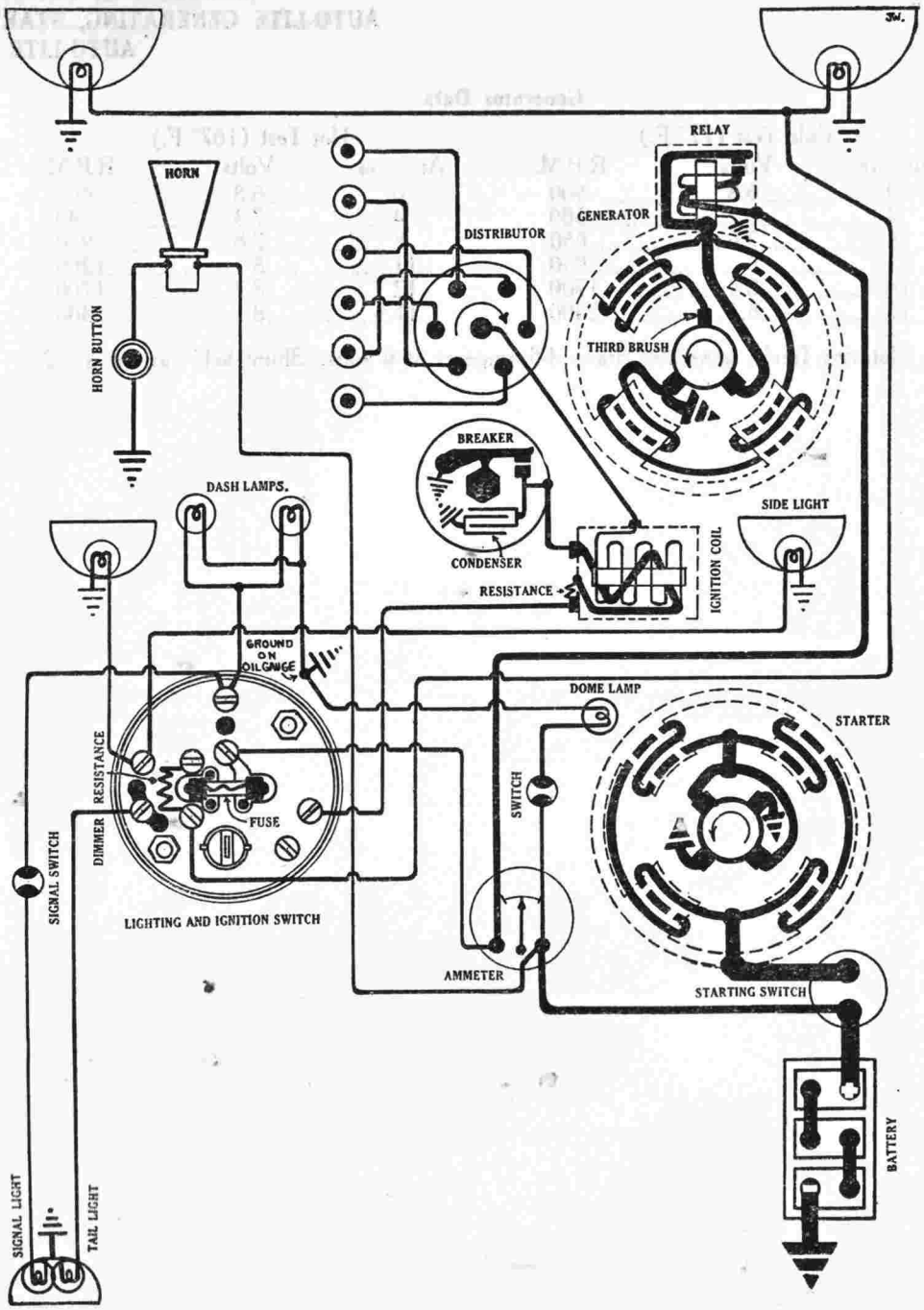
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.8	500	0	6.8	600
4	7	580	4	7.3	740
8	7.6	650	8	7.8	950
12	8	950	11	8	1200
16.5	8.4	1700	12.7	8.2	1700
15	8.3	2400	11.6	8.1	2400

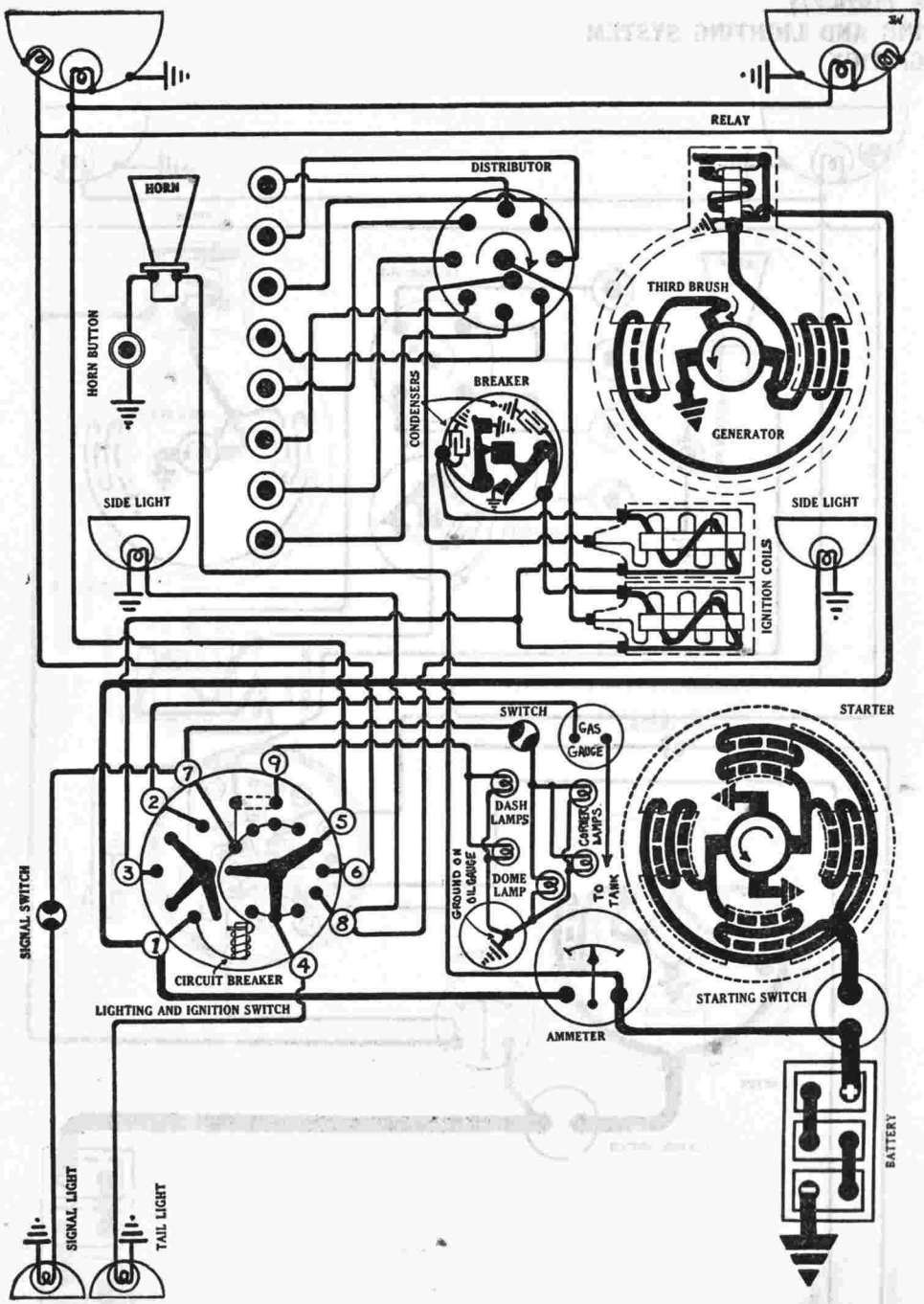
Motoring freely, generator draws 4-5 amperes at 6 volts. Shunt field current is 2.2 amperes at 6 volts.

RELAY:—Relay contacts close when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .015-020 inch, contacts closed.

LIGHTING:—Clum Switch Model 10365. Head lamps are 6-8 volt, 21 cp. S.C. Dimmer lamps are 6-8 volt, 4 cp. S.C. Dash and tail lamps are 6-8 volt, 2 cp. S.C.

FUSES:—Lighting fuses are 20 amperes.





ELCAR

MODEL 8-80 (1925-26)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—U. S. L., Type XY-15. 6 volt, 105 ampere hour. The starting capacity is 115 amperes for 20 minutes. Lighting capacity is 5 amperes for 21 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model 2182. Distributor Model 5277. Breaker contacts separate .020-.0275 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file or on a medium hard oilstone.

Oiling.—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing.—Breaker contacts begin to separate when piston No. 1 on compression stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs.—Spark plug gaps are .025 inch.

STARTER.—Model 240. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 2¼-2¾ pounds each. Starter switch is Model 1953.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	50
12 "	Lock	2.75	—

Oiling.—Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR.—Model 256.—The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the output, loosen the generator cover band and shift the third brush mounting plate by the handle attached. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. The mounting plate is held in any desired position by friction clamp washers. The generator brush tension should be 1¼-1¾ pounds each.

Generator Data

Amperes	R.P.M.
5	700
18	1800

Oiling.—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY.—Relay is mounted on top of the generator. Relay contacts close at 600-800 R.P.M. of the generator when the voltage reaches 6.75-7.5 volts and open with a discharge current of 0-3 amperes. Contacts separate .025-.035 inch. Air gap between relay armature and coil core is .015-.020 inch, contacts closed.

LIGHTING.—Switch Model 1246. Head and stop lamps are 6-8 volt, 21 cp. S. C. Side, dome and corner lamps are each 6-8 volt, 4 cp. S. C. Dash and tail lamps are each 6-8 volt, 2 cp. S. C.

ELCAR

MODEL 4-55 (1926-27)

REMY GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY:—U.S.L. Type XY-13-X, 6 volt. Starting capacity is 102 amperes for 20 minutes. Lighting capacity is 5 amperes for 17.4 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model 284-L. Distributor Model 366-U. Breaker contacts separate .025 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine flat contact file. Distributor is of manual type. Manual advance is 40°. Breaker arm spring tension is 13-16 ounces.

Mounting:—Distributor is mounted at right of engine. To remove distributor, disconnect manual advance rod and breaker lead. Remove distributor head with high tension cables intact. Then remove locknut and set screw in side of distributor mounting and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down two turns every two weeks or each 500 miles. Put a small bit of vaseline on the face of the breaker cam under the fiber bumper of the contact arm every month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position. To set timing, crank engine until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Then fully retard spark control lever and continue to crank engine until piston reaches top dead center. The breaker contacts should begin to separate at this point. If they do not, loosen lock nut on top of cam and pry cam upward. Rotate cam until contacts begin to separate. Tighten the lock nut making certain that the rotor is under the segment connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-3-4-2.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .030 inch.

STARTER:—Model 714-A. Starter is connected to the engine through an outboard Bendix drive Type R-11-X. The direction of rotation is counter-clockwise, looking at the commutator end. Starter switch is Model 406-A. Brush spring tension is 24-28 ounces. Starter cranks the engine drawing 175 amperes at 5 volts.

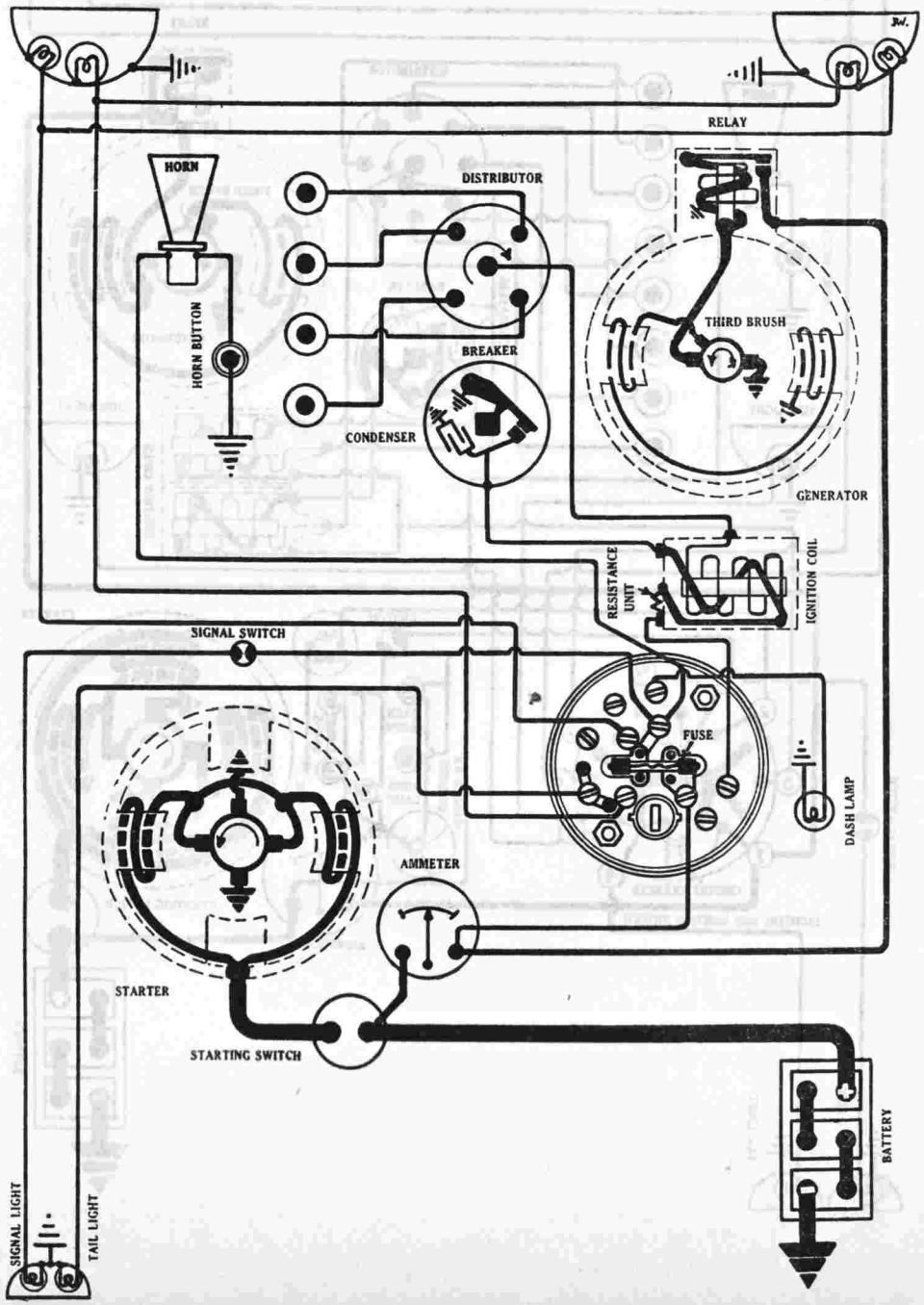
Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
12 "	Lock	3.63	475

Mounting:—Starter is mounted by S.A.E. No. 1 flange mounting at left of engine on forward side of flywheel housing. To remove starter, disconnect starter cable and remove three flange mounting cap screws. Then slide starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the starter bearing oilers every month or each 1000 miles.

GENERATOR:—Model 941-Q. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. The maximum charging rate of 17 amperes (cold) is reached at 1400 R.P.M.



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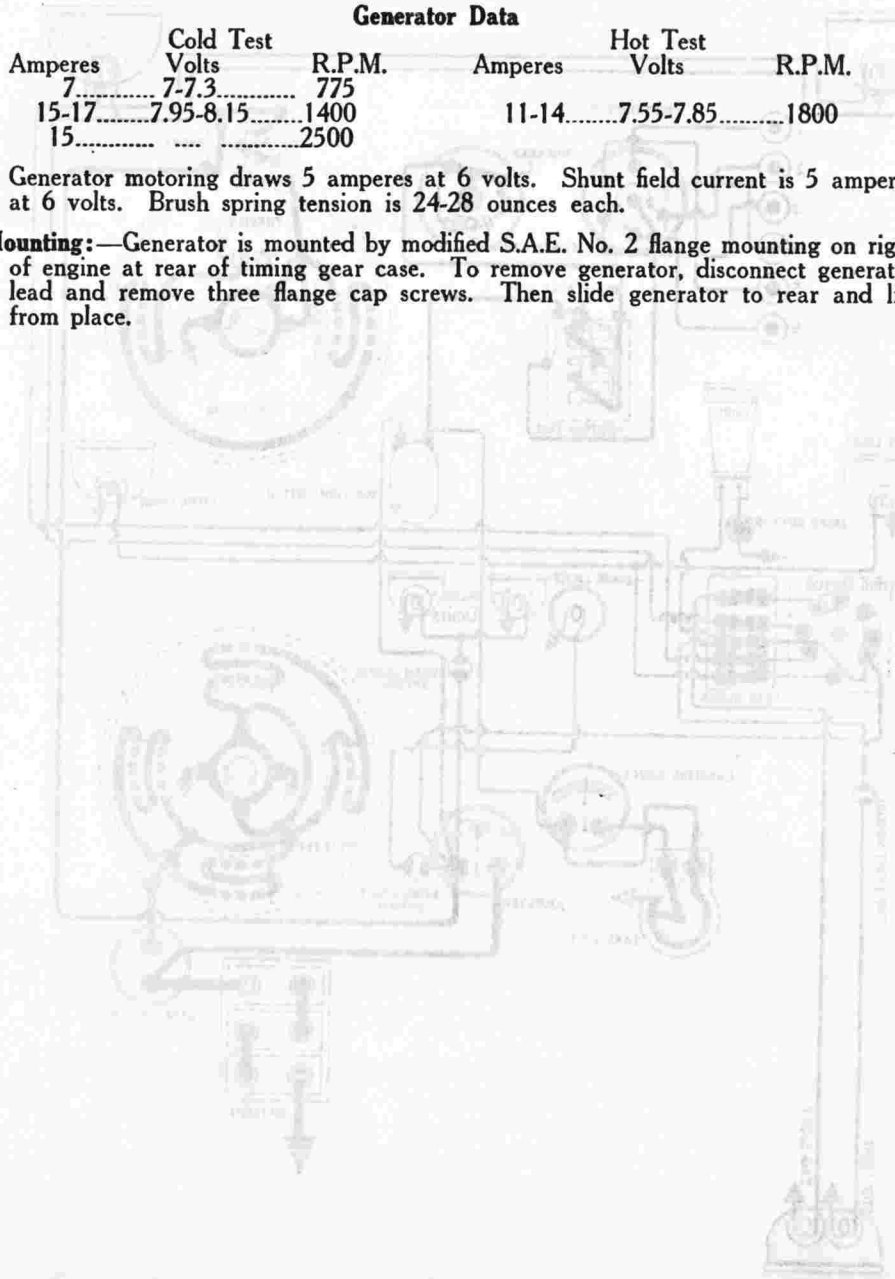
MODEL 4-55 (1926-27)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7-7.3	775			
15-17	7.95-8.15	1400	11-14	7.55-7.85	1800
15	....	2500			

Generator motoring draws 5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 24-28 ounces each.

Mounting:—Generator is mounted by modified S.A.E. No. 2 flange mounting on right of engine at rear of timing gear case. To remove generator, disconnect generator lead and remove three flange cap screws. Then slide generator to rear and lift from place.



Oiling:—Put 4 or 5 drops of oil in the oiler on the commutator end of the generator every month or each 1000 miles. The drive end bearing is oiled by splash from the gear case.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay closes when the voltage of the generator reaches 7.25 volts and opens with a discharge current of 0-3 amperes. Charging current at closing of contacts is 2 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING:—Clum Switch Number 10365. Head lamps are each 6-8 volt, 21 cp. S.C. Stop lamp is 6-8 volt, 15 cp. S.C. Auxiliary head lamps are each 6-8 volt, 4 cp. S.C. Dash and tail lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Lighting fuse on back of switch is 10 amperes.

ELCAR

MODEL 6-65 (1926-27)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY:—U.S.L. Type XY-13-X. Starting capacity is 102 amperes for 20 minutes. Lighting capacity is 5 amperes for 17.4 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model 284-P. Distributor Model 636-H. Breaker contacts separate .024 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is of the semi-automatic type. Manual advance is 25°. Automatic advance is 30°. Breaker arm spring tension is 15-20 ounces. Ignition switch is Remy Model 440-A.

Mounting:—Distributor is mounted on top of the cylinder head. To remove distributor, disconnect primary lead and manual advance rod. Then remove distributor head with high tension cables intact. Remove the set screw in side of mounting and lift distributor from place.

Oiling:—Refill the grease cup under the distributor head with medium cup grease and turn down two turns every month or each 1000 miles. Put a small bit of vaseline on the face of the breaker cam under the fiber bumper of the contact arm every month.

Timing:—Breaker contacts begin to separate when piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position. To check timing, crank engine until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Fully retard spark control lever and continue to crank engine until piston No. 1 reaches top dead center. At this point the flywheel mark 'UDC-1:6' will be opposite the indicator on the flywheel housing. If breaker contacts are not beginning to separate, loosen distributor clamp screw and rotate distributor housing until contacts begin to separate. Tighten the clamp screw and make certain that the rotor is under the segment connected to the spark plug in cylinder No. 1.

Valve Timing:—INLET VALVES:—Head diameter, 1⅝ inches; stem diameter, .3425-.341 inch; stem length, 5 19/32 inches (over head); spring pressure, 34-38 pounds (valve closed); valve lift, 5/16 inch; tappet clearance, .006 inch (hot). Inlet valves open on top dead center and close 35° after lower dead center.
EXHAUST VALVES:—Head diameter, 1 15/32 inches; stem diameter, .3425-341 inch; stem length, 5 9/16 inches (over head); valve lift, 5/16 inch; spring pressure, 34-38 pounds (valve closed); tappet clearance, .008 inch (hot). Exhaust valves open 42° before lower dead center and close 5° after top dead center. Valve stem guides are removable. Oversize valve stems are made.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard 'Short'. Gaps are .027 inch.

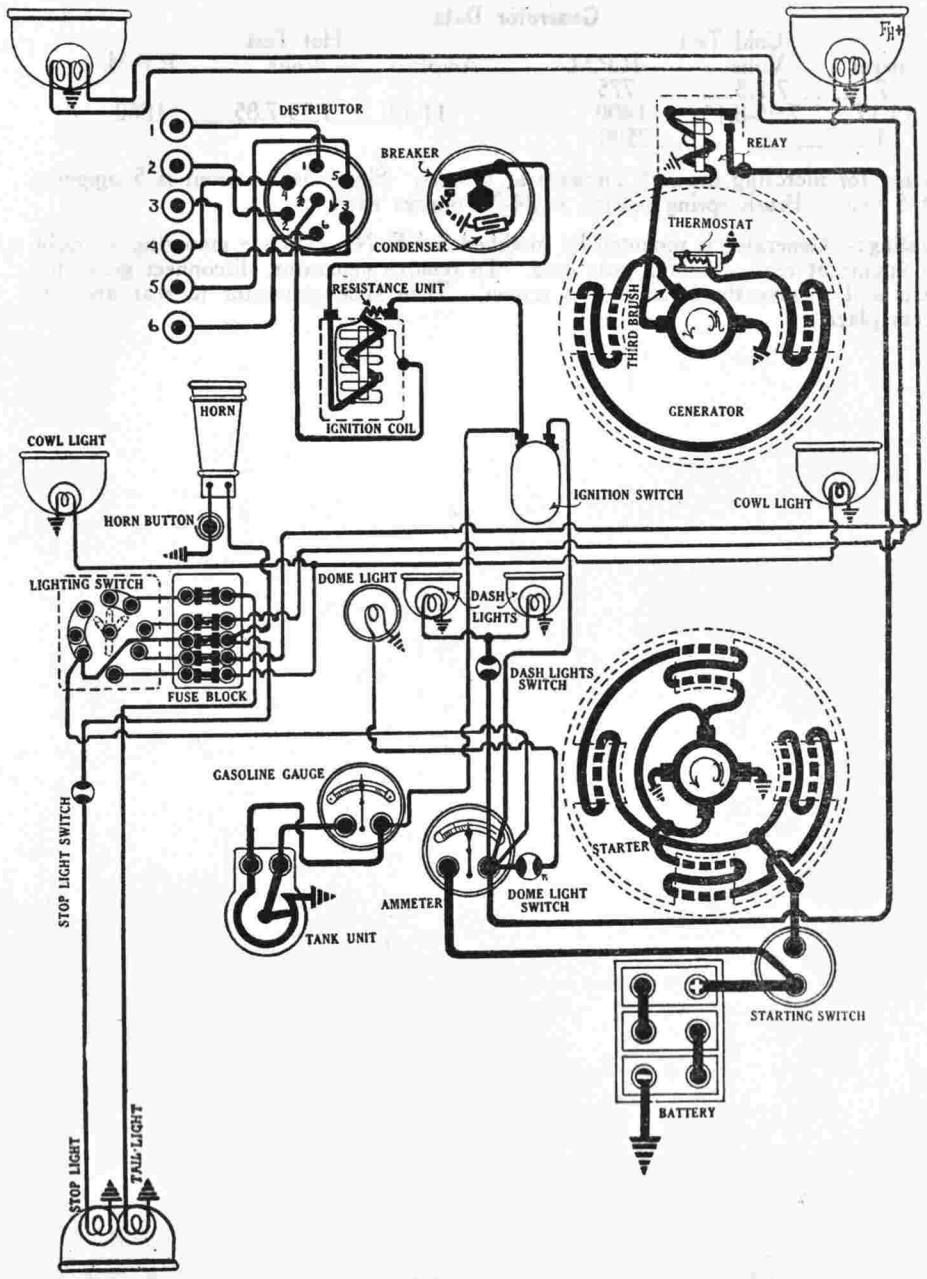
STARTER:—Model 720-Q. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter switch is Model 406-A. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect starter cable and remove three flange mounting cap screws. Then slide starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles.



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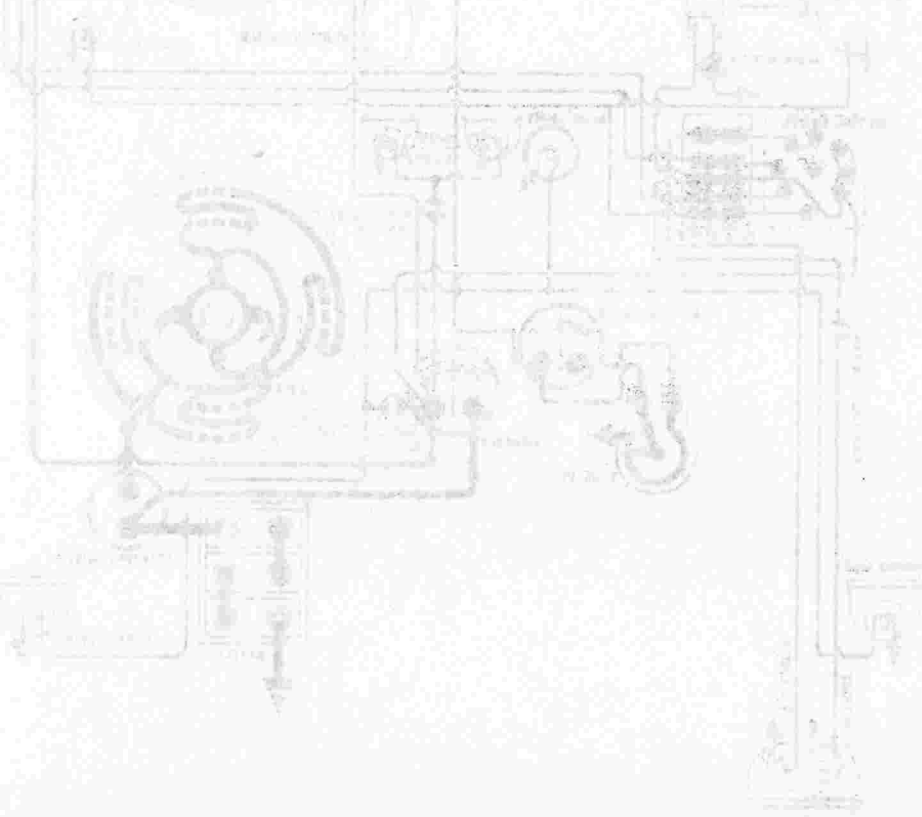
MODEL 6-65 (1926-27)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

GENERATOR:—Model 941-D. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field combined with a thermostat. Thermostat contacts open at 165°F. cutting a resistance in the field circuit and reducing the ouput approximately 40%. To adjust generator output, loosen the small round headed screw on the commutator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Maximum charging rate is 21 amperes (cold) reached at 1450 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
2	7.25	675			
7	7.3	750	12	7.65	2000
21	8.5	1450			

Generator motoring draws 5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 22-28 ounces.



Mounting:—Generator is flange mounted at right of engine on rear of timing gear case. To remove generator, disconnect generator lead and remove three flange mounting cap screws. Then slide generator to rear and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay closes at 675 R.P.M. when the voltage of the generator reaches 7.25 volts and opens with a discharge current of 0.3 amperes. Charging current at closing of contacts is 2 amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING:—Remy Switch Model 420-N. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Auxiliary head lamps are 6-8 volt, 4 cp. S.C. Stop lamp is 6-8 volt, 15 cp. S.C. Dash and tail lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Lighting fuses mounted under switch cover are 10 amperes.

ELCAR

MODEL 8-81 AND MODEL 8-81 TAXICAB (1926-1927)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY:—U.S.L. Type XY-15-X, 6 volt. Starting capacity is 119 amperes for 20 minutes. Lighting capacity is 5 amperes for 20.8 hours The negative (—) terminal is grounded.

IGNITION:—Coil Model 284-L. Distributor Model 648-A. Breaker contacts separate .020-.028 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 20° (engine). Automatic advance begins at 400 R.P.M. (engine) and reaches a maximum of 17° at 1800 R.P.M. Breaker arm spring tension is 17-21 ounces. Breaker uses two sets of contacts opening together. For correct ignition the contact must be synchronized. See Timing. Ignition switch is Remy Model 440-A.

Mounting:—Distributor is mounted on the cylinder head. To remove distributor disconnect primary lead and remove distributor head with high tension cables intact. Then remove set screw on side of distributor mounting and lift distributor from place.

Oiling:—Refill the grease cup under the distributor head with medium cup grease and turn down two turns every month or each 1000 miles. Put a small bit of vaseline on the face of the breaker cam every month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position. To check timing, crank engine over until piston No. 1 enters compression stroke (the upstroke with both valves closed). Make certain that spark control lever is fully retarded and continue to crank engine until piston No. 1 reaches top dead center. Both sets of contacts should begin to separate at this point. Set contacts on stationary plate by loosening locknut on top of breaker cam and rotating cam until contacts begin to separate. Then reset the cam and tighten locknut. Set the other set of contacts on movable plate by loosening three lock screws and shifting breaker assembly until contacts begin to separate. Tighten the lock screws. A very accurate check of the contacts can be made by connecting a test lamp across each set of contacts. When the contacts separate the lamps will light. They should both light at the same instant.

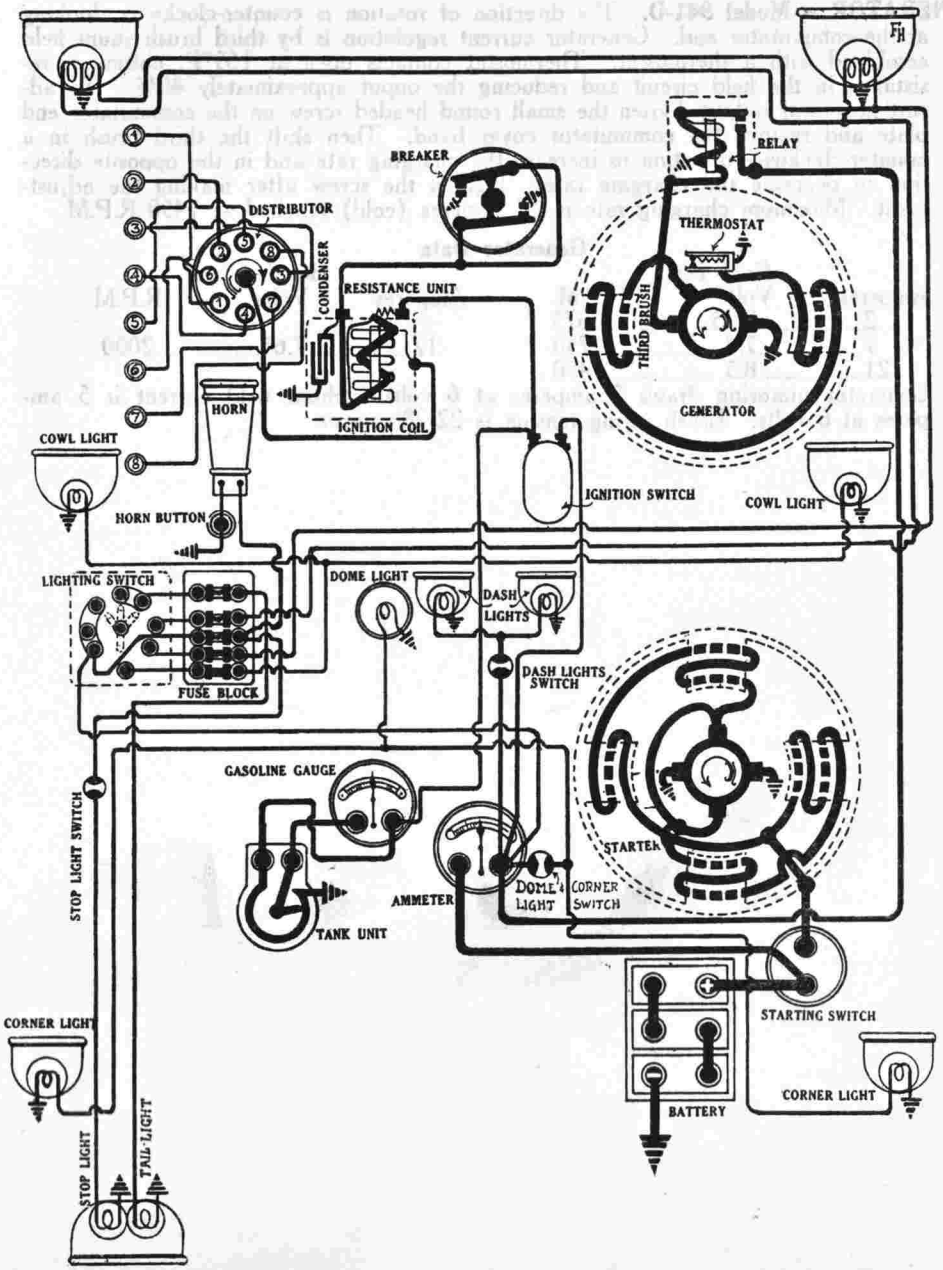
Valve Timing:—INLET VALVES:—Head diameter, 1⅝ inches; stem diameter, .3425-.341 inch; stem length, 5 19/32 inches (over head); valve lift, 5/16 inch; spring pressure, 34-38 pounds (valve closed); tappet clearance, .006 inch (hot). Inlet valves open on top dead center and close 35° after lower dead center. EXHAUST VALVES:—Head diameter, 1 15/32 inches; stem diameter, .3425-.341 inch; stem length, 5 9/16 inches (over head); valve lift, 5/16 inch; spring pressure, 34-38 pounds (valve closed); tappet clearance, .008 inch (hot). Exhaust valves open 42° before lower dead center and close 5° after top dead center. Valve stem guides are removable. Oversize valve stems are made.

STARTER:—Model 720-Q. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter switch is Model 406-A. Brush spring tension is 24-28 ounces.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect starter cable and remove three flange mounting cap screws. Then slide starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles.



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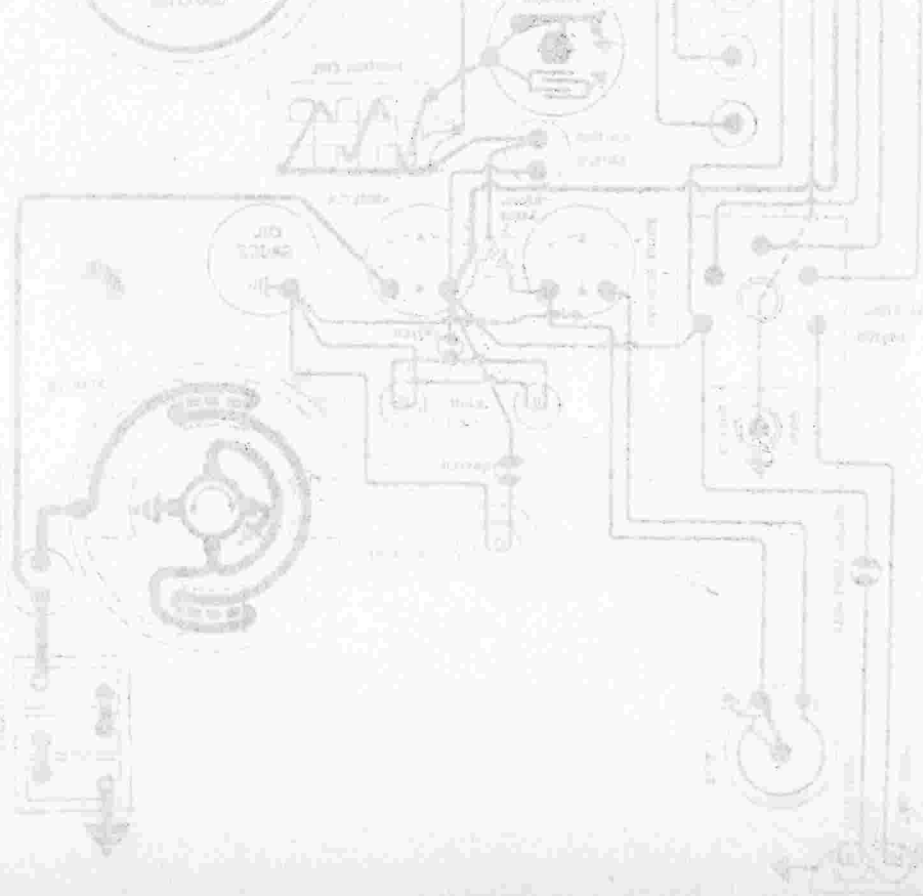
MODEL 8-81 AND MODEL 8-81 TAXICAB (1926-1927)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

GENERATOR:—Model 941-D. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field combined with a thermostat. Thermostat contacts open at 165° cutting a resistance in the field circuit and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. The maximum charging rate is 21 amperes (cold) reached at 1450 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
2	7.25	675			
7	7.3	750	12	7.6	2000
21	8.5	1450			

Generator motoring draws 5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 22-28 ounces.



Mounting:—Generator is flange mounted at right of engine at rear of timing gear case. To remove generator, disconnect generator lead and remove three flange mounting cap screws. Then slide generator to the rear and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay closes at 675 R.P.M. when the voltage of the generator reaches 7.25 volts and opens with a discharge current of 0-3 amperes. Charging current at closing of contacts is 2 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING:—Remy Switch Model 420-F. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Side lamps (or cowl lamps) are 6-8 volt, 4 cp. S.C. Stop lamp is 6-8 volt, 15 cp. S.C. Dome lamp and corner lamps are each 6-8 volt, 4 cp. S.C. Dash and tail lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Lighting fuses mounted under switch cover are 10 amperes.

ELCAR

MODEL 6-70 (1927-28)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—U. S. L. Type XY-13X, 6 volt. Starting capacity is 102 amperes for 20 minutes. Lighting capacity is 5 amperes for 17 hours. The negative (—) terminal is grounded. Battery is mounted under the right front seat.

IGNITION:—Coil Model 525-C. Distributor Model 636-S. Breaker contacts separate .020-.028 inch. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 25°. Maximum automatic advance is 30°. Breaker arm spring tension should be 17.5-20.5 ounces.

Mounting:—Distributor is mounted on top of engine block. To remove distributor, disconnect manual advance rod and coil lead and remove high tension cables or remove distributor head. Then loosen distributor clamp screw at base of distributor cup and lift from place.

Oiling:—Refill the grease cup under the distributor head with medium cup grease and turn down two turns every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position. To set timing, crank engine until piston No. 1 reaches top dead center on compression stroke (the up stroke with both valves closed). At this point the flywheel mark '1 and 6' will be opposite the indicator on the flywheel case. Make certain that the spark control lever is fully retarded. Loosen clamp screw under distributor cup and rotate distributor until contacts begin to separate. Tighten the clamp screw.

Valve Timing:—INLET VALVES:—Head diameter, 1 17/32 inches; stem diameter, .3425-.341 inch; stem length, 5 5/16 inches over head; tappet clearance, .006-.008 inch (hot); spring pressure, 36 pounds; valve lift, 11/32 inch. Inlet opens at top dead center and closes 45° past lower dead center.

EXHAUST VALVES:—Head diameter, 1 13/32 inches; stem diameter, .3425-.341 inch; stem length, 5 5/16 inches over head; tappet clearance, .008 inch (hot); spring pressure, 36 pounds; valve lift, 11/32 inch. Exhaust opens 50° before lower dead center and closes 10° after top dead center.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8 S.A.E. Standard 'Short.' Gaps are .027 inch.

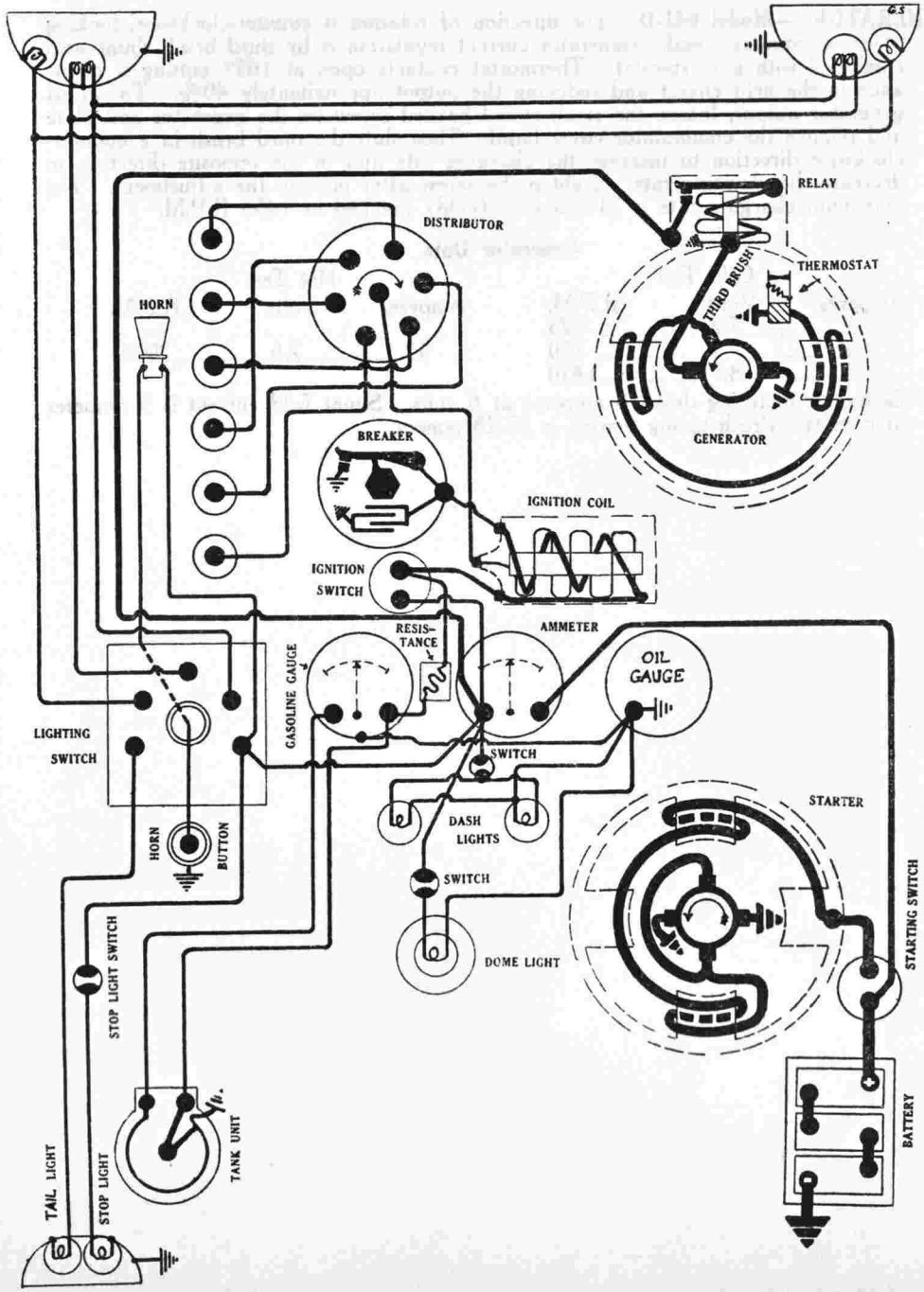
STARTER:—Model 716-A. Starter is connected to engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at commutator end. Starter brush tension is 24-28 ounces. Starting switch is Model 406-A.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Mounting:—Starter is mounted at front of flywheel housing on right of engine. To remove starter, disconnect starter cable and remove three flange mounting screws. Then slide starter forward from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.



ELCAR

MODEL 6-70 (1927)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

GENERATOR:—Model 949-C. The direction of rotation is counter-clockwise, looking at commutator end. Generator current regulation is by third brush system combined with a thermostat. Thermostat contacts open at 150°F cutting a resistance into the shunt field circut and reducing output approximately 40%. Thermostat does not require adjustment or attention. To adjust generator output, remove commutator cover band and loosen small round headed screw on generator end plate. Then shift third brush in a counter-clockwise direction to increase charging rate and in a clockwise direction to decrease charging rate. Tighten the screw after making the adjustment.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.5	1450	9-12	7.5	2000

Shunt field current is 4 amperes at 6 volts. Generator brush spring tension is 24-28 ounces each. Generator motoring draws 5 amperes at 6 volts.

Mounting:—Generator is mounted at forward end of engine on right side by special swing mounting and is belt driven. Care must be taken not to get the belt too tight or excessive wear of the generator bearings will result. To remove generator, remove two screws on swinging base bracket. Slip driving belt from pulley and lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay contacts close at 675 R.P.M. of the generator when the voltage reaches 6.75-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts must not exceed 3 amperes. Contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch, contacts closed. Set contact opening by bending brass stop over relay armature. Set air gap by loosening two screws at base of relay armature and inserting feeler gauge between armature and coil core. Then close relay contacts by hand and tighten the two base screws.

LIGHTING:—Delco-Remy Switch Model 1303. Head lamps are 6-8 volt, 21 cp. double filament using Tilt-ray principle for dimming. Auxiliary head lamps are 6-8 volt, 3 cp. S.C. Side lamps are 6-8 volt, 4 cp. S.C. Stop lamp is 6-8 volt, 12 cp. S.C. Dome lamp is 6-8 volt, 6 cp. D.C. Dash lamps are 6-8 volt, 3 cp. D.C. Tail lamp is 6-8 volt, 3 cp. S.C.

FUSES:—Lighting fuses are 10 amperes.

ELCAR

MODEL 8-82 (1927-28)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—U.S.L. Type XY-15X, 6 volt. Starting capacity is 119 amperes for 20 minutes. Lighting capacity is 5 amperes for 20.8 hours. The negative (—) terminal is grounded. Battery is mounted under the right front seat.

IGNITION:—Coil Model 525-C. Distributor Model 658-B. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 15°. Automatic advance begins at 600 R.P.M. and reaches a maximum of 17.5° at 2000 R.P.M. Breaker arm spring tension should be 17-21 ounces. Double breaker contacts are used. They operate on a four sided cam and open at intervals of 45° corresponding to 90° of crankshaft rotation. It is very important that the firing interval be correctly set. To check position of second set of breaker contacts (see Timing).

Mounting:—Distributor is mounted on the top of the engine block on the left side. To remove distributor, disconnect breaker leads and remove high tension cables or remove distributor head. Then loosen distributor clamp screw under distributor cup and lift distributor from place.

Oiling:— Refill the grease cup under the distributor head with medium cup grease and turn down one turn every two weeks or each 500 miles. Every 5000 miles remove rotor button and saturate wick oiler with light engine oil. Put a small bit of vaseline on the face of the breaker cam under the fiber bumper of the contact arm.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position. To set timing, crank engine until piston No. 1 reaches top dead center on compression stroke (the upstroke with both valves closed). Make certain that the spark control lever is fully retarded. Loosen distributor clamp screw and rotate distributor until stationary contacts begin to separate. Tighten the clamp screw. To check second set of contact on movable plate, use special tool issued by Delco-Remy Corporation. Contacts can be checked without tool by cranking engine over 90° after setting timing in cylinder No. 1. Piston No. 6 will then be on top dead center entering power stroke. The contacts on movable plate should open at this point.

Valve Timing:—INLET VALVES:—Head diameter, 1 13/32 inches; stem diameter, .3425-.341 inch; stem length, 5 5/16 inches over head; tappet clearance, .006-.008 inch (hot); spring pressure, 36 pounds; valve lift, 11/32 inch. Inlet opens at top dead center and closes 45° after lower dead center.

EXHAUST VALVES:—Head diameter, 1 13/32 inches; stem diameter, .3425-.341 inch; stem length, 5 5/16 inches over head; tappet clearance, .008 inch (hot); spring pressure, 36 pounds; valve lift, 11/32 inch. Exhaust opens 50° before lower dead center and closes 10° after top dead center. No valve stem guides are used. Oversize valves are made.

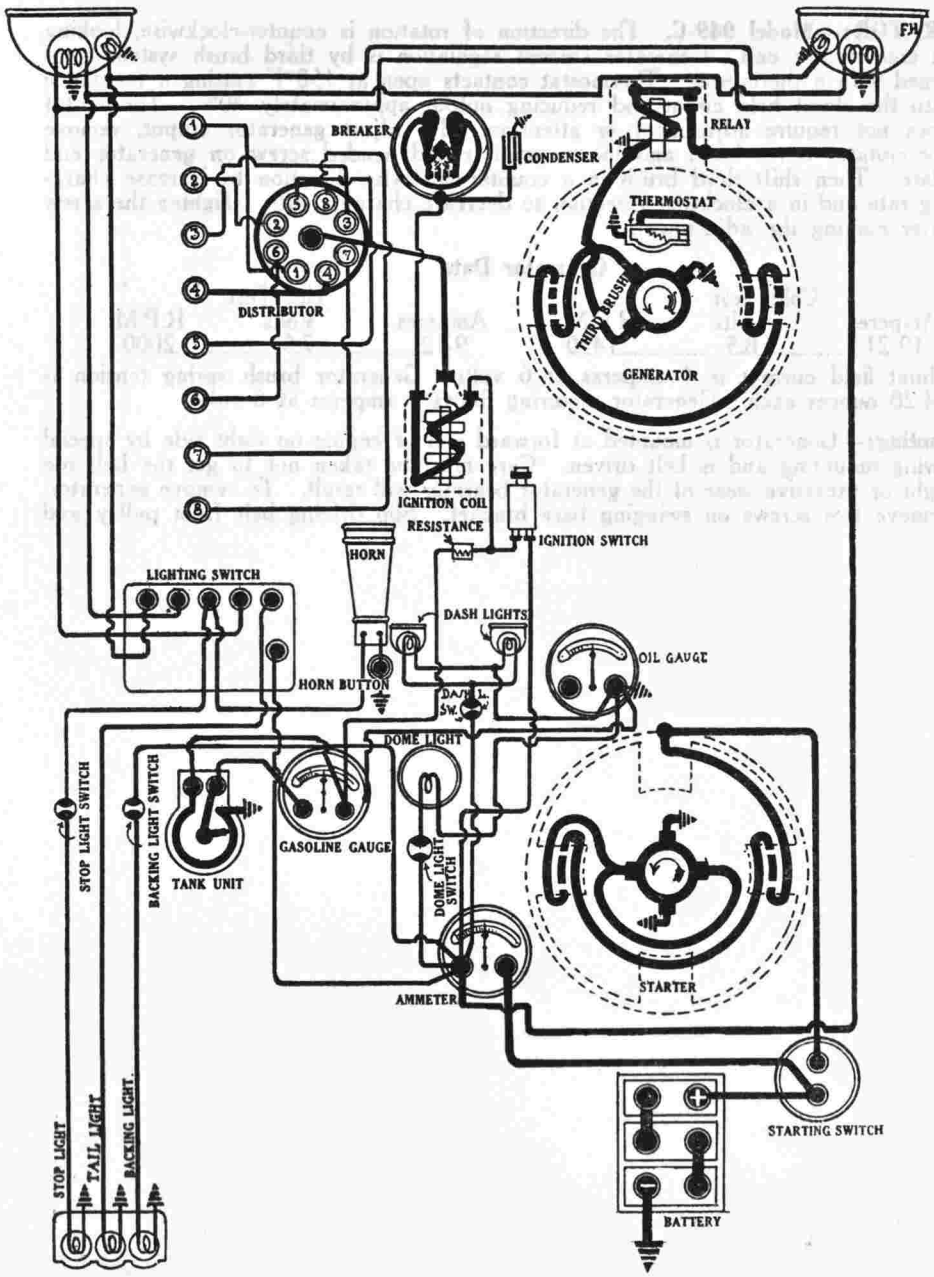
Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 7/8 S.A.E. 'Short.' Gaps are .027 inch.

STARTER:—Model 716-A. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at commutator end. Starter brush tension is 24-28 ounces. Starting switch is Model 406-A.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5.0	70
15 "	Lock	3.7	450



ELCAR

MODEL 8-82 (1927)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

Mounting:—Starter is flange mounted on forward side of flywheel housing at right of engine. To remove starter, disconnect starter cable, remove three flange mounting capsrews and slide starter forward from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR:—Model 949-C. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field combined with a thermostat. Thermostat contacts open at 150°F. cutting a resistance into shunt field circuit and reducing output approximately 40%. To adjust generator output, remove commutator cover band and loosen small round headed screw on generator end plate. Then shift third brush in a counter-clockwise direction to increase charging rate and in the opposite direction to decrease charging rate. Tighten the screw after making the adjustment.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.5	1450	9-12	7.5	2000

Shunt field current is 4 amperes at 6 volts. Generator brush spring tension is 24-28 ounces each. Generator motoring draws 5 amperes at 6 volts.

Mounting:—Generator is mounted at forward end of engine on right side by special swinging base bracket and is belt driven. In adjusting belt tension care must be taken not to get belt too tight or excessive wear of the generator bearings will result. To remove generator, remove two screws in base bracket and slip off drive belt. Then lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay contacts close at 675 R.P.M. of the generator when the voltage reaches 6.75-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts must not exceed 3 amperes. Contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch, contacts closed. Set contact opening by bending brass stop over relay armature. Set air gap by loosening two screws in armature base and inserting feeler between armature and coil core. Then close relay contacts by hand and tighten the two screws.

LIGHTING:—Delco-Remy Lighting Switch Model 420-N. Switch is mounted at lower end of steering column. Head lamps are 6-8 volt, 21 cp. double filament using Tilt-ray principle for dimming. Auxiliary head lamps are 6-8 volt, 3 cp. S.C. Side lamps are 6-8 volt, 4 cp. S.C. Stop and backing lamps are 6-8 volt, 12 cp. S.C. Dome lamp is 6-8 volt, 6 cp. D.C. Dash lamp is 6-8 volt, 3 cp. D.C. Tail lamp is 6-8 volt, 3 cp. S.C.

Ignition Switch:—Model 440-A.

FUSES:—Five fuses are mounted on switch. They are 10 amperes.

ELCAR

MODEL 8-90 (1927) 8-91, 8-92 (1928)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—U.S.L. Type XY-17X, 6 volt. Starting capacity is 136 amperes for 20 minutes. Lighting capacity is 5 amperes for 24 hours. The negative (—) terminal is grounded. Battery is mounted under the right front seat.

IGNITION:—Coil Model 525-C. Distributor Model 658-A. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Double breaker contacts are used. They operate on a four sided cam and open alternately at intervals of 45° corresponding to 90° of crankshaft rotation. It is very important that the firing interval be correctly set. To set position of second set of breaker contacts see (Timing). Distributor is semi-automatic. Manual advance is 15°. Automatic advance begins at 300 R.P.M. Maximum automatic advance is 17° reached at 1800 R.P.M. (engine). Breaker arm spring tension is 17-21 ounces.

Mounting:—Distributor is mounted on top of engine block at center. To remove distributor, disconnect breaker leads and remove high tension cables or remove distributor head. Then loosen distributor clamp screw under distributor cup and lift distributor from place.

Oiling:—Refill the grease cup under the distributor head with medium cup grease and turn down one turn every two weeks or each 500 miles. Every 5000 miles remove the rotor button and saturate the wick oiler with light engine oil. Put a small amount of vaseline on the face of the breaker cam under the fiber bumper of the contact arm.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position. To set timing, crank engine until piston No. 1 reaches top dead center on compression stroke (the upstroke with both valves closed). Make certain that the spark control lever is in the fully retarded position. Loosen distributor clamp screw and rotate distributor cup until stationary contacts begin to separate. Tighten the clamp screw. To check second set of contacts (on movable plate), use special adjustment cam issued by Delco-Remy Corporation. Remove cam and place special adjustment cam on shaft. Loosen screws holding second set of contacts on breaker plate and shift until fiber bumper of contact arm rests in notch on cam. Tighten the screws. Setting of contacts can be checked without adjusting tool by cranking engine over 90° after setting timing in cylinder No. 1. Piston No. 6 will then be on top dead center entering power stroke. The breaker contacts should separate at this point.

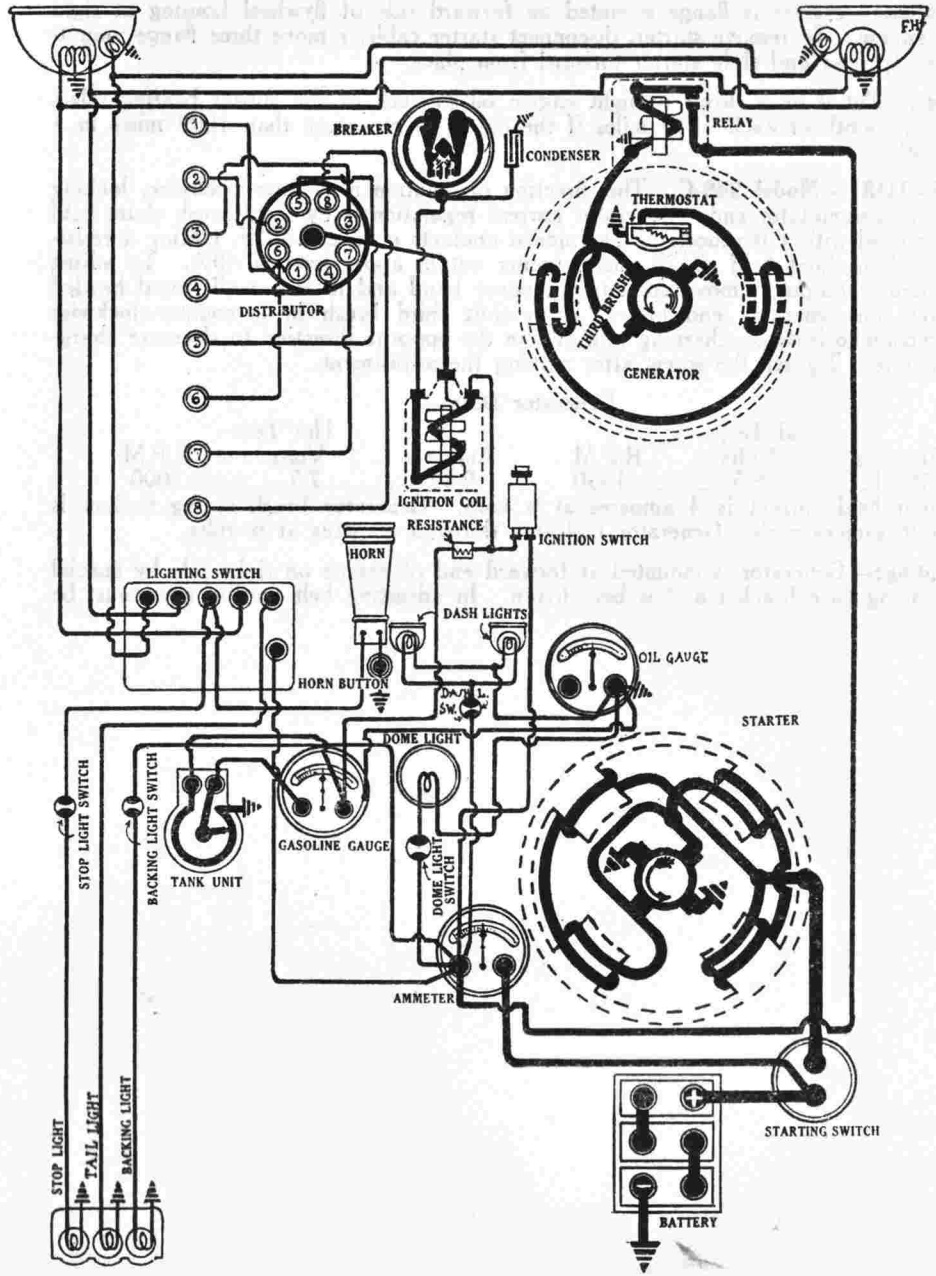
Valve Timing:—INLET VALVES:—Head diameter, 1⅝ inches; stem diameter, .3425-.341 inch; stem length, 5 19/32 inches over head; tappet clearance, .066 inch (hot); spring pressure, 34-38 pounds (valve closed); valve lift, 5/16 inch; inlet opens on upper dead center and closes 35° after lower dead center.

EXHAUST VALVES:—Head diameter, 1 15/32 inches; stem diameter, .3425-.341 inch; stem length, 5 9/16 inches (over head); tappet clearance, .008 inch (hot); spring pressure, 34-38 pounds (valve closed); valve lift, 5/16 inch; exhaust opens 42° before lower dead center and closes 5° after top dead center. Valve stem guides are removable. Oversize valve stems are made.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are ⅞ S.A.E. Standard 'Short.' Gaps are .027 inch.

STARTER:—Model 720-Q. Starter is connected to engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at commutator end. Starter brush tension is 24-28 ounces. Starter switch is Model 406-A.



ELCAR

MODEL 8-90 (1927)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Mounting:—Starter is flange mounted on forward side of flywheel housing on right side of engine. To remove starter, disconnect starter cable, remove three flange mounting cap screws and slide starter forward from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR:—Model 949-A. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field combined with a thermostat. Thermostat contacts open at 150°F. cutting a resistance into the shunt field circuit and reducing the output approximately 40%. Thermostat is entirely automatic and does not require adjustment or attention. To adjust generator output, loosen the small round headed screw on the generator end plate and remove commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screws after making the adjustment.

Generator Data

	Cold Test			Hot Test	
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.5	1450	9-12	7.5	2000

Shunt field current is 4 amperes at 6 volts. Generator brush spring tension is 14-18 ounces. Generator motoring draws 5 amperes at 6 volts.

Mounting:—Generator is flange mounted at forward end of motor on right side. To remove generator, disconnect generator lead and remove three flange mounting capscrews. Then slide generator to rear and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 675 R.P.M. of the generator when the voltage reaches 6.75-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts must not exceed 3 amperes. Contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch, contacts closed. Set contact opening by bending brass stop extending over relay armature. To set air gap, loosen two screws in base of relay armature and insert feeler gauge between armature and coil core. Then close relay contacts by hand and tighten the two base mounting screws.

LIGHTING:—Delco-Remy Lighting Switch Model 420-N. Switch is mounted at foot of steering column. Head lamps are 6-8 volt, 21 cp. double filament using Tiltray principle for dimming. Auxiliary head lamps are 6-8 volt, 3 cp. S.C. Side lamps are 6-8 volt, 4 cp. S.C. Stop and backing lamps are 6-8 volt, 12 cp. S.C. Dome lamp and corner lamps are each 6-8 volt, 6 cp. D.C. Dash lamp is 6-8 volt, 3 cp. D.C. Tail lamp is 6-8 volt, 3 cp. S.C.

FUSES:—Five 10 ampere fuses are mounted on switch.

ELCAR

MODEL 8-78 (1928)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—U.S.L. Type 3-CVX-6X. 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 115 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 21 hours.

IGNITION:—Coil Model 525-C. Distributor Model 658-B. Breaker contacts separate .022 inch. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 15 degrees. Automatic advance begins at 600 R.P.M. and reaches a maximum of 17.5 degrees at 2000 R.P.M. Breaker arm spring tension is 17-21 ounces. Double breaker contacts are used. They operate on a four sided cam and open at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. It is very important that the firing interval be correctly set. See Timing.

Oiling:—Refill the grease cup under the distributor head with medium cup grease and turn down one turn every two weeks or each 500 miles. Every 5000 miles remove the rotor button and saturate wick oiler with light engine oil. Put a small bit of vaseline on the face of the breaker cam under the fiber bumper of the contact arm.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position. To set timing, fully retard spark, crank engine until piston No. 1 reaches top dead center on compression stroke. Loosen distributor clamp screw and rotate distributor until stationary contacts begin to separate. Tighten the clamp screw. To check second set of contacts use special tool issued by Delco-Remy Corporation, or crank engine over 90 degrees after setting timing in cylinder No. 1 when piston No. 6 will be on top dead center entering power stroke. The contacts on movable plate should open at this point.

VALVE TIMING:—Inlet Valves open at top dead center and close at 35 degrees after lower dead center. **Exhaust Valves** open 42 degrees before lower dead center and close 5 degrees after top dead center.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 7/8 Standard A.C. Gaps are .027 inch.

STARTER:—Model 716-A. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, looking at the commutator end. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	70
15 lb. ft.	Lock	3.7	450

Oiling:—Put 4 or 5 drops of light engine oil in the starter bearing oilers every month or each 1000 miles.

GENERATOR:—Model 949-C. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 150 degrees F. cutting a resistance into shunt field circuit and reducing output 40%. To adjust generator output, remove commutator cover band and loosen small round headed screw on generator end plate. Shift third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten screw after adjustment.

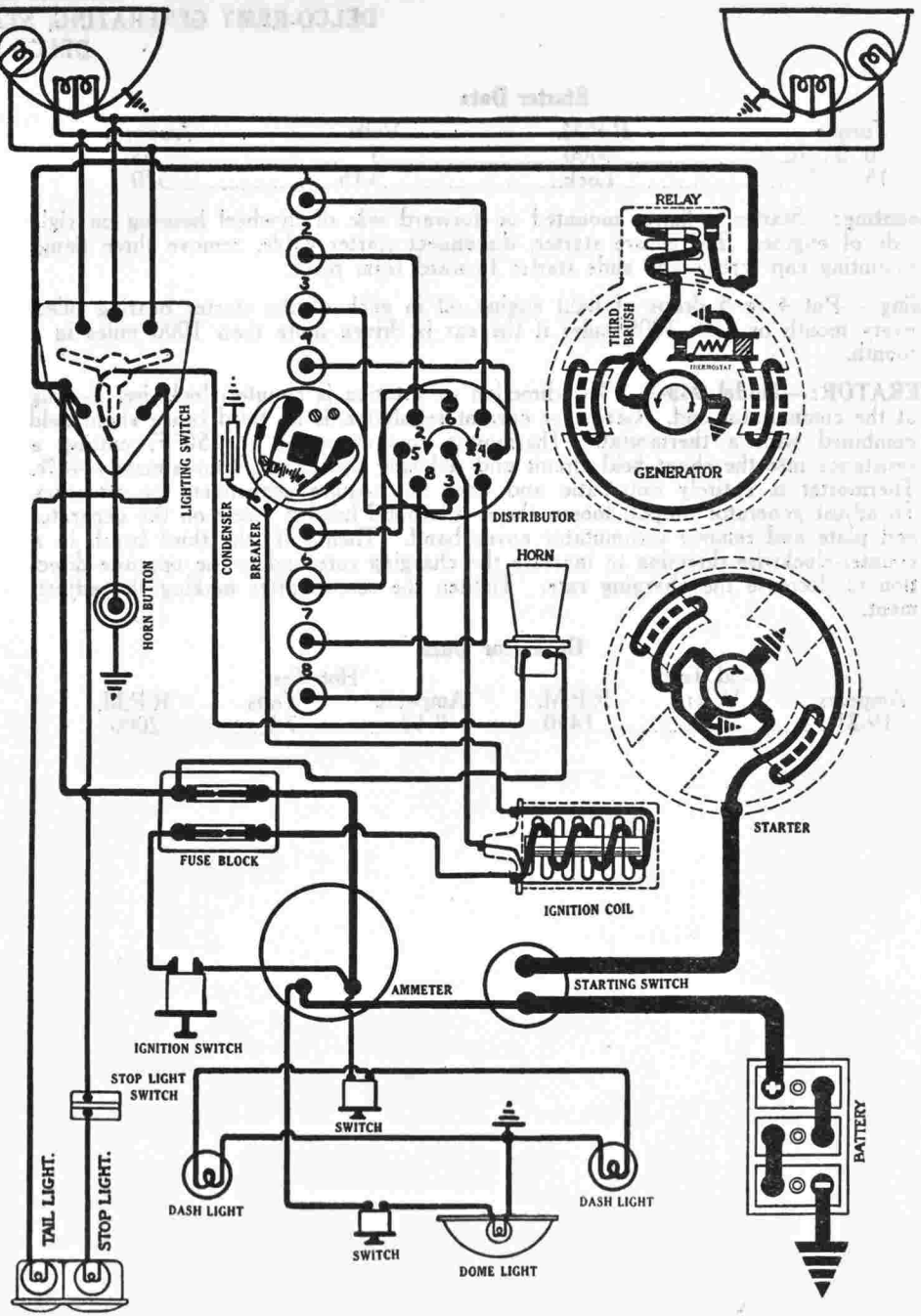
Generator Data

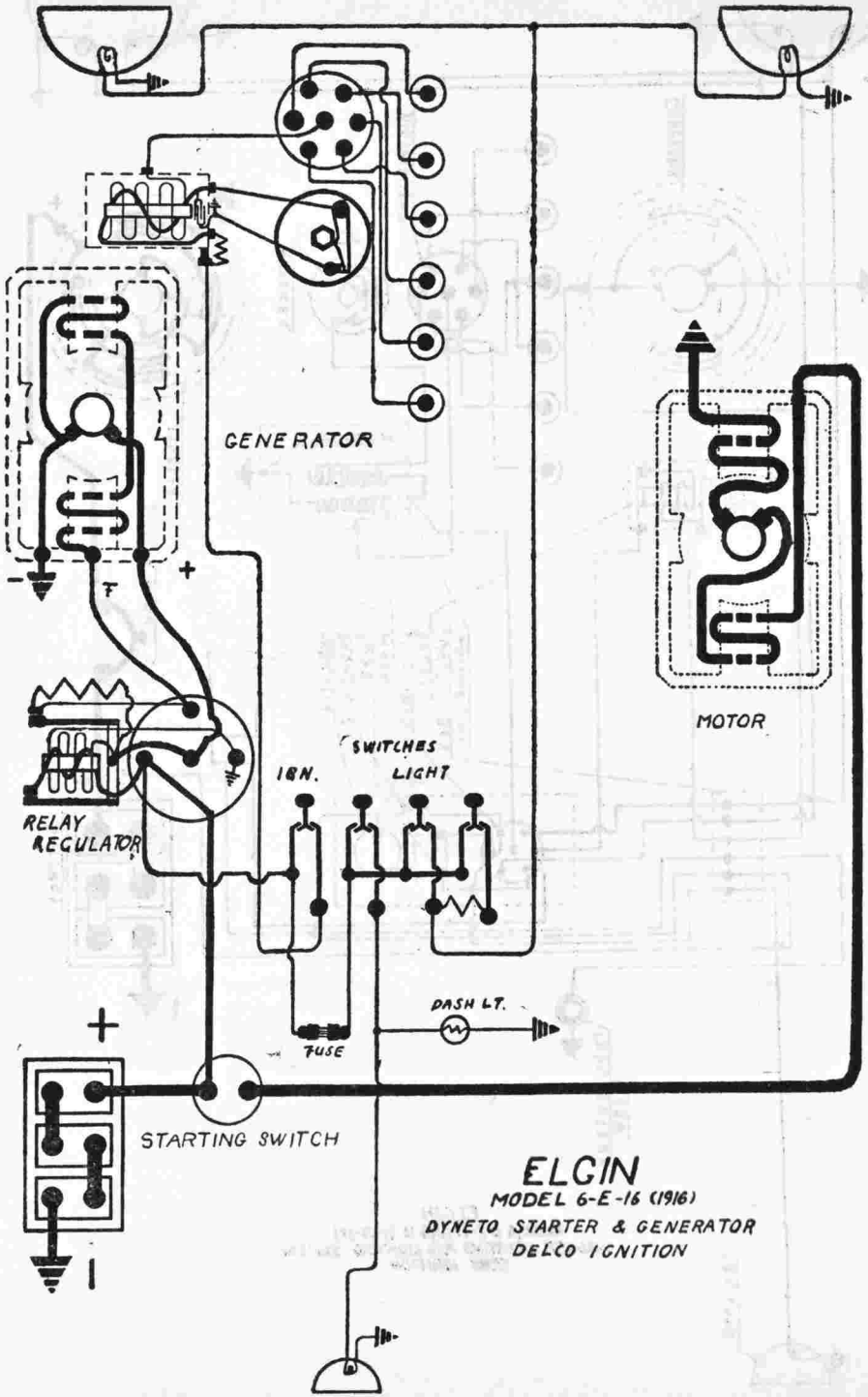
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
9-12	7.5	2000	19-21	8.5	1450

Shunt field current is 4 amperes at 6 volts. Spring tension is 24-28 ounces each. Generator motoring, draws 5 amperes at 6 volts.

RELAY:—Model 265-B. Relay is mounted on the generator. Contacts close when the voltage reaches 6.75-7.5 volts and open with a discharge current of 0-2.5 amperes. Contact gap .015-.025 inch. Air gap .014-.021 inch with contacts closed.

LIGHTING:—Switch Model 1303. Switch is mounted at the base of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact). Mazda 1110. Auxiliary lights are 6-8 volt, 6 cp. S.C. Mazda 81. Dash and tail lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87.





Elgin

Model 6-E-16 (1916)

Dyneto Starting and Lighting System

Delco Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts should separate .018 inch to .020 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be about .027 inch.

Oiling.—Put 3 or 4 drops of light engine oil in the top distributor bearing every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Starter.—Starter is connected to the engine through a Bendix drive. When free to operate, motor should take 40-50 amperes, armature revolving at about 3000 R. P. M. Greater speed indicates damp, grounded or short circuited field coils. Lower speed and high current indicates damp, grounded or short circuited armature coils or commutator bars. Movement of the ammeter needle at low speed indicates grounded or short circuited armature coils or commutator bars.

STARTER DATA, TYPE UA

Torque	R. P. M.	Amperes	Volts
2.5 lb. ft.	1350	160	5.2
5.0 lb. ft.	650	280	4.7
7.5 lb. ft.	270	380	4.4
10.0 lb. ft.	Lock	480	4.0

Oiling.—Saturate the felt disk at the commutator end and the felt wick at the driving end with light engine or machine oil every month.

Generator.—Generator current regulation is by a vibrating type regulator. Relay is combined with the regulator. Relay should close at 6-8 miles per hour. Maximum generator output should be reached at 10-12 miles per hour. The maximum output should be 10-12 amperes. Clean relay and regulator contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface them with a piece of well worn No. 00 sand paper, drawing a piece of unglazed paper between them, to remove all grit, before again putting into service. Increasing the spring tension on regulator armature (moving member) will increase the output. Decreasing the spring tension will decrease the output. Generator output will decrease slightly as the speed increases above that necessary to produce the maximum.

Oiling.—Saturate the felt disk at the commutator end and the felt wick at the driving end with light engine or machine oil every month. If car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

Lamps—Head lamps are 6-8 volts, 20 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.

Elgin

MODELS 6-E 17 AND 18 (1917-18) SERIAL NOS. 17000 TO 177760
WAGNER GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .020 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when flywheel marking "D.C.1-6" appears in middle of opening in top of flywheel housing, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .020 to .025 inch.

STARTER.—E.M.-180, Type 36-T. Starter is connected to the engine through a Bendix drive.

OILING.—Put 5 or 6 drops of light engine oil in each of starter bearing oilers every month.

GENERATOR.—E. M.-165, Type 41-Y. Generator current regulation is by third brush system. Rotation is counter-clockwise, viewed from commutator end. Maximum current output of 15 amperes is reached at 1650 R.P.M. of armature, or 20 miles per hour.

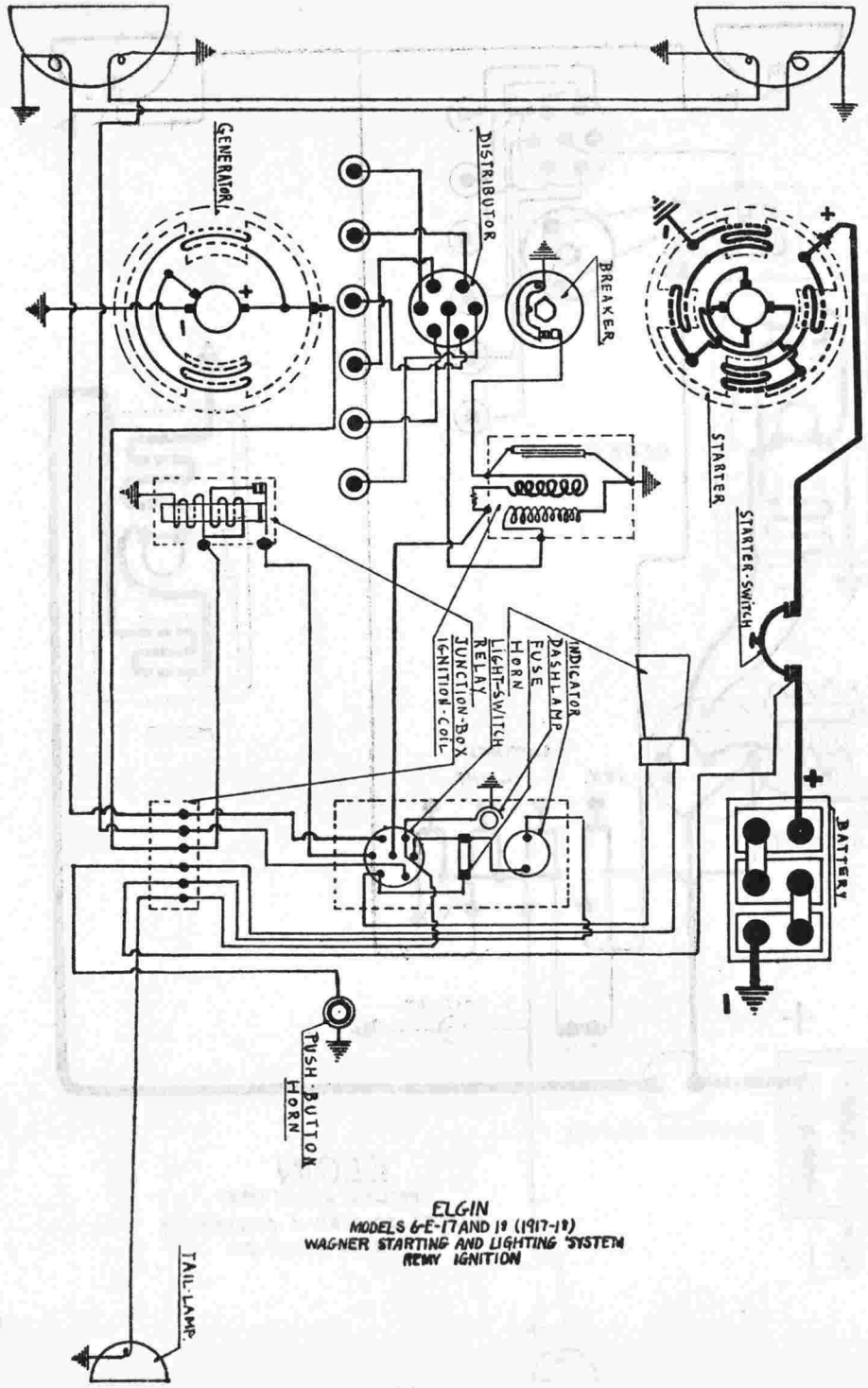
Amperes	Generator Data	R. P. M.
4.0		800
9.0		1000
12.0		1200
14.5		1500
15.0		1650
14.0		2000
11.0		2500

OILING.—Put 5 or 6 drops of light engine oil in each of the generator bearings every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles

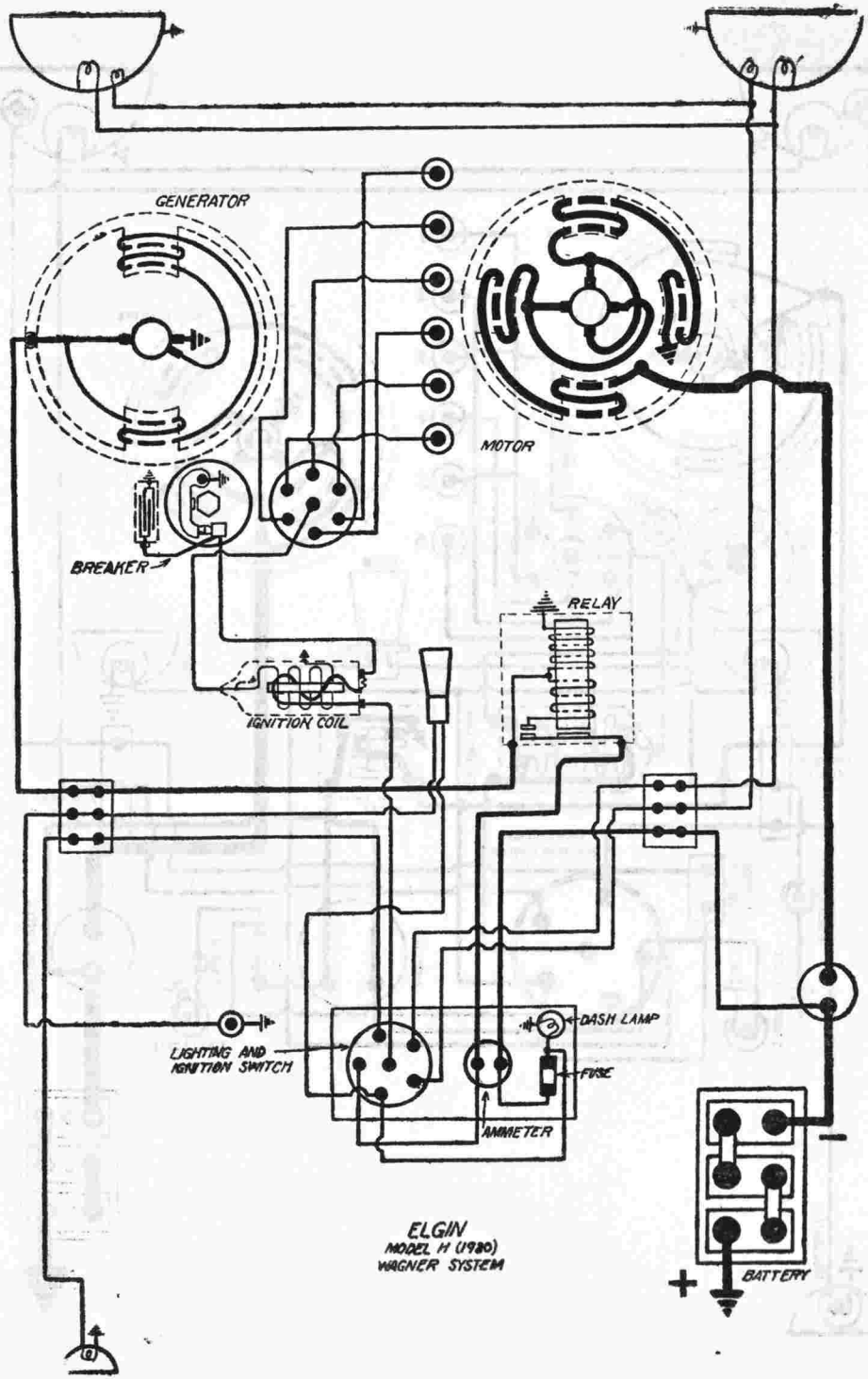
RELAY.—Relay closes at 8-10 miles per hour and opens at 6-8 miles per hour. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 20 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are each 6-8 volt, 2 cp.

FUSES.—Fuses are 20 ampere.



ELGIN
MODELS 6-E-17 AND 18 (1917-18)
WAGNER STARTING AND LIGHTING SYSTEM
REMY IGNITION



ELGIN

MODELS H (1919) AND K (1920)
WAGNER GENERATING, STARTING AND LIGHTING SYSTEM
WAGNER IGNITION

BATTERY:—Willard (1919) Type SJR-3 6 volt, 90 ampere hour. The negative (—) terminal is grounded. **(1920) Type SJW-3** 6 volt, 93 ampere hour. The positive (+) terminal is grounded. (Note:—This installation is shown on the cut).

IGNITION.—Coil Model K-32. Distributor Model KC-335. Breaker contacts separate .024 to .029 inch. They are made of tungsten. When the condition of the contacts affects the ignition, renew the lever arm and contact screw.

OILING.—If the car is driven more than 500 miles in two weeks, this must be done every Screw up the grease cup under the breaker head one-half turn every two weeks. 500 miles. Put 3 or 4 drops of light engine oil on the wick in the breaker lever spindle every 6 months.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .028 inch.

STARTER.—Model E.M.-298, Type 36-T. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 115 R.P.M., current being 160 amperes. Lock torque is 11.5 pound-feet, current being 475 amperes. Running freely, starter armature revolves at 8000 R.P.M., current being 60-90 amperes.

OILING.—Put 5 or 6 drops of light engine oil in each of starter oilers every month.

GENERATOR.—Model E.M.-316, Type 46-V-5, or Model E.M.-200, Type 41-Y. Generator current regulation is by third brush system. Maximum current output is 16 amperes, reached at 20-23 miles per hour.

Generator Data

Amperes	Model E.M.-200, Type 41-Y.	R.P.M.
0		660
6		880
9		1000
12		1200
15		1650
11		2500

The maximum current output of the Model E.M.-316 generator is 16 amperes, reached at 1400 R.P.M. of the armature.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Model I-471. Relay closes at 8-10 miles per hour or 567-710 R.P.M. of the armature, and opens at 6-8 miles per hour or 425-567 R.P.M. of the armature. Relay contacts separate .035 to .065 inch. Air gap between relay armature (moving member) and coil core is .025 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Dash and tail lamps are 6-8 volt, 2 cp. On the Model "H" cars, head lamps are 6-8 volt, 15 cp. Tail lamp is 6-8 volt, 4 cp.

FUSES.—Fuses are 20 ampere.

ELGIN

MODEL K (1920), K-1 (1921-22)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WAGNER IGNITION

BATTERY:—Willard, Type SJW-3, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 100 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 18 hours.

IGNITION:—Coil Model K-32. Distributor Model KC-335. Breaker contacts separate .024-.029 inch. They are made of tungsten. When the condition of the contacts affects the ignition, renew the breaker arm and stationary contact. For temporary service the contacts can be resurfaced with a fine flat contact file or on a medium hard oilstone.

Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down one half turn every two weeks or each 500 miles. Every six months put 4 or 5 drops of light oil in the wick oiler of the breaker arm pivot pin.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark advance lever and breaker assembly fully retarded.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plugs are S.A.E. 7/8-18. Gaps are .025-.028 inch.

STARTER:—Frame No. 100. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 100 R.P.M. drawing 150 amperes at 5 volts. Brush spring tension should be 1¼-1½ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4100-7000	5.5	35-45
1.75 "	1600	5.5	145
12 "	Lock	4.0	475

Oiling:—Put 5 or 6 drops of light oil in the starter bearing oilers every month or each 1000 miles.

GENERATOR:—Frame No. 150. The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by the third brush shunt field system. To adjust generator output, remove commutator cover band and loosen nut on third brush mounting bracket. Then shift the third brush in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the nut after making the adjustment. Maimum charging rate is 16 amperes at 7.5 volts reached at 1450 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	800			
8	6.5	925	8.5-10.5	7-7.5	1000
15-16	7.5	1450-1750			
7.5-12.5	7-7.5	2500			

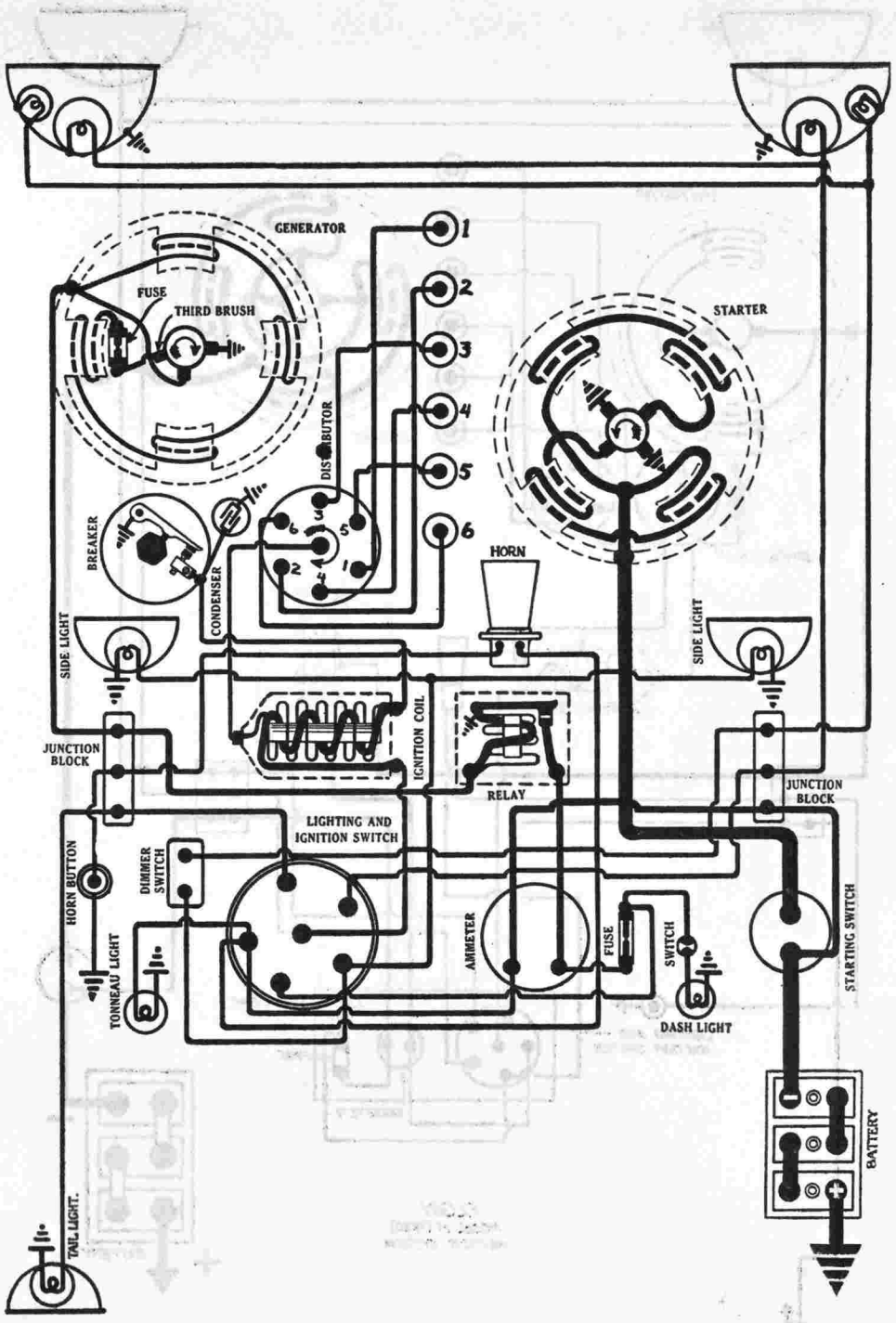
Motoring generator draws 4.2 amperes at 6-6.3 volts. Shunt field current is 3.25-4.0 amperes at 6-6.3 volts.

Oiling:—Put 5 or 6 drops of light oil in the generator bearing oilers every two weeks or each 500 miles.

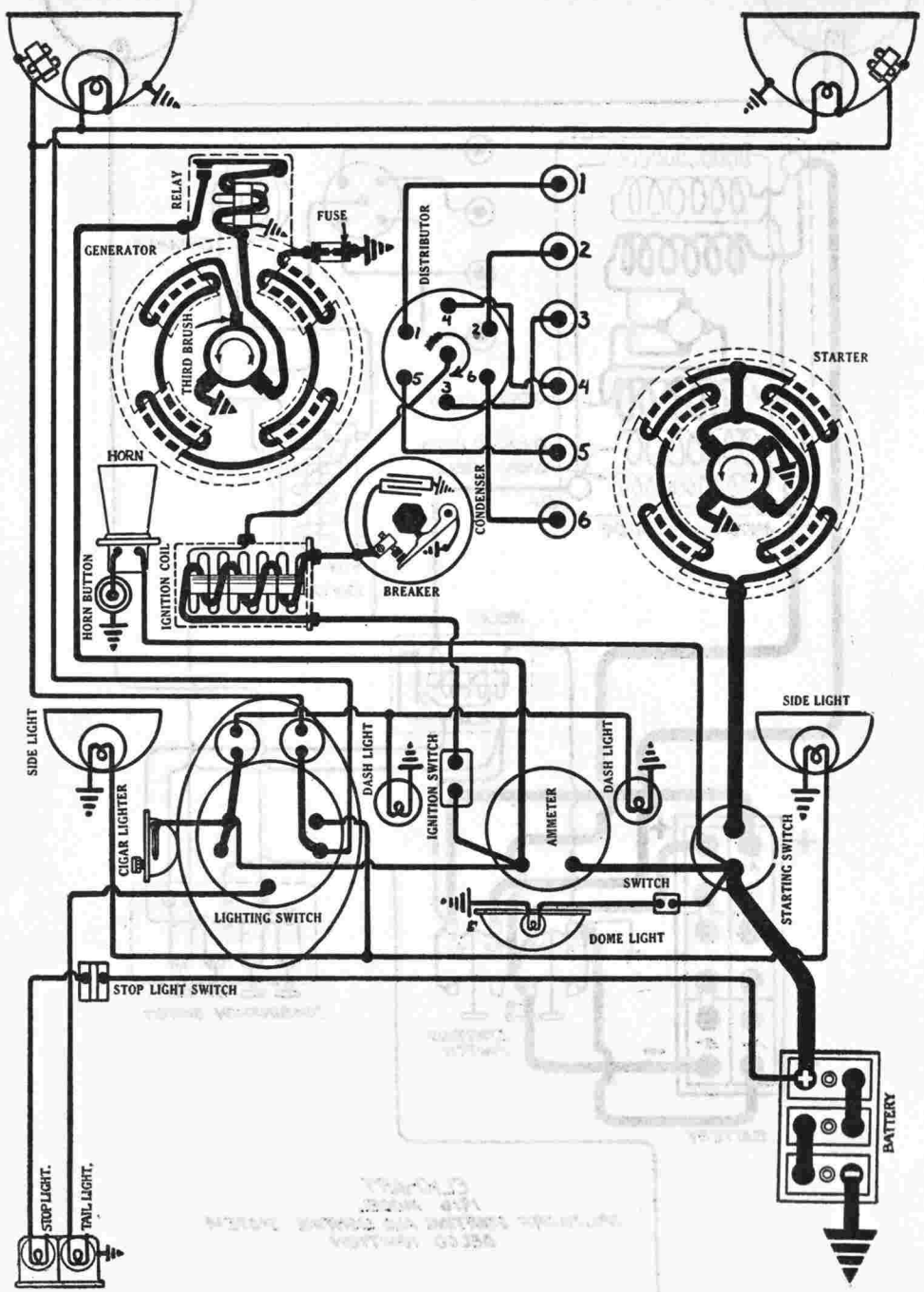
RELAY:—No. 273899. Relay is mounted on the dash. Relay contacts close when the voltage of the generator reaches 6.2-6.5 volts and opens with a discharge current of 0-3 amperes. Charging current at closing of contacts is approximately 2 amperes. Contacts separate .030-.035 inch. Air gap is .005 inch with contacts closed.

LIGHTING:—Briggs and Stratton Panel No. 1272. Head lights are 6-8 volt, 21 cp. S.C. Dimmer and side lights are each 6-8 volt, 4 cp. S.C. Dash and tail lights are each 6-8 volt, 2 cp. S.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuse on panel is 20 amperes.



DEJON GENERATING, STARTING SYSTEM
DEJON IGNITION



BATTERY:—U.S.L. Type 3-CVX-6X. 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 115 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 21 hours.

IGNITION:—Coil Model CA-4001. Distributor Model IA-4002. Breaker contacts separate .018-.022 inch. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Ignition current is 6.3 amperes at 6 volts (cold) or 3.5 amperes at 6 volts (hot) with engine stopped. On bench test the maximum spark should be .394 inch at atmospheric pressure when run at 1000 R.P.M. Distributor is semi-automatic. Automatic advance begins at 100 R.P.M. of distributor. Maximum automatic advance is 15 degrees (distributor) reached at 1600 R.P.M.

Oiling:—Put 4 or 5 drops of light oil in the oiler on the side of the distributor housing every two weeks or each 500 miles. Put a small bit of vaseline on the face of the breaker cam under the fiber bumper every month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position. To set timing, crank engine until piston No. 1 reaches top dead center entering power stroke. Fully retard spark lever. Then loosen the lockscrew in the center of the cam and rotate the breaker cam until the contacts begin to separate.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plugs are S.A.E. 7/8-18. Caps are .025 inch.

STARTER:—Model SA-4002. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	45
.5 "	2800	5.5	100
2.5 "	1600	5.0	200
4.7 "	1000	4.5	300
7.3 "	600	4.0	400
20 "	Lock	4.0	800

Oiling:—Put 4 or 5 drops of light oil in the starter bearing oilers every month or each 1000 miles.

GENERATOR:—Model DB-4001. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush shunt field. To adjust generator output, turn the slotted shifter shaft extending through the commutator end plate directly above the bearing retainer. Turn the shaft in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Maximum charging rate is 15.5 amperes reached at 1600 R.P.M.

Generator Data

Cold Test Amperes	R.P.M.	Hot Test Amperes	R.P.M.
2.75	600	1.5	600
8	800	5.5	800
10.5	1000	8.5	1000
15	1200	12	1200
15.5	1600	13	1600
11.75	2400	11	2400
10.25	3200	9.5	3200

Motoring generator draws 4 amperes at 6 volts. Shunt field current is 2.5 amperes at 6 volts. A five ampere field fuse is mounted on the end-plate.

Oiling:—Put 4 or 5 drops of light oil in each of the generator bearing oilers every month or each 1000 miles.

RELAY:—Model RA-4001. Relay is mounted on the generator. Relay closes at 480-510 R.P.M. when the voltage of the generator reaches 7-8 volts and opens with a discharge current of 0-2.5 amperes. Charging current must not exceed 5 amperes at closing of contacts. Contacts separate .025-.035 inch. Air gap is .015 inch with contacts closed.

LIGHTING:—Briggs and Stratton Switch Model 37900. Head lights are 6-8 volt, 21 cp. S.C. Dimming is by tilting reflectors. Side, dash and tail lights are each 6-8 volt, 3 cp. S.C.

FUSES:—Generator field fuse is 5 amperes.

ELKHART

1916 MODEL CROW ELKHART

SPLITDORF GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Battery is 12 volt, 35 ampere-hour. The negative (—) terminal is grounded at the starting switch.

IGNITION.—Breaker contacts separate .018 to .023 inch. They are made of tungsten. When the condition of t he points affects the ignition, remove and resurface with fine emery cloth or against the side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 3 or 4 drops of light engine oil in timer bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3,4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .027 to .030 inch.

STARTER-GENERATOR.—Starter and generator are combined into one unit. Armature is permanently chain connected to engine crank shaft.

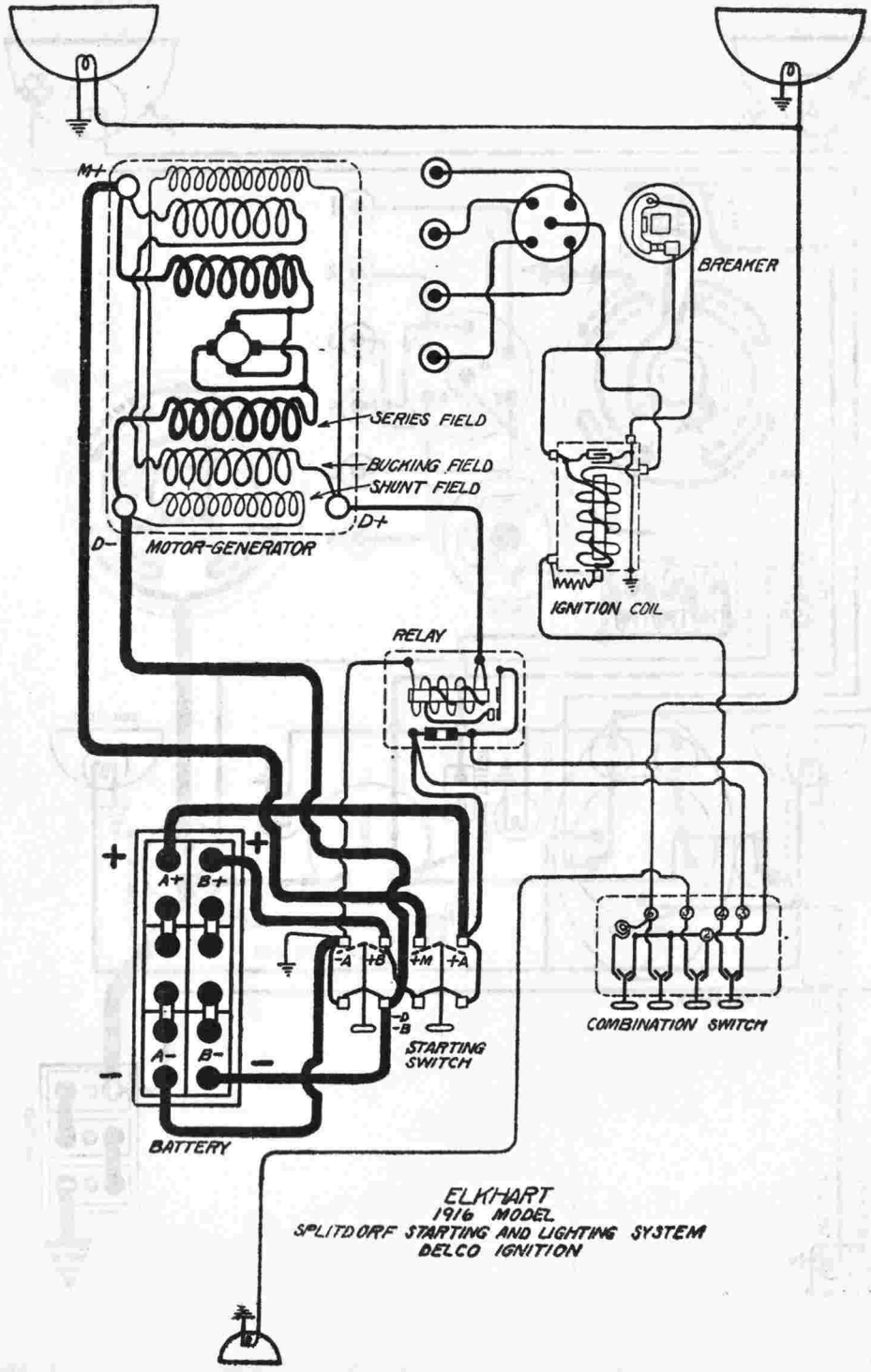
GENERATOR.—Generator current regulation is by reverse series field. Maximum charging rate of 15 amperes is reached at 1500 R.P.M. of armature, or 20-25 miles per hour.

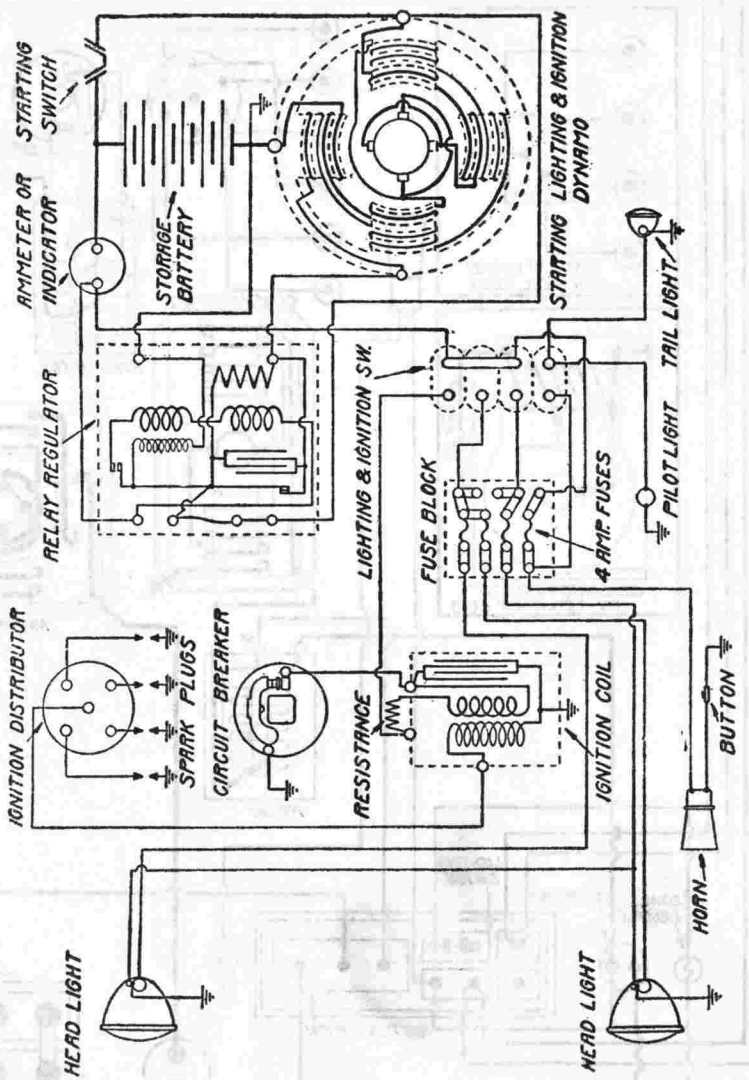
OILING.—Put several drops of light engine oil in each of starter-generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Cutout relay closes at 7-9 miles per hour and opens at 5-7 miles per hour. Charging current is 1-3 amperes at closing and the discharge current 0 to 1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No.00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

FUSE.—Fuse on back of indicator-relay is 15 ampere.





Empire

MODEL 31-40 (1915) (SERIAL NOS. 405101 TO 406190)
MODEL 33 (1915) (SERIAL NOS. 331001 TO 333300)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Battery is 12 volt, 50 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .018 to .020 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions should be given every 500 miles.

TIMING.—Breaker contacts begin to separate when piston entering stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 2, 4, 3.

SPARK PLUG GAPS.—Spark plug gaps are .028 to .030 inch.

STARTER-GENERATOR.—Starter and generator are combined into one unit, but are electrically separate. Starter is connected to the engine through a set of reduction gears.

Starter Data. Motor-Generator No. 129-A

Torque	R.P.M.	Amperes	Volts
0 lb. ft.	1100-1200	6- 10	12.0-13.0
2 lb. ft.	900-1000	20- 30	11.4-11.3
3 lb. ft.	800- 900	30- 40	11.3-11.5
5 lb. ft.	600- 700	40- 50	10.5-10.6
7 lb. ft.	500- 600	70- 80	10.0-10.5
8 lb. ft.	Lock	300-350	10.0

GENERATOR.—Generator current regulation is by reverse series field and vibrator regulator. Maximum output is reached at 15 miles per hour.

Generator Data. Motor-Generator No. 129-A

Amperes	R. P. M.	Volts
0.0	1050-1140	13.0-13.5
5.0	1200-1350	14.0-14.5
7.5	1250-1450	14.5-15.0
6.5	6000	14.0-15.0

OILING.—Put 5 or 6 drops of light engine oil in each of starter-generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY-REGULATOR.—Relay closes at 8-10 miles per hour and opens at 6-8 miles per hour. Air gap between relay armature (moving member) and coil core is .012 to .015 inch. Contacts separate .012 to .015 inch. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service. Increasing spring tension on regulator armature will increase the output, and decreasing spring tension will decrease the output.

LAMPS.—Head lamps are 12-16 volt, 16 cp. Dimmer lamps are 12-16 volt, 6 cp. Dash and tail lamps are connected in series and are each 6-8 volt, 3 cp.

FUSES.—There is a 15 ampere fuse on relay-regulator base. Other fuses are 4 ampere.

MODEL NUMBERS.—Motor-Generator is No. 129-A. Relay-Regulator is No. 262-A. Ignition Coil is No. 49-A. Combination Switch is No. 145-A.

EMPIRE

MODELS 60, 60-R (1916-17) 50, 51 (1917-18-19)
MODELS 70, 70-A, 71, 73 (1917-18-19-20)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—Battery is 6 volt, 85 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the points affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order of Models 50 and 51 is 1, 3, 4, 2. The firing order of Models 70 and 70A is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .027 inch.

STARTER.—Model ME or MC. Starter is connected to the engine through a Bendix drive.

OILING.—Clean and repack starter bearings with soft cup grease every six months. Put in 1 or 2 drops of oil every month to keep grease soft.

GENERATOR.—Models GF and GG. Generator current regulation is by reverse series field.

Generator Data

Model GF — Used on 4 Cylinder Cars		Model GG — Used on 6 Cylinder Cars	
Amperes	R.P.M.	Amperes	R.P.M.
5.00	430- 490	5.00	750- 860
10.00	730- 870	10.00	1225-1400
12.50	945-1180	12.50	1600-1825
15.00	1225-1660	15.00	2125-2450
16-19	2200-2800	17-19	3200-3700

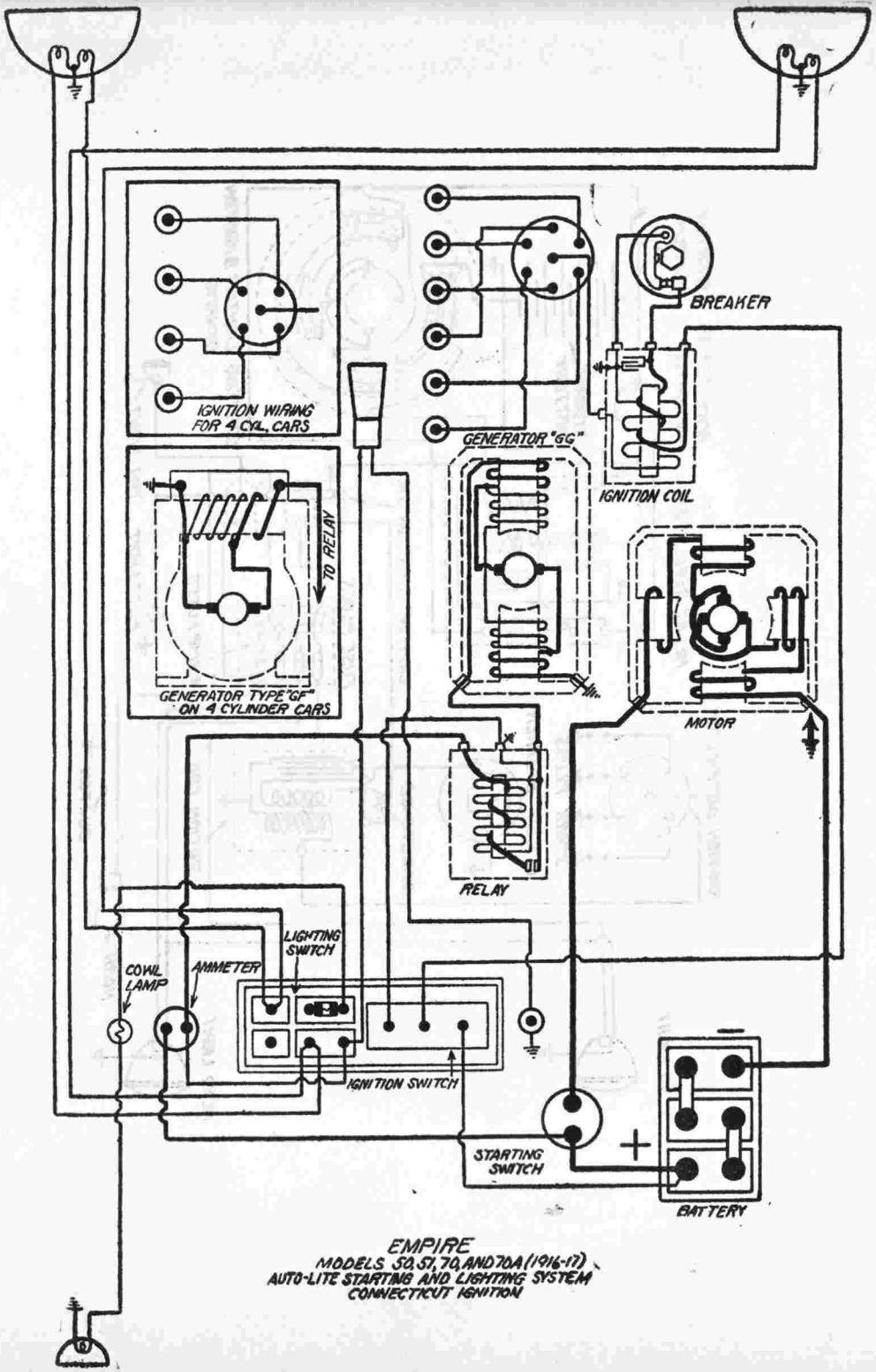
The brush pressure is 1 to 1¼ pounds. When Model GF is operating freely as a motor, the current is 1.8 amperes, speed 200 R.P.M. When Model GG is operating freely as a motor, the current is 2.8 amperes, speed 350 R.P.M. The shunt field current of Model GF is 1 ampere. The shunt field current of Model GG is 1.1 amperes.

OILING.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

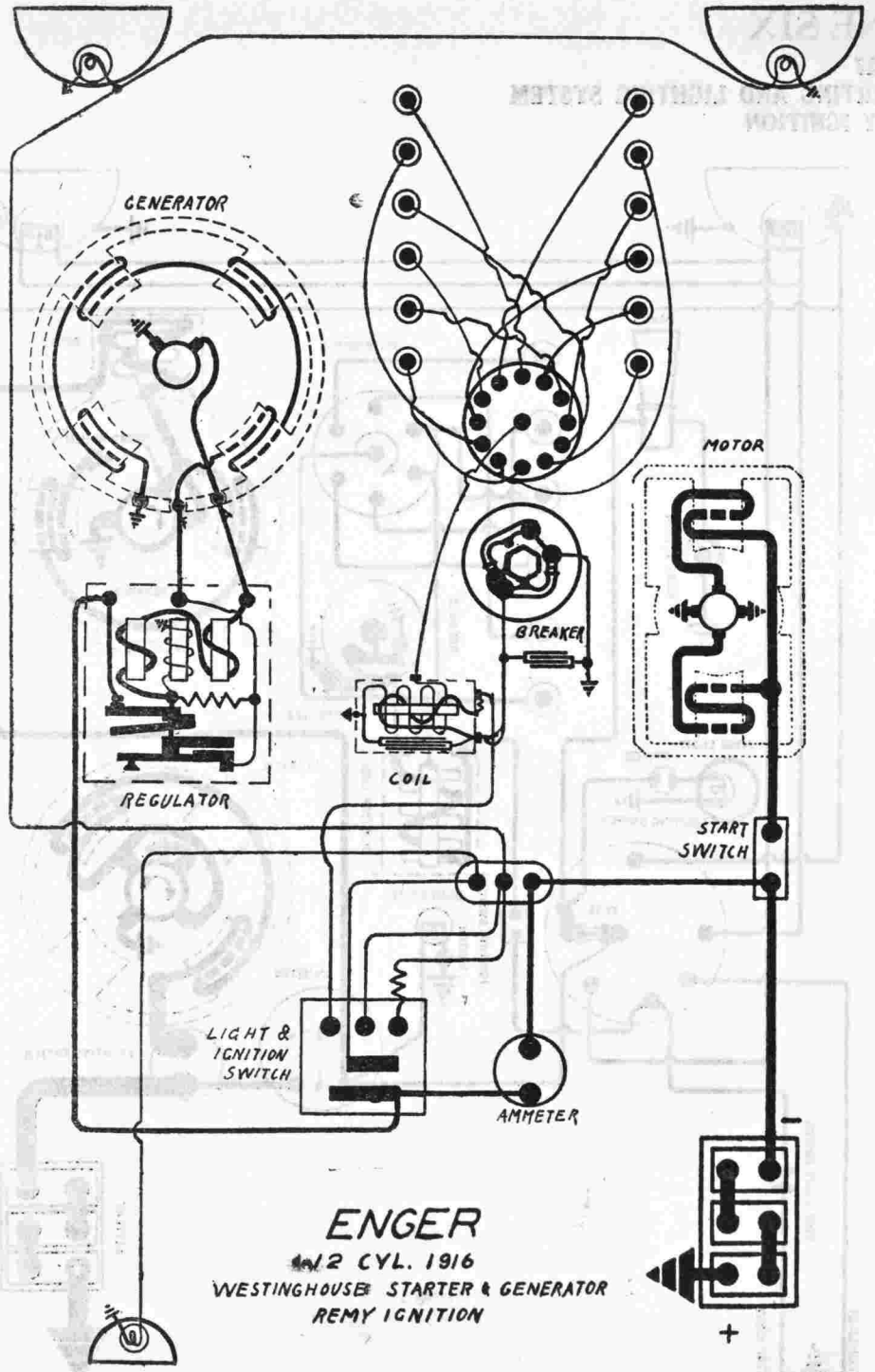
RELAY.—Relay closes at 6 to 8 miles per hour and opens at 4 to 6 miles per hour. Model GF Generator closes relay at 230-265 R.P.M. Model GG Generator closes relay at 500-575 R.P.M. Charging current at closing is .5 to 1.5 amperes, and the discharge current 0 to 1 ampere at opening of relay contacts.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are in series and are each 3-4 volt, 2 cp. Tonneau lamp is 6-8 volt, 2 cp.

FUSES.—Fuses are 20 ampere.



EMPIRE
MODELS 50, 51, 70, AND 70A (1916-17)
AUTO-LITE STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION



Enger

Twelve Cylinder (1916-17)
Westinghouse Starting and Lighting System.
Remy Ignition

Battery.—Battery is 6 volts, 80 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should open .020 inch to .025 inch. Should they become badly burned or pitted, affecting the ignition, resurface them with a fine, flat jeweler's file or a piece of worn No. 00 sand paper.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position. There are two sets of contacts operated by a six-sided cam. These contacts open alternately bu if one set is closed when the other opens, the circuit will not be broken, the result being no spark produced at the plugs. The breaker must be so set that the set of contacts which are separated remain so until the other pair is separated.

Firing Order.—The firing order is 1R, 1L, 5R, 5L, 3R, 3L, 6R, 6L, 2R, 2L, 4R, 4L.

Spark Plug Gaps.—Spark plug gaps should be about .025 inch.

Oiling.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions should be given every 500 miles.

Starter.—Starter is connected to the engine through a Bendix drive. It should run at 1500 R. P. M., when delivering 2 pound-feet torque. It should develop 11.5 pound-feet lock torque, taking about 400 amperes.

Oiling.—Refill the oil wells under the starter bearings with light machine oil every three months.

Generator.—Generator voltage regulation is by a vibrating regulator. Relay is combined with the regulator. The charging current should be about 1.5 amperes at closing and the discharge current 1.25 amperes at opening of relay contacts. The air gap between relay armature (moving member) and coil core should be .027 inch to .030 inch. Contacts should separate .013 inch to .017 inch. Adjust by bending brass prongs. Clean relay and regulator contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface them with a piece of well worn No. 00 sand paper, drawing a piece of unglazed paper between them, to remove all grit, before again putting into service. Generator should deliver 14 amperes at 7.5 volts.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 15 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.

Fuses.—Fuses are 20 ampere.

ERSKINE SIX

1927

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—Willard, Type CRR-13, 6 volt, 90 ampere hour. Starting capacity is 98 amperes for 20 minutes. Lighting capacity is 5 amperes for 17 hours. The positive (+) terminal is grounded. Battery is mounted in special battery box on right hand running board.

IGNITION:—Coil Model 525-A. Distributor Model 637-Y. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts with a fine, flat contact file or on a medium hard oilstone. Stationary contact is mounted on special crescent shaped arm which moves in same arc as movable contact. To set contact opening loosen screw on contact arm and turn eccentric adjusting screw until proper gap is secured. Then tighten lock screw. The parallel surface of the contacts will not be disturbed. Distributor is semi-automatic. Manual advance is 15°. Maximum automatic advance begins at 400 R.P.M. (engine). Maximum automatic advance is 23° (engine) at 2800 R.P.M. Breaker arm spring tension should be 15-20 ounces

Mounting:—Distributor is mounted on rear of generator at right of engine by S.A.E. standard 'A' mounting. To remove distributor, disconnect breaker lead and high tension cables or remove distributor head. Then disconnect manual advance rod and remove lock screw in side of distributor shaft housing. Then lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor housing with medium cup grease and turn down two turns every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control lever one-half advanced. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Place spark control lever midway between the fully retarded and fully advanced positions. Continue to crank engine until piston No. 1 reaches top dead center. If breaker contacts do not separate at this point, loosen distributor clamp screw and rotate distributor housing until contacts begin to separate. Tighten the clamp screw.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

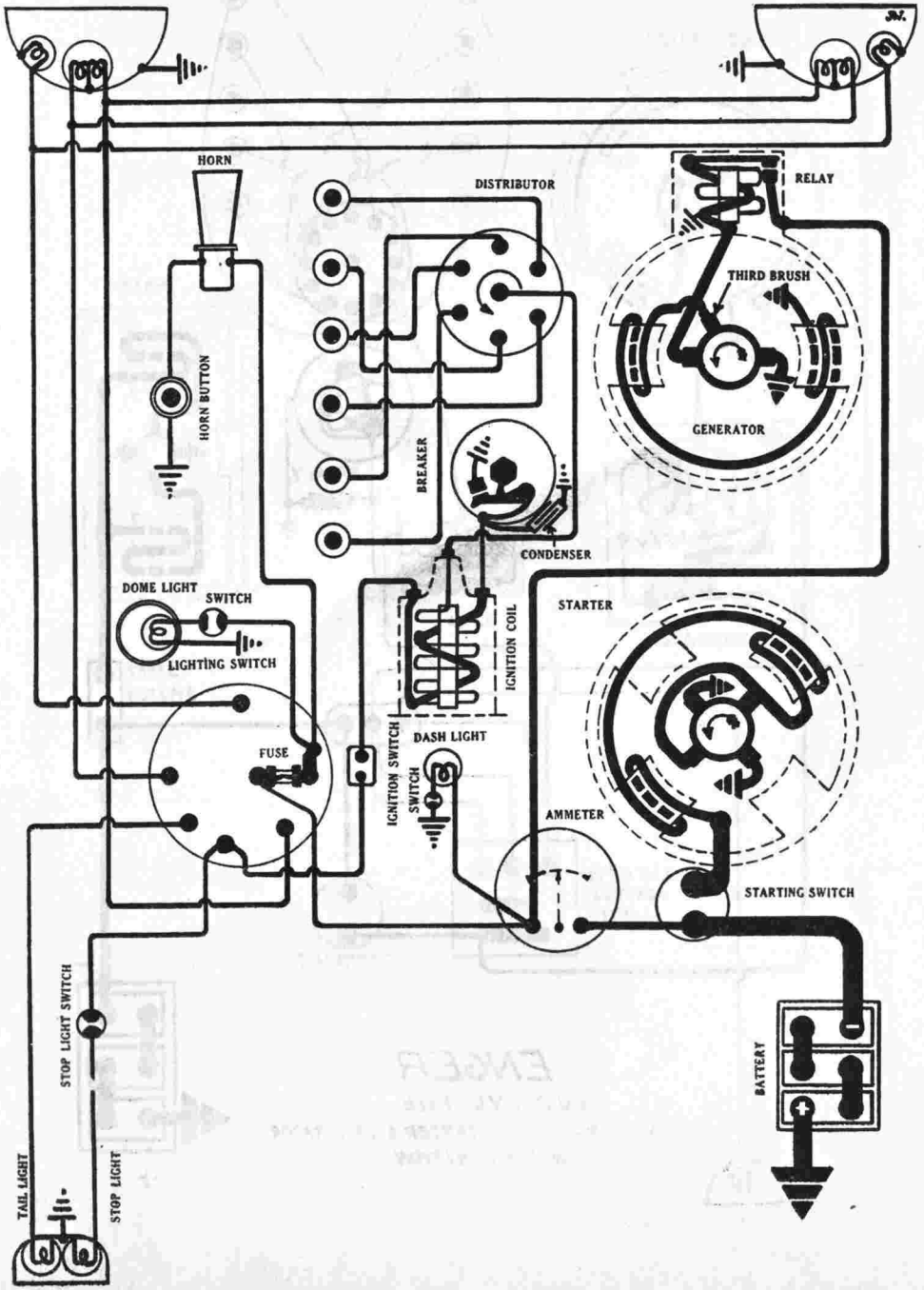
Valve Timing:—INLET VALVES:—Head diameter, 1 3/8 inches; stem diameter, 5/16 inch; tappet clearance, .006 inch (hot). Inlet opens at top dead center and closes 40° after lower dead center.
EXHAUST VALVES:—Head diameter, 1 1/4 inches; stem diameter, 5/16 inch; tappet clearance, .006 inch (hot). Exhaust opens at 40° before lower dead center and closes 7° after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

STARTER:—Model 712-G. Starter is connected to the engine through a Bendix outboard drive Type R-11-X. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine taking 175 amperes at 4.5 volts. Starter brush tension is 28-31 ounces. Starting switch is Model 405-C.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	70
11 "	Lock	3.6	450

Mounting:—Starter is mounted on right of engine by modified flange mounting. To remove starter, disconnect starter cable. Then remove three flange mounting screws and slide starter forward from place.



ERSKINE SIX

1927

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

Oiling:—Put 8 or 10 drops of light engine oil in the commutator end bearing of the starter every month or each 1000 miles. The drive end bearing is oilless and requires no attention.

GENERATOR:—Model 942-B. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove commutator cover band and loosen small round headed screw on generator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Maximum charging rate is 16 amperes (cold) at 8.5 volts reached at 1600 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
16	8.5	1600	11-13	7.5	1850

Generator brush tension is 16-18 ounces each. Running as a motor, generator draws 5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts.

Mounting:—Generator is mounted at right of engine by special flange mounting. To remove generator, remove distributor or disconnect all distributor lines. Then loosen chain adjustment set screw and remove two flange mounting screws. Slide generator to rear, being careful not to let timing chain slip off drive sprocket, as this will disturb valve timing.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles. The drive end bearing is oiled by splash from the chain case.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay closes when the voltage of the generator reaches 6.75-7.5 volts with a maximum charging current of 3 amperes and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch, contacts closed. Set contact opening by bending brass stop over relay armature. To set air gap, loosen two screws at base of relay armature and insert feeler gauge between core and armature to secure proper gap. Then close contacts by hand and tighten the two screws.

LIGHTING:—Briggs & Stratton Lighting Switch. Head lamps are 6-8 volt, 21 cp double filament using Tilt-ray system for dimming. Side lamps are 6-8 volt, 3 cp. S.C. Dash and tail lamps are each 6-8 volt, 3 cp. S.C. Stop lamp is 6-8 volt, 15 cp. S.C. Dome lamp is 6-8 volt, 3 cp. S.C.

FUSES:—Lighting fuse on switch is 20 amperes.

ERSKINE SIX

MODEL 51 (1928)

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—Willard, Type WR-13, 6 volt, 13 plate. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Plates are 5¾ inches wide, 4¾ inches high, 3/32 inch thick. Battery is mounted under front floor boards on right frame member.

IGNITION:—Coil Model 525-A. Coil is mounted on the generator. Ignition current is ½-2 amperes at 6 volts with engine running and 4-5 amperes at 6 volts with engine stopped.

Distributor Model 639-R. Breaker contacts separate .020-.025 inch. Adjust contact opening by loosening locknut directly back of stationary contact and turning eccentric adjusting screw to secure proper setting. The stationary contact is mounted on a movable plate and moves so that contact surfaces are always parallel. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 14-16 ounces. Distributor is semi-automatic. Maximum manual advance is 15° (engine). Automatic advance starts at 600 R.P.M. of engine. Maximum automatic advance is 24° reached at 3100 R.P.M.

Mounting:—Distributor is mounted on the rear of the generator at the right of the engine. To remove distributor, disconnect manual advance rod and primary lead and remove head with high tension cables intact. Then loosen the clamp screw in the distributor shaft housing and lift the distributor from place.

Oiling:—Fill the grease cup on the side of the shaft with medium cup grease and turn down two turns every 1000 miles. At the same time remove the distributor head and rotor and put 4 or 5 drops of light oil in the wick oiler in the center of the distributor shaft.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 7½ degrees after top dead center measured on the flywheel with manual spark lever fully retarded. To set timing, crank engine until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Continue to crank engine until piston reaches top dead center. This can be determined by removing plug in cylinder head directly over piston No. 6. and inserting rod or long wire to gauge piston travel. Piston No. 6 and No. 1 reach top dead center at the same instant. Then advance spark lever exactly one half. Breaker contacts should begin to separate at this point. If they do not, loosen clamp screw in advance arm and rotate distributor until contacts separate. Tighten the clamp screw. Connect the segment directly opposite rotor to spark plug in cylinder No. 1 and connect remaining plugs in order 5-3-6-2-4 counter-clockwise around the distributor head.

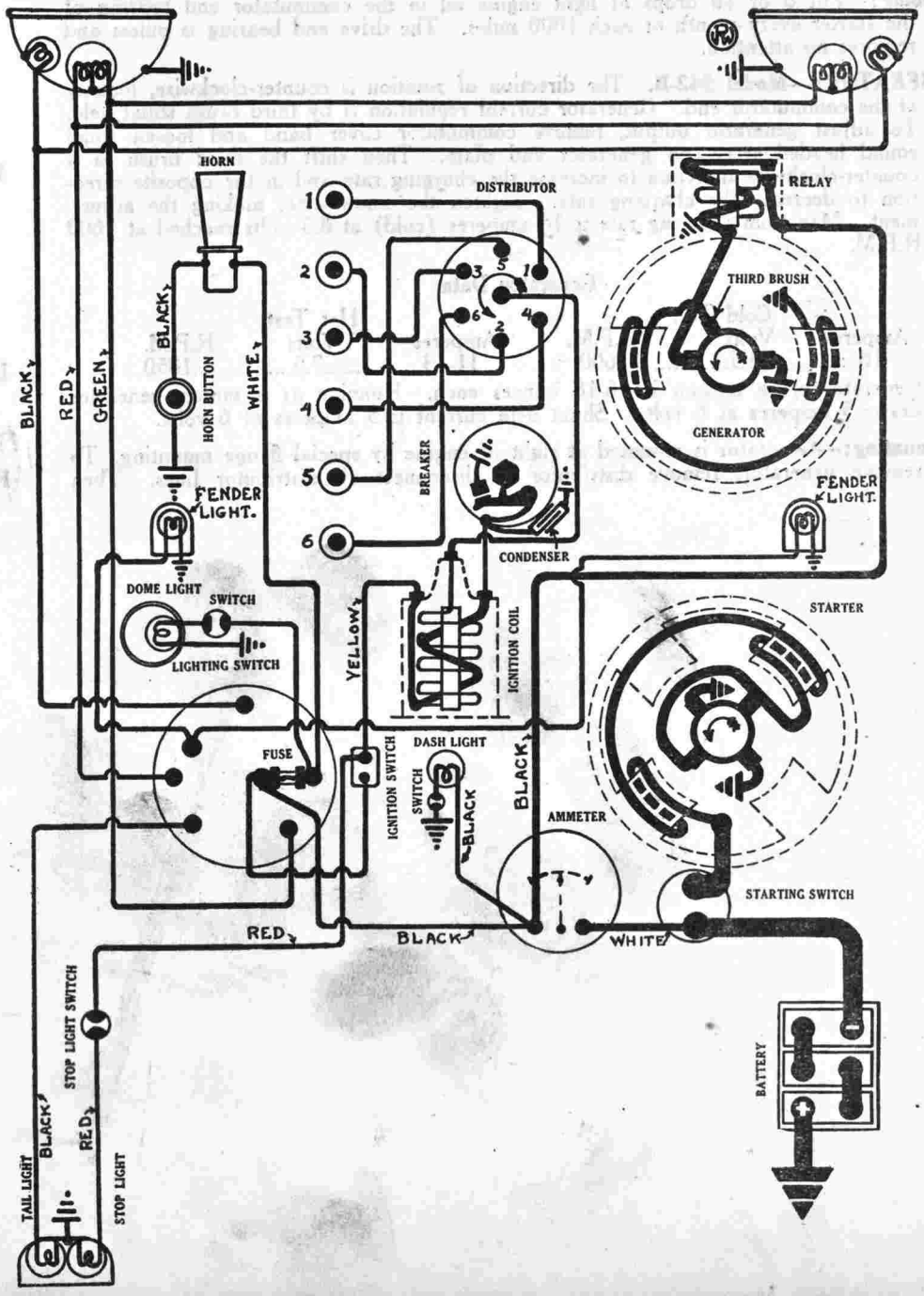
Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are .025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1⅜ inches; stem diameter, 5/16 inch; valve lift, 5/16 inch. Tappet clearance, .006 inch (hot). Inlet valves open 5° after top dead center and close 40° after lower dead center.

EXHAUST VALVES:—Head diameter, 1¼ inches; stem diameter, 5/16 inch; valve lift, 5/16 inch. Tappet clearance, .006 inch (hot). Exhaust valves open 45° before lower dead center and close 12° after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

STARTER:—Model 712-H. Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine drawing 305 amperes at 4.5 volts. Brush spring tension is 20-28 ounces.



ERSKINE SIX

MODEL 51 (1928)
SERIAL NUMBERS 5,025,001 UP
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
11 "	Lock	3.6	450

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove one bolt and two flange mounting cap screws. Then pull starter forward and lift from place.

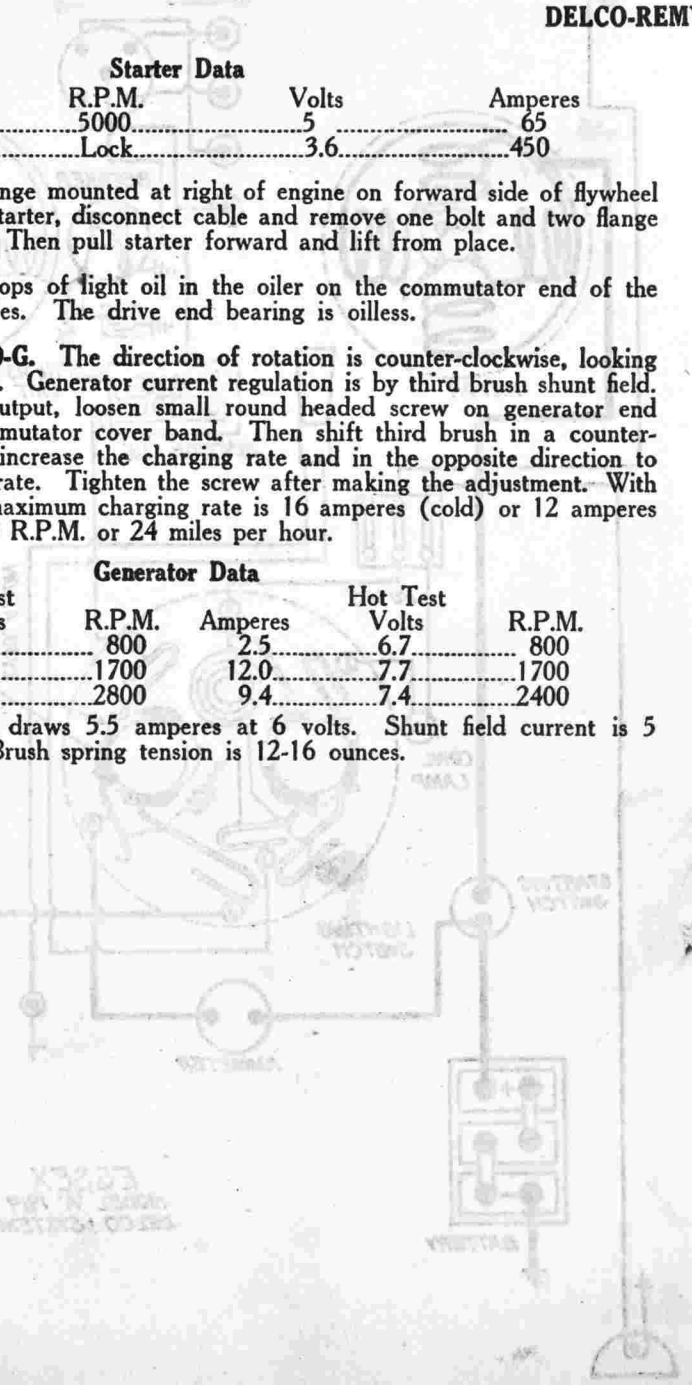
Oiling:—Put 8 or 10 drops of light oil in the oiler on the commutator end of the starter every 1000 miles. The drive end bearing is oilless.

GENERATOR:—Model 940-G. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen small round headed screw on generator end plate and remove commutator cover band. Then shift third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, maximum charging rate is 16 amperes (cold) or 12 amperes (hot) reached at 1700 R.P.M. or 24 miles per hour.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
6	7.0	800	2.5	6.7	800
15.5	8.0	1700	12.0	7.7	1700
10	7.4	2800	9.4	7.4	2400

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 12-16 ounces.



Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect all ignition wiring or remove distributor and coil. Then back off chain adjustment screw and remove two flange mounting cap screws. Pull generator to rear, being careful not to disturb timing chain mesh on sprockets.

Adjustment of Timing Chain Tension:—Timing Chain tension is adjusted by shifting generator around lower flange mounting cap screw as a pivot. To adjust chain, loosen both flange mounting cap screws and turn up on adjusting screw until chain begins to hum with engine running. Then back off adjusting screw until chain runs noiselessly and tighten flange cap screws. Be careful not to get the chain too tight. With proper tension the chain will run without noise.

Oiling:—Put 8 or 10 drops of light oil in the oiler on the commutator end of the generator every 1000 miles. The drive end bearing is oiled by splash from the chain case.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay closes at 12 M.P.H. or 800 R.P.M. when the generator voltage reaches 7-7.5 volts and opens at 9 M.P.H. or 600 R.P.M. with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 3 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Delco-Remy Switch, Model 484-E. Switch is mounted on lower end of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament, double contact base using second filament instead of dimming) Mazda No. 1110. Parking lights (in head lamps) are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop and dome lights are each 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Lighting fuse on front of dash is 20 amperes capacity.

Essex

Model A (1918-19) (Serial Nos. for 1918, A-5000 to A-39999)

Delco Generating, Starting and Lighting System
Delco Ignition

Battery.—The battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded

Ignition.—Breaker contacts should separate .018 inch. They are made of tungsten They will operate properly even though very irregular, due to the fact that the rough sur.faces fit each other perfectly. Their natural color is dark gray, not silver. Should they become badly burned or pitted, affecting the ignition, remove and resurface them by drawing across a piece of fine emery cloth laid on a flat surface, as on the bed of a drill press, finishing on a very hard oil stone. Clean all oil from contacts before again putting into service. Spark control is both manual and automatic.

Timing.—Breaker cam should be so set that when the marking "A-1" appears at the pointer on the flywheel housing, the contacts will just open when the slack in the distributor driving gears is rocked forward, and will again close when the unit is rocked backward, with the spark control lever and breaker assembly in the fully advanced position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—The spark plug gaps should be .030 inch.

Oiling.—The distributor rotor button and the track which it follows, if not well polished, should be lubricated with a very small amount of vaseline. Apply 2 or 3 drops of light engine oil to the upper ball bearing of the distributor shaft every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles. Repack the distributor housing with soft cup grease every six months.

Starter.—The starting motor engages the flywheel through a Bendix drive. The motor circuit is completed by means of a switch located in the toe board. Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current.

Oiling.—Every two weeks put 4 or 5 drops of light engine oil in the oiler at the commutator end bearing. At the same time put 8 or 10 drops in the oiler on the rear end of the motor which supplies lubrication to the armature and starting gear bearings.

Generator.—Generator current regulation is by third brush method. Normal maximum output is 14-16 amperes at 20-25 miles per hour. Charging rate is adjustable by loosening the three screws which hold the bearing retainer plate in place on the commutator end. To increase charging rate, move the third brush in a counter-clockwise direction (when facing the commtuator end), and in a clockwise direction to reduce the charging rate. The brush must be reseated after adjusting position.

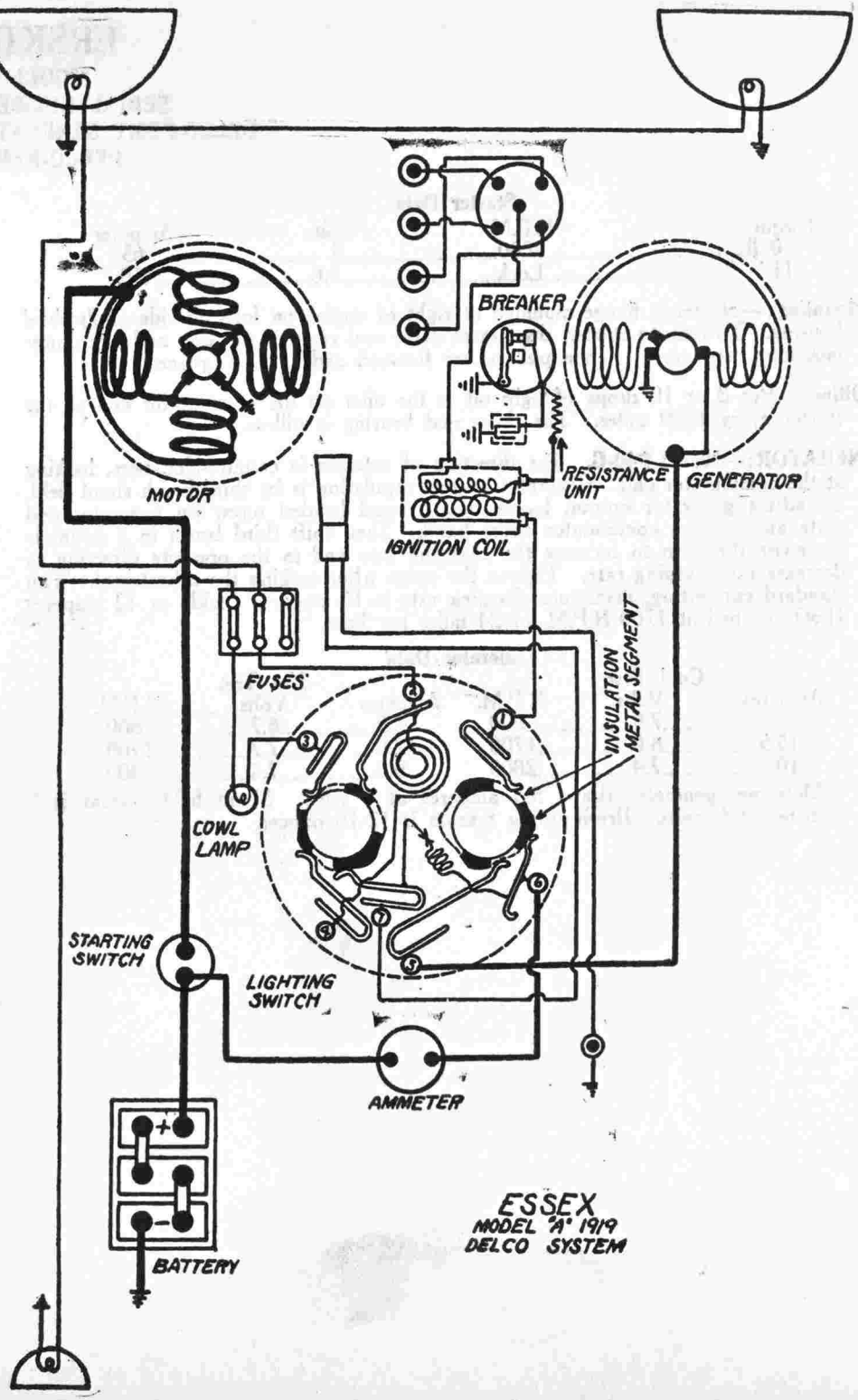
Oiling.—Every two weeks put 4 or 5 drops of light engine oil in each of the generator oilers. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

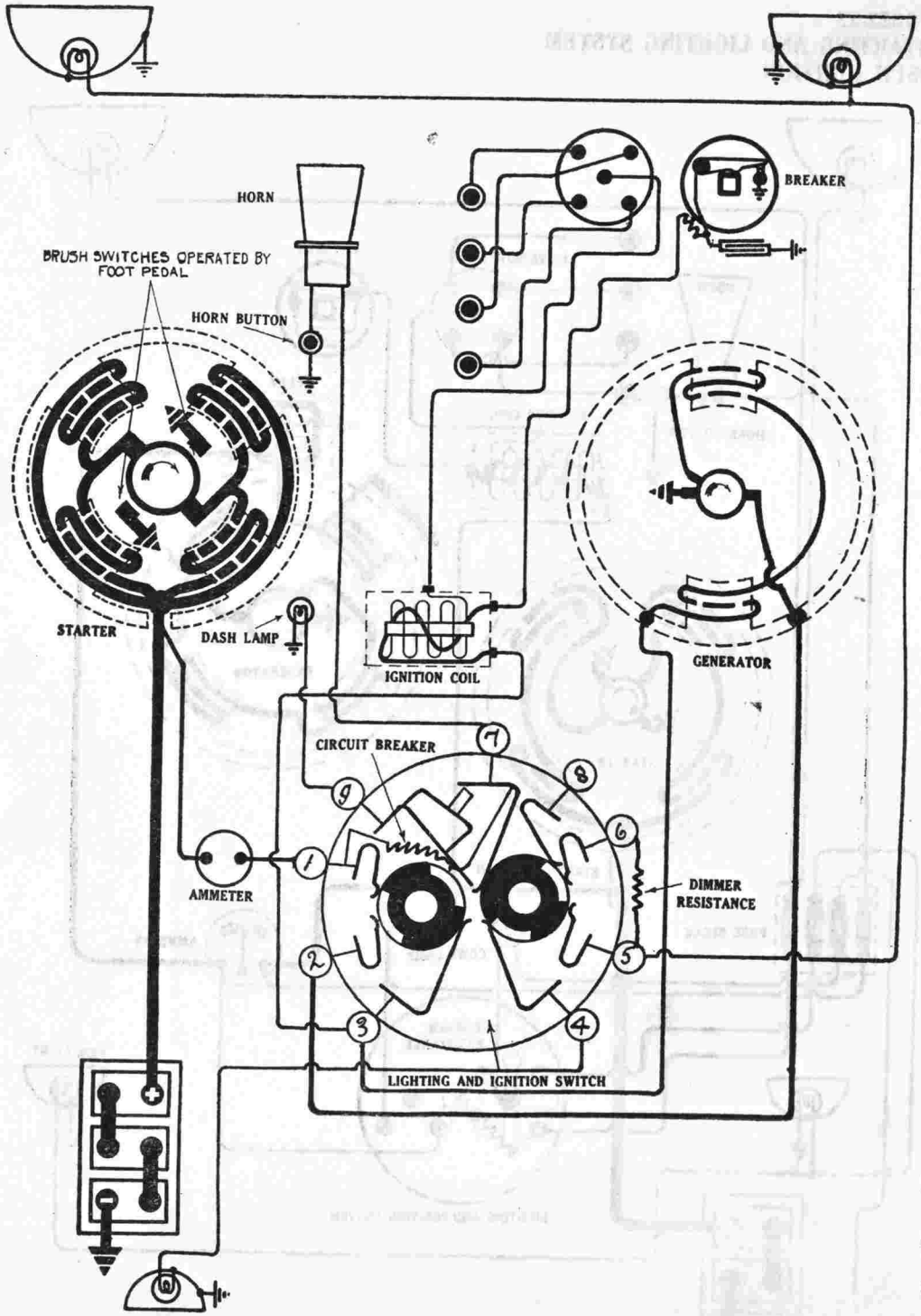
Relay.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

Lamps.—Head lamps are 6-8 volt, 22 cp. Dash and tail lamps are in series and are each 3-4 volt, 2 cp.

Circuit Breaker.—There is a vibrating circuit breaker to take the place of fuses in the lighting circuit. It should take about 25 amperes to start the device vibrating, but a current of 3 to 5 amperes will cause is to continue vibrating.

Model Numbers.—Starter is No. 130 or No. 161. Generator is No. 133 or No. 166 Combination switch is No. 1130. Ignition coil is No. 2127. Distributor is No. 5193





ESSEX

MODEL A (1920-21-22)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY:—(1921) Exide, Type XC-15-1, 6 volt 105 ampere hour **(1922) Exide Type XC-13-1,** 6 volt, 90 ampere hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2127. Distributor Model No, 5222. Breaker contacts separate .020 to .0275 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 2 or 3 drops of light engine oil in the upper ball bearing of the distributor shaft every two weeks. If the track of the rotor button in the distributor shaft is not well polished, apply a small amount of vaseline with a soft cloth. Clean out and repack the distributor housing with soft cup grease every six months.

TIMING.—Breaker contacts begin to separate when the flywheel marking "DC 1 & 4" is at the indicator, spark control lever and breaker assembly in the fully advanced position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model No. 161. Starter is connected to the engine through a set of reduction gears. The raising and lowering of the two grounded starter brushes serves as a starting switch. Starter cranks the engine at 120 R.P.M., taking 150 amperes. Lock torque is 10.4 pound-feet, current being 780 amperes at 2.86 volts.

OILING.—Put 4 or 5 drops of light engine oil in the oiler at the commutator end and 8 to 10 drops in the oiler at the opposite end every two weeks.

GENERATOR.—Model No. 166. Generator current regulation is by third brush system. Maximum current output is 12-16 amperes, reached at 20 miles per hour or 1400 R.P.M. of the armature. Generator begins to supply current at 7 miles per hour.

Amperes	Generator Data	R.P.M.
2		600
12-16		1400
12-16		1600
8		2400

Charging rate is varied by adjusting the third brush setting. To move the third brush, loosen the three screws which hold the bearing retainer plate in place on the commutator end. Move the third brush holder in a counter-clockwise direction (looking at the commutator end) to increase the charging rate, and in a clockwise direction to decrease the charging rate. Tighten the holding screws and reseat the brush after adjusting position.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dash and tail lamps are 6-8 volt, 2 cp. On 1921 cars, head lamps are 6-8 volt, 15 cp.

CIRCUIT-BREAKER.—A vibrating circuit-breaker takes the place of fuses. It requires a current of 25 amperes to start the vibrator, but 3-5 amperes will cause it to continue.

ESSEX

MODEL 1922-23
AMERCAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

BATTERY.—Exide, Type 3-DX-13-1, 6 volts, 90 ampere-hour capacity. The starting capacity is 114 amperes for 20 minutes. The lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. TC-Ed. 4. Distributor Model No. T-474. The direction of rotation is clockwise, looking from top of distributor. The distributor is of the compensating type, having automatic advance. The coil is mounted on the engine side of the dash, and is dust and waterproof. It carries the "Ballast Coil", which prevents the battery from discharging if the ignition switch is accidentally left in the "On" position. The timer-distributor is mounted on the right side of the engine on top of the pump and timer bracket. Contact points are made of tungsten and should separate .020 inch. The surface is flat. If the condition of the points affects the ignition, remove and resurface with a flat jeweler's file, or on a medium hard oilstone. If they are excessively worn, replace the points.

Oiling.—Fill the oiler on the side of the distributor housing with light engine oil. Put one drop of oil (less rather than more) on the interrupter lever pivot. Place a bit of hard grease or vaseline, the size of a match head, on the side of the interrupter fibre block nearest to the pivot post. Follow the above instructions every month. If the car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

Timing.—Contact points just begin to separate when the flywheel marking "DC 1 &4" is opposite the indicator on the flywheel housing, with piston No. 1 on compression stroke, and the spark control lever and breaker assembly fully advanced. To adjust timing, place spark control lever and breaker assembly in fully advanced position, loosen clamping screw on timer arm and turn the housing opposite to the direction of rotation (counter-clockwise) of rotor shaft until the points just begin to separate. Tighten the clamping screw, being sure not to disturb the relative position of the timing arm and housing.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plugs.—Spark plug gaps are .030 inch.

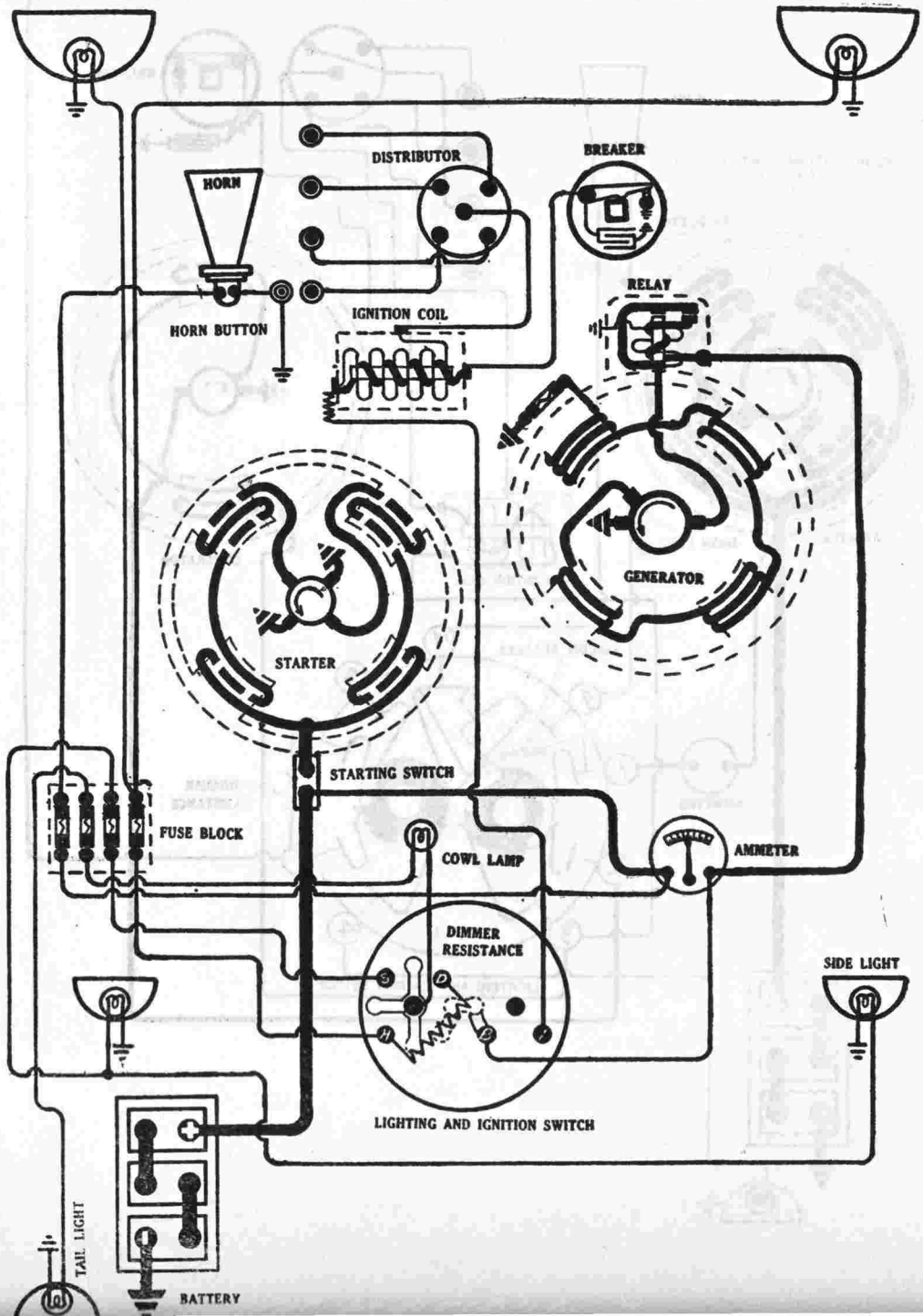
STARTER:—Type 925 or 926. Direction of rotation is counter-clockwise, looking at the commutator end. The starter is of the four pole, series-wound type. The starting mechanism is operated by a foot pedal and over-running clutch.

Starter Test Data

Torque	Amperes	Volts	R.P.M.	H.P.
0.0 lb. ft.	40	5.75	4000	0.0
1.3 lb. ft.	100	5.5	1900	0.4
4.0 lb. ft.	200	5.0	1000	0.725
5.0 lb. ft.	235	4.8	850	0.74
6.9 lb. ft.	300	4.5	550	0.68
10.0 lb. ft.	400	4.0	250	0.40
13.3 lb. ft.	490 (Lock)	3.8	0 (Lock)	0.00

Oiling.—Some starters are equipped with oilless bearings and no oiling is necessary. To clean commutator, wipe off with a clean cloth slightly moistened with gasoline. Be sure to wipe dry before operating. On starters equipped with oilers, put 3 or 4 drops of light engine oil in each oiler every 500 miles or each week.

GENERATOR:—Type 1217 or 1238. Direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. The charging rate is varied by loosening the screws on the commutator end plate and moving the third brush in the direction of rotation (counter-clockwise) to increase the output; and against the direction of rotation (clockwise) to decrease the charging rate. The maximum charging rate is 14-15 amperes at 8 volts, reached at 1100 R.P.M. of armature.



ESSEX

MODEL 1922-1923
AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

Generator Test Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0.0	7.0	400	0.0	6.8	450
8.0	7.4	600	4.0	7.2	600
12.0	7.8	800	7.5	7.5	800
14.3 (Max.)	8.0	1100	10.3 (Max.)	7.6	1200
10.6	8.0	2000	8.5	7.7	2000
7.8	7.6	3000	6.2	7.2	3000

Field Test (Cold)

R.P.M.	600	1200	1600	2000	3000
Amperes	2.9	2.1	1.6	1.3	0.7

Oiling.—See that the commutator is not dirty or pitted. Clean by holding a piece of clean cloth, slightly moistened with gasoline, against it. Wipe dry before operating. If the commutator is rough or slightly pitted, smooth it by using fine (No. 00) sandpaper. Brush surface must conform to the curvature of the armature. Put 4 or 5 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—The relay is mounted on top of the generator frame and is enclosed in a metal case. The contact gap separates .015 inch, and the air gap between relay armature and coil core is .010 inch. To adjust the relay for the proper cut in current, connect a voltmeter across the main brushes and gradually speed up the generator. Observe the voltmeter reading when contact is closed; it should read 6.5-7.5 volts. The points should open at 0-2 amperes discharge. Connect an ammeter in series with battery and gradually slow generator down. The contacts should open at the readings given above. Adjust by loosening or tightening the adjusting screw on the side of the relay. Be sure to resolder the screw after an adjustment, so as to eliminate the possibility of the screw becoming loose and changing the tension. Clean the contacts by drawing fine sandpaper between them.

LIGHTING.—Combination Switch Type S-106 is used. The switch is supplied with two face levers; one for the controling of the lighting system and the other for operating the ignition system. The terminals on the back of the switch are marked for proper connection of wires. Head lights are 6-8 volts, 21 cp., S.C. Dimmer lamps are 6-8 volts, 4 cp., S.C. Tail and dash lamps are 3-4 volts, 2 cp., S.C.

FUSES.—Fuse Box Type FB-10 is used. It is mounted on the engine side of the dash and carries all fuses in connection with the system, except the generator fuse. Two spare fuses are supplied. All fuses are 10 amperes, and the generator fuse is **5** amperes. Generator fuse is mounted on top of generator.

ESSEX

MODEL 1924-1925
AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

BATTERY:—Prest-O-Lite, Type 613-JFK. 6 volt, 85 ampere hour. The starting capacity is 102 amperes for 20 minutes. The lighting capacity is 5 amperes for 17 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. TC-30. Distributor Model T-6200. Breaker contacts separate .020 inch. They are made of tungsten. The contact surface of both points should be flat. When the codition of the contacts affects the ignition,resurface them with a fine flat jeweler's file. If the points are excessively worn they should ,be replaced.

Mounting:—Distributor is mounted at right of engine on rear of timing chain case. To remove distributor, disconnect primary lead and manual advance rod and remove head with cables attached. Then loosen clamp screw on housing directly below distributor and lift distributor from place.

Oiling:—Fill the oiler on the side of the disributor housing with light engine oil. Put one drop of oil (never more) on the interrupter lever pivot. Place a small bit of cup grease, about the size of a match head, on the side of the interrupter fibre block nearest the pivot post. These attentions should be given every 1000 miles or each month.

Timing.—Breaker contact points begin to separate when, with piston No.1 on compression stroke, the mark on the flywheel is just opposite the indicator on the flywheel case. To adjust timing, turn engine until this position is reached. Then loosen the clamping nut on the stud just below the distributor and turn the housing in a counter-clockwise direction (opposite to direction of rotation) until the contacts begin to separate. Tighten the nut, being careful not to change the relative positions of the housing and shaft. The distributor is of the full automatic type. No manual advance is provided.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plugs:—Spark plug diameters are metric standard. Gaps are .025 inch.

VALVE TIMING:—Inlet Valves:—Head diameter is 1¼ inches; stem diameter is 5/16 inch; stem length is 5 1/32 inches. Tappet clearance is .002 inch (hot). Inlet valves open 7 degrees after top dead center and close 50 degrees after lower dead center.

Exhaust Valves:—Head diameter is 1¼ inches; stem diameter is 5/16 inch; stem length is 5 1/32 inches. Tappet clearance is .004 inch (hot). Exhaust valves open 55 degrees before lower dead center and close 8 degrees after top dead center.

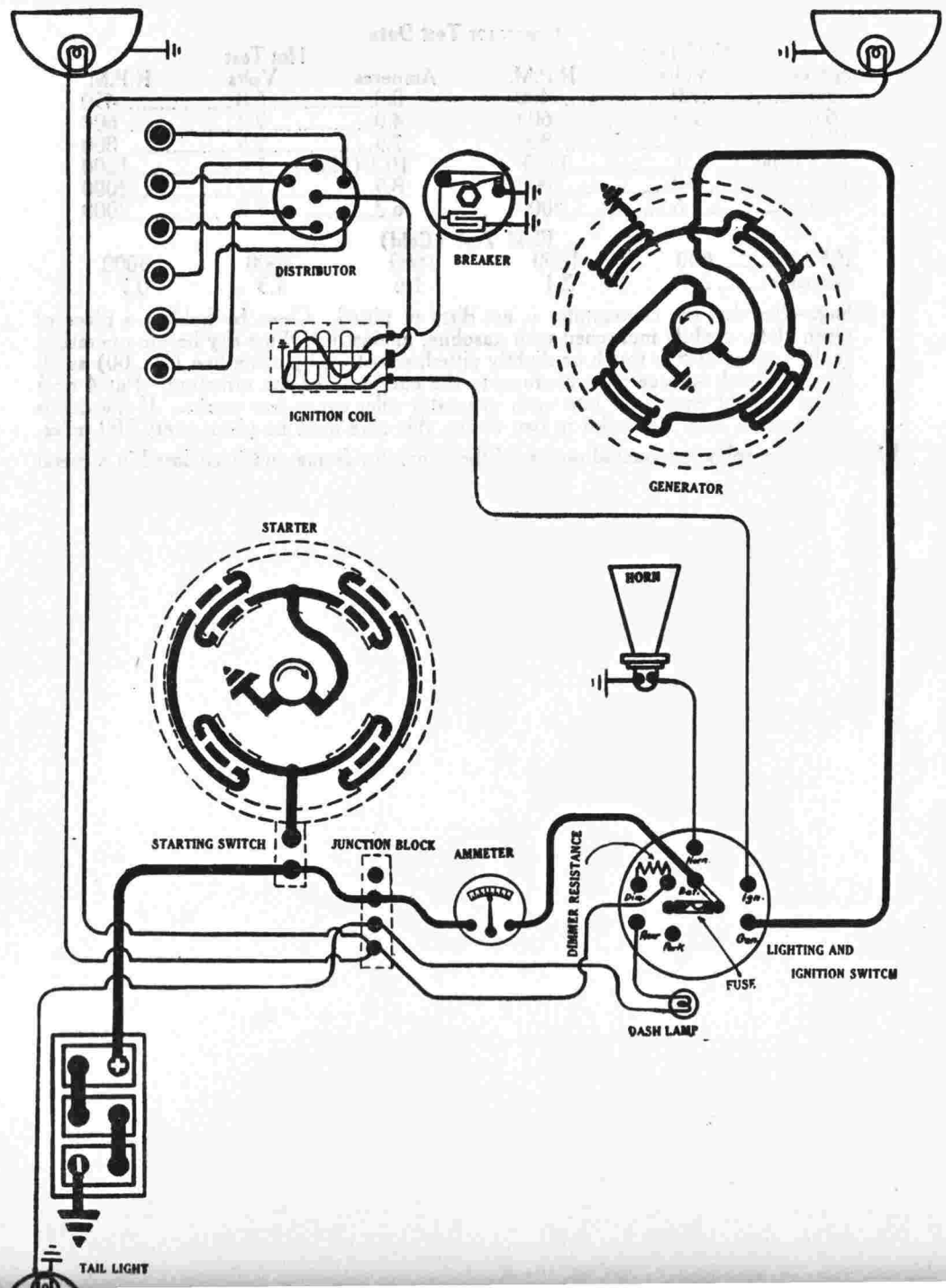
STARTER:—Type 940, 944, 948. The starter is connected to the engine by a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The starter is a four pole, parallel wound machine. Model 940 starter is as shown. Models 944 and 948 have four brushes but are wound as shown.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	6	60
12 lb. ft.	Lock	4	450

The Bendix drive on Starter Models 940 and 944 are identical and may be interchanged. Starter Model 948 has a special type drive which is not interchangeable with the earlier types.

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter disconnect cable and remove flange mounting bolts. Then pull starter forward to free drive pinion and lift from place.



Oiling.—Self-oiling bearings are used. They require no attention. Keep commutator clean and free from oil. Clean commutator by wiping it off with a clean cloth moistened with gasoline. Wipe dry before again using.

GENERATOR.—Type 1043. Generator current regulation is by the third brush system. The direction of rotation is counter-clockwise, looking at the commutator end. The maximum charging rate is 10 amperes (hot) at 8 volts, reached at 1600 R.P.M. of the generator.

Generator Data

Cold Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
0	500	0	600
7	800	4	800
12	1200	8.5	1200
13.5	1600	10	1600
12.8	2000	9.5	2000
9	3000	6.5	3000

To adjust the charging rate, turn the adjusting screw on the outside of the commutator end plate. Turning the screw to the right increases the charging rate and to the left decreases the charging rate.

Mounting:—Generator is base mounted on right of engine and is driven by a flexible coupling from the chain case. To remove generator, disconnect lead and remove mounting screws. Then lift generator from place.

Adjustment of Timing Chain:—To check timing chain, grasp generator drive coupling and rotate armature. There should be approximately 1/8 inch play on circumference of shaft. If play is excessive, loosen three bolts on rear of distributor gear housing and turn flange at forward end of housing away from the engine until excessive play of the chain is removed. Tighten the mounting bolts. Do not remove bolts entirely. If they are removed or if they are out, back off adjustment until the bolts can be inserted through the notch in the flange.

Oiling.—Put two or three drops of light engine oil in each of the generator oilers every 500 miles or each two weeks. See that commutator is clean and free from oil. Clean commutator by wiping it with a clean cloth moistened with gasoline. Wipe dry before again operaing the generator.

RELAY.—No relay is used. The circuit between the generator and the battery is controlled by the ignition switch. Turning off the ignition disconnects the generator and prevents the battery from discharging.

LIGHTING.—Combination Switch Type S-116. Head lamps are 6-8 volt, 21 cp. Dash and tail lamps are connected in series. They are each 3-4 volt, 2 cp.

FUSES.—No generator fuse is used. Lighting fuse is mounted on the back of the switch and is 20 ampere. Two spare fuses are mounted at the bottom of the switch.

ESSEX

MODEL 1925-1926

AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM

AMERICAN BOSCH IGNITION

BATTERY:—Prest-O-Lite, Type 613-JFK, 6 volt, 85 ampere hour. The starting capacity is 102 amperes for 20 minutes. The lighting capacity is 5 amperes for 17 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. TC-30. Distributor Model T-6200. Breaker contacts separate .020 inch. They are made of tungsten. The contact surface of both points should be flat. When the condition of the contacts affects the ignition, resurface them with a fine flat jeweler's file. If the points are excessively worn they should be replaced.

Oiling:—Fill the oiler on the side of the distributor housing with light engine oil. Put one drop of oil (never more) on the interrupter lever pivot. Place a small bit of cup grease, about the size of a match head, on the side of the interrupter fibre block nearest the pivot post. These attentions should be given every 1000 miles or each month.

Timing:—Breaker contact points begin to separate when, with piston No. 1 on compression stroke, the mark on the flywheel is just opposite the indicator on the flywheel case. To adjust timing, turn engine until this position is reached. Then loosen the clamping nut on the stud just below the distributor and turn the housing in a counter-colckwise direction (opposite to direction of rotation) until contacts begin to separate. Tighten the nut, being careful not to change the relative positions of the housing and shaft. The distributor is of the full automatic type. No manual advance is provided.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are metric standard. Gaps are .025 inch.

STARTER:—Model 964. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 1¾ to 2 pounds each.

Starter Data

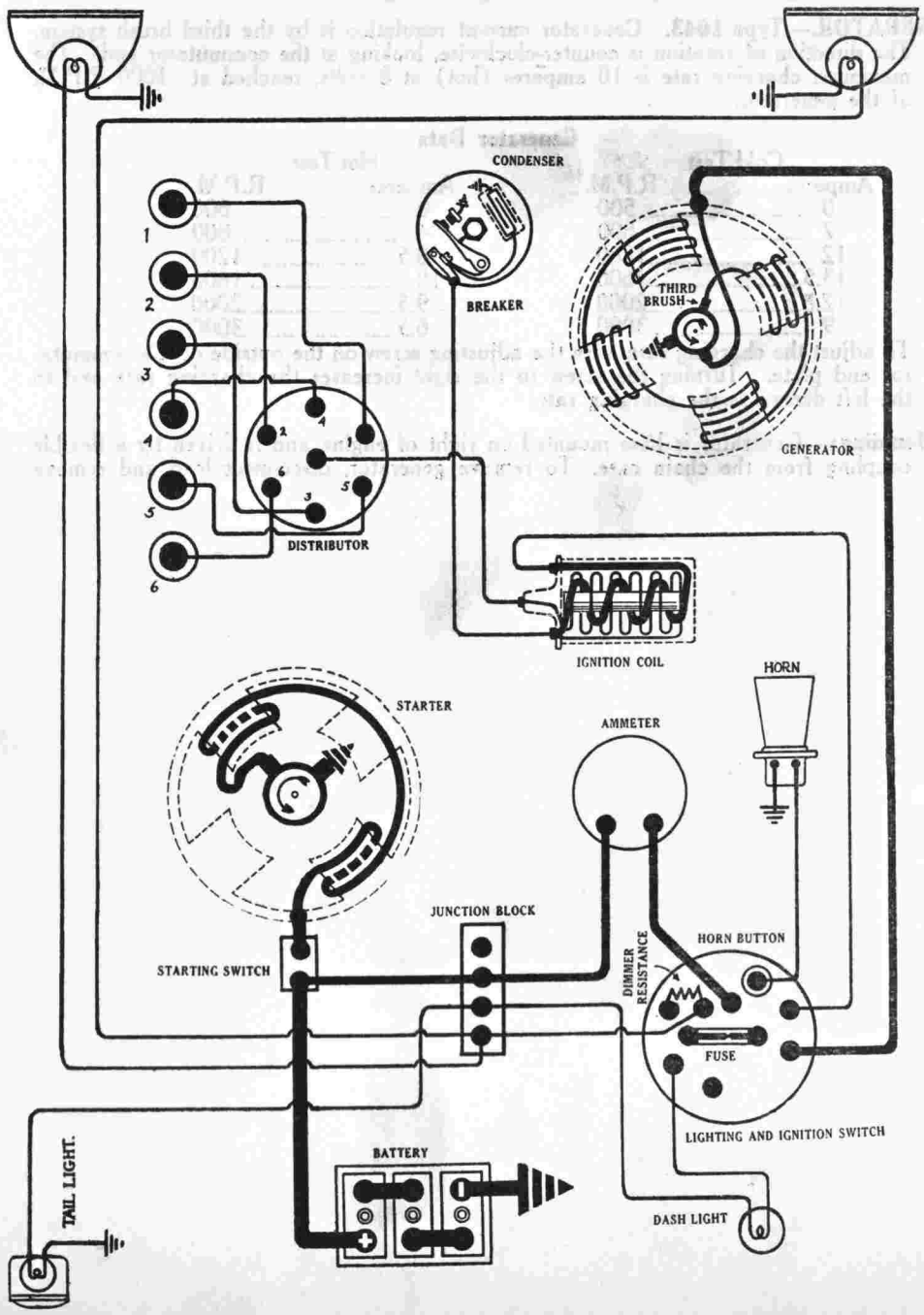
Torque	R.P.M.	Volts	Amperes
0 lb. ft	3000	6	60
12 "	Lock	4	450

Oiling:—Self-oiling bearings are used. They require no attention. Keep commutator clean and free from oil. Clean commutator by wiping it off with a clean cloth moistened with gasoline. Wipe dry before again using.

GENERATOR:—Model 1067. Generator current regulation is by the third brush system. To adjust the charging rate, insert the special Bosch key in the hole on the generator end plate and shift the the third brush mounting plate by turning the key. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. The third brush may be shifted by hand by removing the commutator cover band. The maximum charging rate is 13-14 amperes reached at 1600-1800 R.P.M. of the generator armature. Motoring freely the generator draws 6 amperes at 6 volts. The shunt field current is 3.2 amperes at 6 volts.

Generator Data

Cold Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
0	500	0	600
7	800	4	800
12	1200	8.5	1200
13.5	1600	10	1600
12.8	2000	9.5	2000
9	3000	6.5	3000



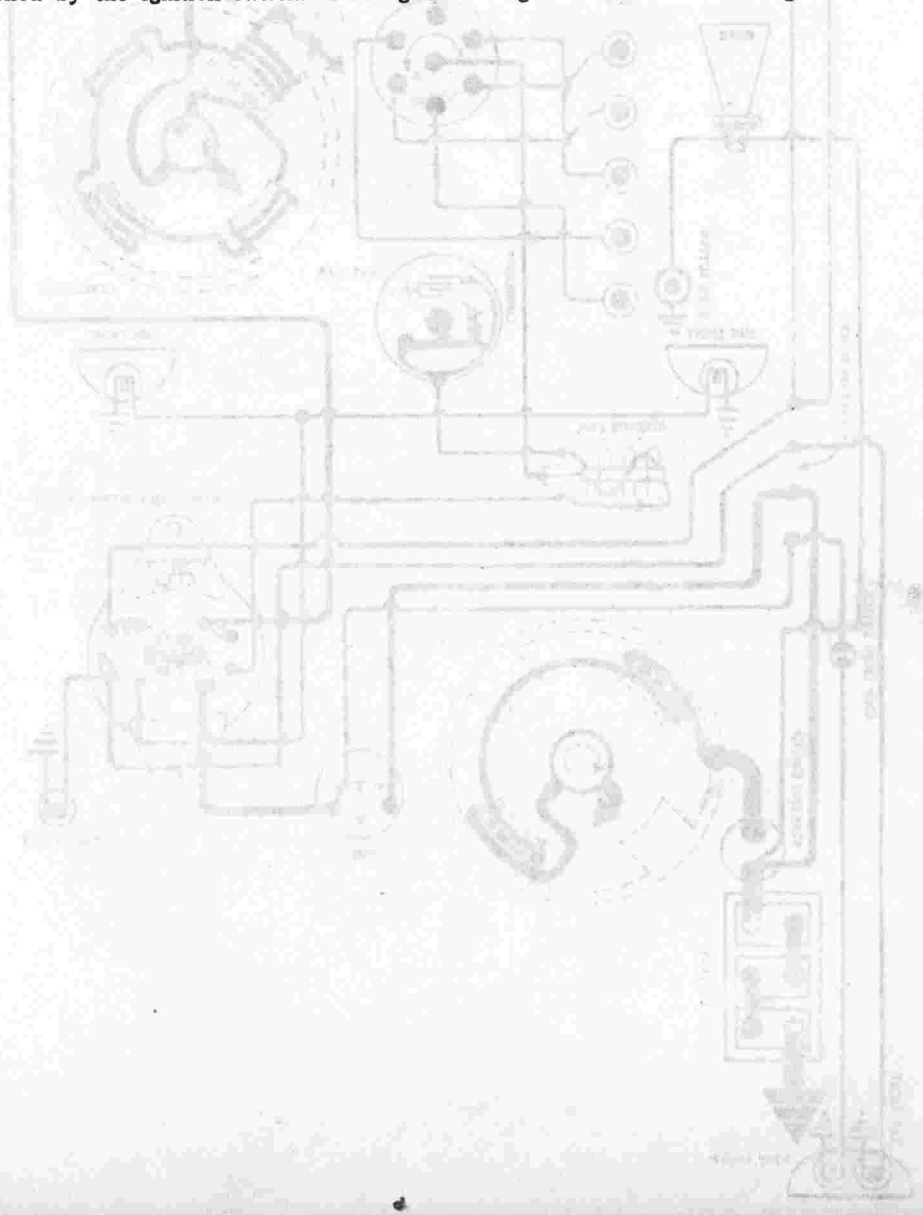
ESSEX

MODEL 1925-26

AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

Oiling:—Put two or three drops of light engine oil in each of the generator oilers every 500 miles or each two weeks. See that commutator is clean and free from oil. Clean commutator by wiping it with a clean cloth moistened with gasoline. Wipe dry before again operating the generator.

RELAY:—No relay is used. The circuit between the generator and the battery is controlled by the ignition switch. Turning off the ignition disconnects the generator and prevents the battery from discharging.



LIGHTING:—**Combination Switch Type S-123.** Head lamps are 6-8 volt, 21 cp. Dash and tail lamps are connected in series. They are each 3-4 volt, 2 cp.

FUSES:—No generator fuse is used. Lighting fuse is mounted on the back of the switch and is 20 ampere. Two spare fuses are mounted at the bottom of switch.

ESSEX

SIX (LATE 1926) (1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

BATTERY:—Prest-O-Lite, Type 6-13-JFK, 6 volt. Starting capacity is 102 amperes for 20 minutes. Lighting capacity is 5 amperes for 17 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model CE-4001. Distributor Model IB-4001. Breaker contacts separate .018-.022 inch. They are made of tungsten. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Distributor is automatic. Advance starts at 500 engine R.P.M. and reaches maximum of 9.6° at 2800 R.P.M.

Oiling:—Put 6 or 8 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Put one drop of light engine oil on the breaker arm pivot pin every week or each 250 miles and place a small bit of vaseline on the face of the breaker cam under the fiber bumper every 5000 miles.

Timing:—Breaker contacts begin to separate when the piston reaches a position two teeth on the flywheel before top dead center. This position is 10 degrees before the top dead center.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are Metric Standard. Gaps are .025 inch.

STARTER:—Model MU-4001A. Starter is connected to the engine through a special Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension is 1¾-2¼ pounds each. Starter cranks the engine at 125 R.P.M., taking 150 amperes at 5.6 volts.

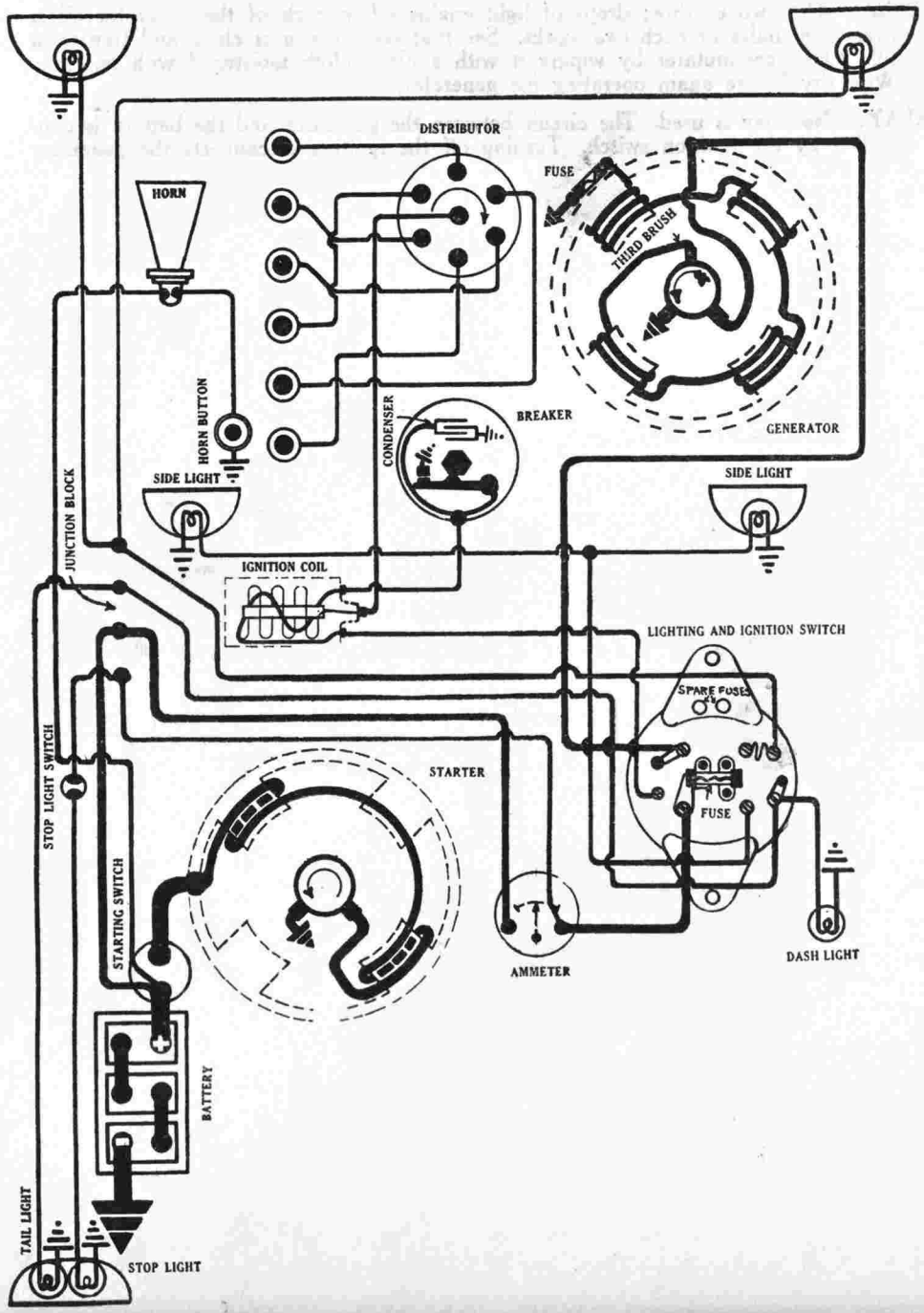
Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	6	50
2 "	1500	5.2	160
4 "	900	4.8	240
6 "	450	4.4	320
10 "	Lock	3.6	500

Starter switch model is MU-2208.

Oiling:—Starter bearings are oilless graphite-bronze. They require no attention.

GENERATOR:—Model GAA-4001. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust charging rate, remove the commutator cover band and shift the third brush mounting bracket by tapping on the mounting lug with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The mounting bracket is held in any desired position by friction between the mounting lug and the generator end plate. The maximum charging rate of 12.5 amperes is reached at 1450 R.P.M. of the generator.



ESSEX

SIX (LATE 1926) (1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

Generator Data

	Cold Test (68°F)		Hot Test (203° F)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
2	6.9	470	2	7.0	680
6	7.3	815	6	7.4	880
10	7.5	1080	10	7.5	1500
12.5	7.5	1450	9	7.4	2250
10	7.5	2380			

Motoring freely at 350-405 R.P.M. generator draws 4.5-4.6 amperes at 6.0 volts.

Shuntfield test current is 3.5-4 amperes at 6 volts. Each coil when tested separately draws 14-16 amperes at 6 volts. Generator brush tension is 1½-1¾ pounds each.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—No relay is used. The generator is connected directly to the battery through the ignition switch when the ignition is "on." With engine off and ignition switch open the generating circuit is broken up, preventing the battery discharging through the generator windings.

LIGHTING:—Clum Switch Model 10643. Auto-Lite No. XA-319. Head and stop lamps are each 6-8 volt, 21 cp. S. C. Side, dash and tail lamps are each 6-8 volt, 3 cp. S. C.

FUSES:—Lighting fuse mounted on switch is 20 amperes.

ESSEX

SUPER SIX (LATE 1927)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—Prest-O-Lite, Type 6-13-JFK, 6 volt. Starting capacity is 102 amperes for 20 minutes. Lighting capacity is 5 amperes for 17 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model CE-4001. Distributor Model IBA-4001. Breaker contacts separate .018-.022 inch. They are made of tungsten. Resurface contacts with a fine flat jeweler's file or on a medium hard oilstone. Distributor is of the full automatic type. No manual advance is provided. Automatic advance begins at 400 R.P.M. (engine). Advance at 2800 R.P.M. (engine) is 10° (engine) increasing to 12° at 4000 R.P.M. Breaker arm spring tension is 24 ounces.

Oiling:—Put 6 or 8 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Put one drop of light engine oil on the breaker arm pivot pin every week or each 250 miles and place a small bit of vaseline on the face of the breaker cam under the fiber bumper every 5000 miles.

Timing:—Breaker contacts begin to separate when the piston reaches a position two teeth on flywheel before top dead center. This position is 10 degrees before the top dead center.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are Metric Standard. Gaps are .025 inch.

STARTER:—Model MZ-4005. Starter is connected to the engine through an inboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 2½-3 pounds each.

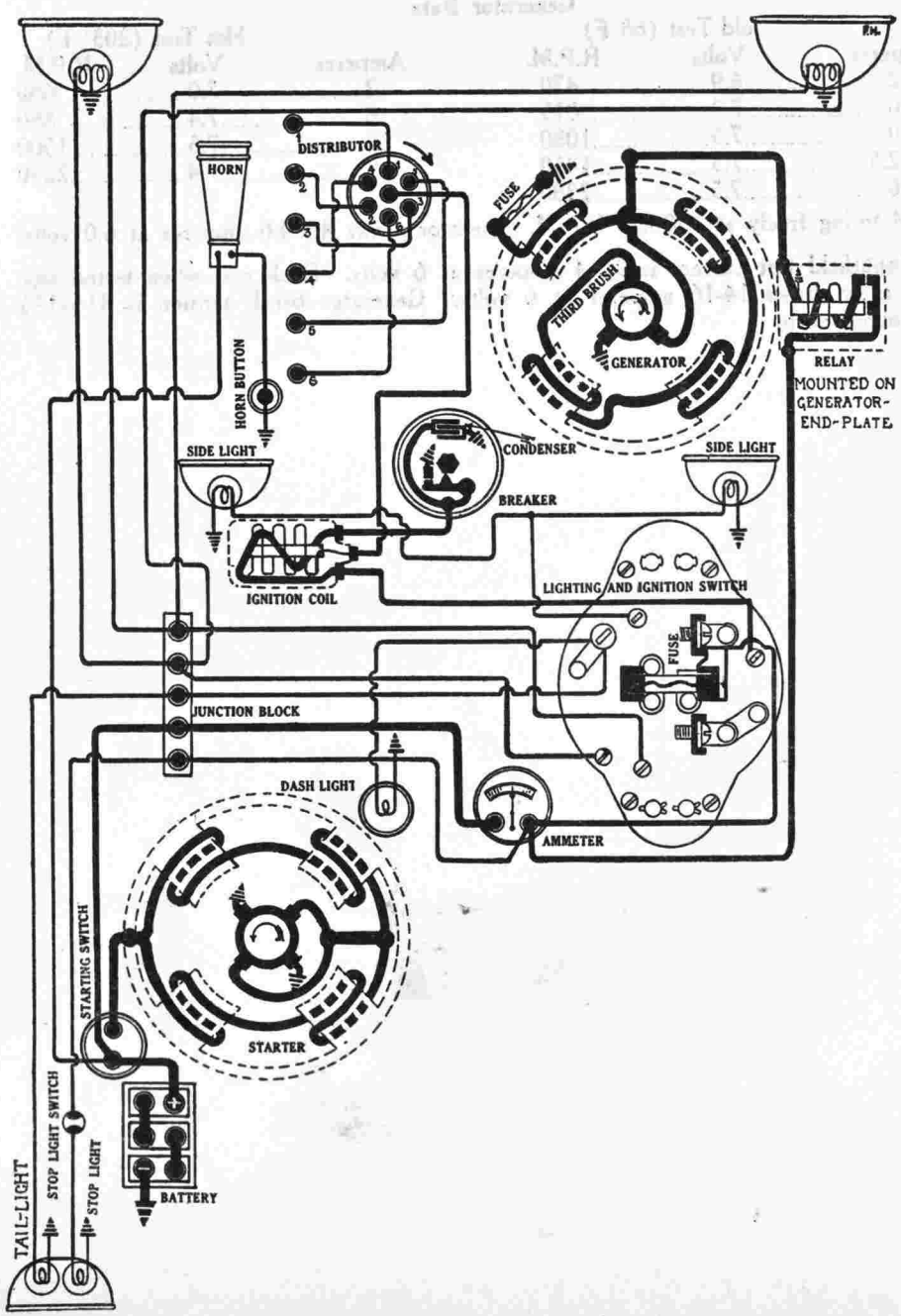
Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	
1.5 "	1800	5.2	150
2.5 "	1325	5.0	200
5.0 "	740	4.5	300
7.6 "	220	4.0	400
12.2 "	Lock	4.0	550

Mounting:—Starter is mounted by special flange at left of engine on forward side of flywheel case. To remove starter, disconenct starter cable, horn wire and wire to junction block. Then remove three flange mounting screws and pull starter forward from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GAA-4005. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust the charging rate, remove the commutator cover band and shift the third brush by tapping on the mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The mounting bracket is held in any position by friction between the mounting lug and the endplate. The maximum charging rate is 12 amperes (cold) at 8 volts which is reached at 1450 R.P.M.



ESSEX

SUPER SIX (LATE 1927)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

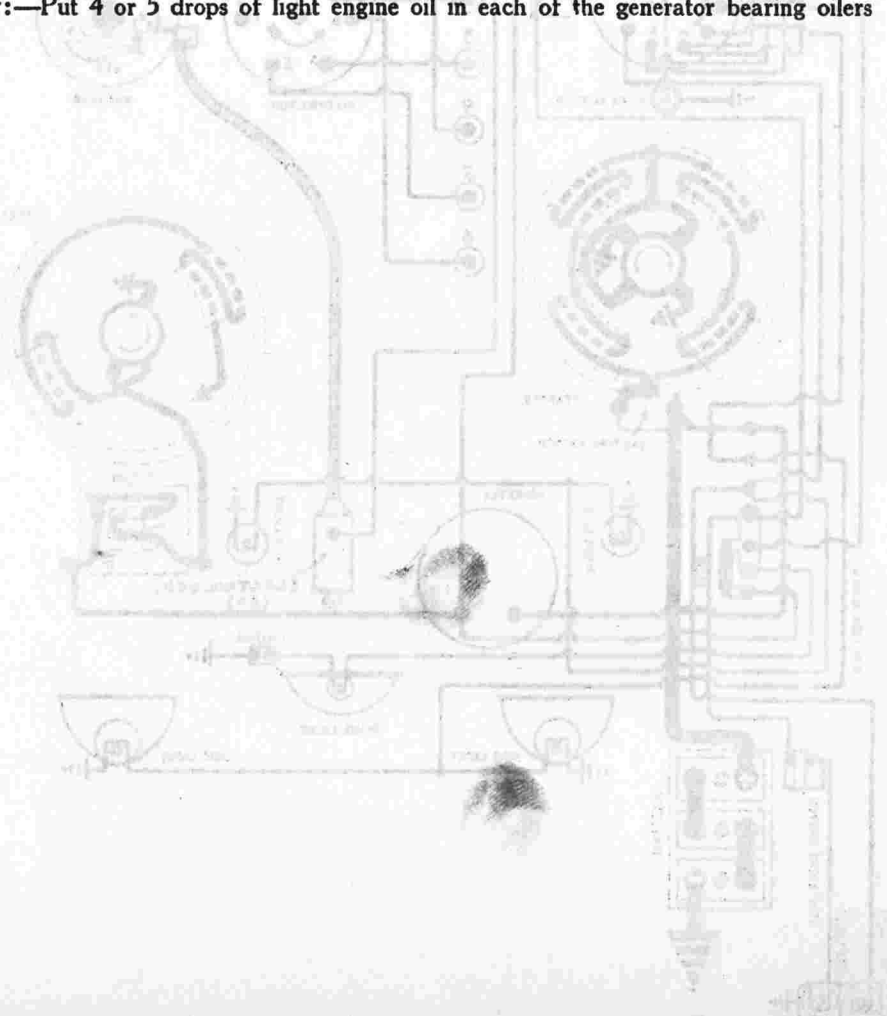
Generator Data

Cold Test (68°F.)			Hot Test (203°F.)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
2	6.6	675	2	7.0	680
6	7.3	815	6	7.4	880
10	7.5	1080	10	7.5	1500
12	8.0	1450	9	7.4	2250
10	7.5	2380			

Shunt field current is 3.5-4 amperes at 6 volts. Running as a motor, generator draws 4.6-5 amperes at 6 volts. Brush spring tension is 1½-2 pounds each.

Mounting:—Generator is cradle mounted at right of engine. To remove generator, disconnect generator wire and loosen mounting strap. Then disconnect flexible coupling and lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.



RELAY:—Model CB-4015. Relay is mounted on a special bracket riveted to the generator endplate. Relay closes at 675 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Clum Switch Model 10643. Auto-Lite No. XA-319. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Side, dash and tail lamps are each 6-8 volt, 3 cp. S.C. Stop lamp is 6-8 volt, 21 cp. S.C.

FUSES:—Lighting fuse on switch is 20 amperes. Two spare fuses are provided. Generator field fuse mounted on frame is 5 amperes.

ESSEX

AFTER MOTOR NO. 901906
Production Started June 1st, 1928
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—Prest-O-Lite. Type 6-13-JFK. Starting capacity (20 minute rate) is 102 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model CE-4001. Distributor Model IGB-4014. Breaker contacts separate .018-.022 inch. They are made of tungsten. Resurface contacts with a fine flat jeweler's file or on a medium hard oilstone. Distributor is of the full automatic type. No manual advance is provided. Automatic advance begins at 400 R.P.M. (engine). Advance at 2800 R.P.M. (engine) is 10 degrees (engine) increasing to 12 degrees at 4000 R.P.M. Breaker arm spring tension is 24 ounces.

Oiling:—Put 6 or 8 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Put one drop of light engine oil on the breaker arm pivot pin every week or each 250 miles and place a small bit of vaseline on the face of the breaker cam under the fiber bumper every 5000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center. To set timing, crank engine until piston No. 1 reaches this position. The D.C. mark on the flywheel will be opposite the lower edge of the motor support.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are Metric Standard. Gaps are .025 inch.

STARTER:—Model MZ-4005. Starter is connected to the engine through an inboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 2½-3 pounds each.

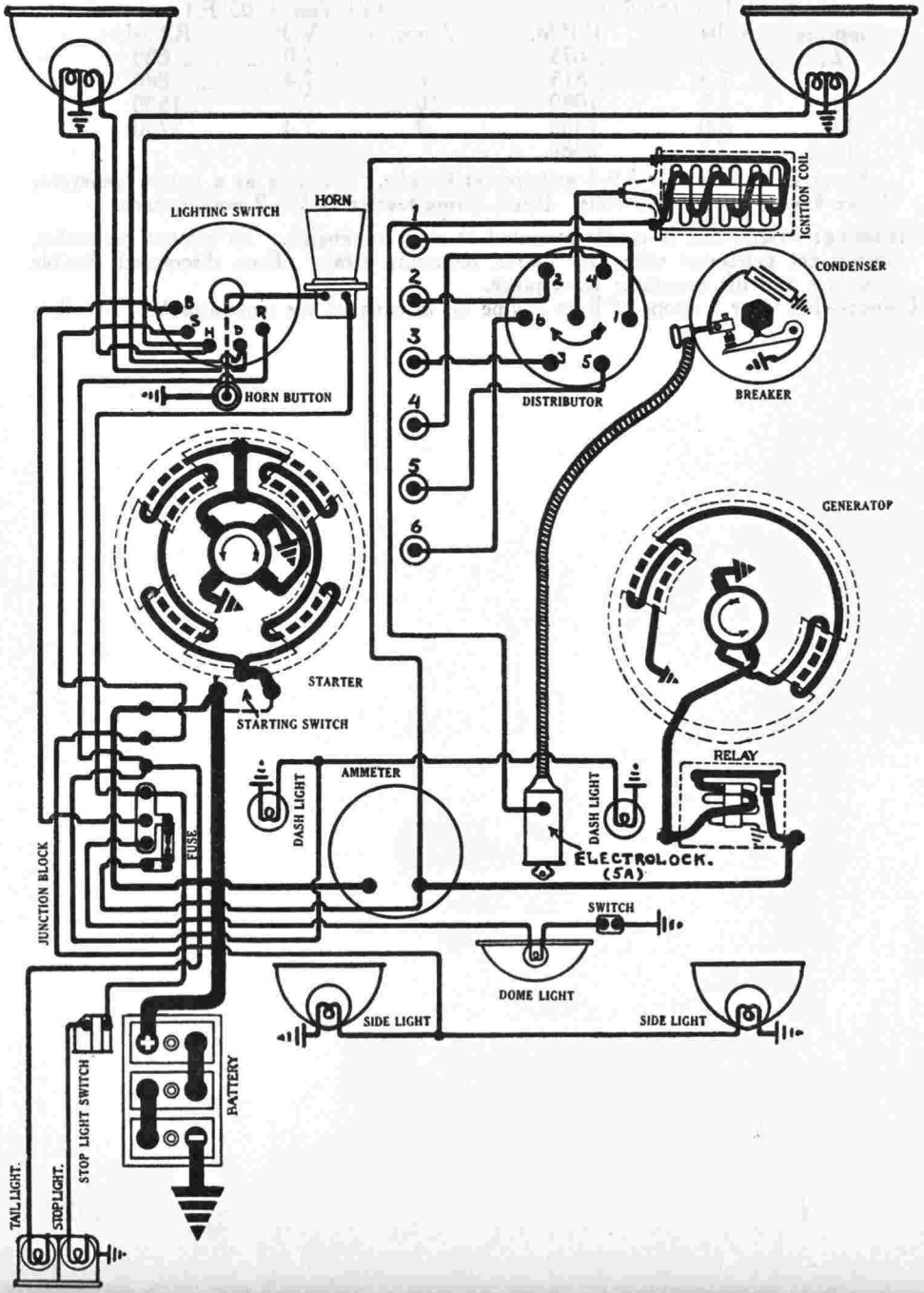
Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	
1.5 "	1800	5.2	150
2.5 "	1325	5.0	200
5.0 "	740	4.5	300
7.6 "	220	4.0	400
12.2 "	Lock	4.0	550

Mounting:—Starter is mounted by special flange at left of engine on forward side of flywheel case. To remove starter, disconnect starter cable and wire to junction block. Then remove three flange mounting screws and pull starter forward from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GAM-4101. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust the charging rate, remove the commutator cover band and shift the third brush by tapping on the mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The mounting bracket is held in any position by friction between the mounting lug and the endplate. The maximum charging rate is 17 amperes at 8 volts which is reached at 1350 R.P.M. or 25 miles per hour.



ESSEX

AFTER MOTOR NO. 901906
Production Started June 1st, 1928
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

Generator Data

Amperes	Volts	R.P.M.
0	6.5	550
2	6.9	600
5	7.1	650
10	7.8	800
14	7.9	950
17	8.0	1350

Motoring generator draws 5.5 amperes at 6 volts. Shunt field current is 6.5 amperes at 6 volts. Brush spring tension is 1¼-1½ pounds each.

Mounting:—Generator is cradle mounted at right of engine. To remove generator, disconnect generator wire and loosen mounting strap. Then disconnect flexible coupling and lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Model CB-4015. Relay is mounted on the generator endplate. Relay closes at 550 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Clum Switch Model 10717. Soreng Manegold Switch Model 2550-A. The lighting switch is mounted at the base of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact). Side, dash and tail lights are 6-8 volt, 3 cp. S.C. Stop light is 6-8 volt, 21 cp. S.C.

FUSES:—Lighting fuse on the junction block is 20 amperes.

FALCON KNIGHT

MODEL 10 (1927) SERIAL NUMBERS 1000 UP
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L. Type 3-HVX-7X, 6 volt. Starting capacity is 148.5 amperes for 20 minutes. Lighting capacity is 5 amperes for 28.4 hours. The negative (—) terminal is grounded. Battery is mounted under the front floor board on the left side.

IGNITION:—Coil Model IG-4065. Distributor Model IG-4107-B, superseded by IGA-4021. Breaker contacts separate .020-.024 inch. Resurface contacts on a medium hard oilstone or with a fine flat contact file. Breaker arm spring tension is 20 ounces. Distributor is semi-automatic. Manual advance is 20° (engine). Automatic advance begins at 800 R.P.M. (engine). Maximum advance is 20° (engine) reached at 2400 R.P.M. Ignition current is 1-3 amperes with engine running and 4-5 amperes with engine stopped.

Mounting:—Coil is mounted on the right side of the engine block at rear of distributor. Coil is grounded through case and all paint and grease must be kept from inside the strap mounting. Distributor is mounted on right side of engine block at forward end of engine. To remove distributor, disconnect manual advance rod and all distributor wires or remove distributor head. Then remove two mounting cap screws and lift distributor from place.

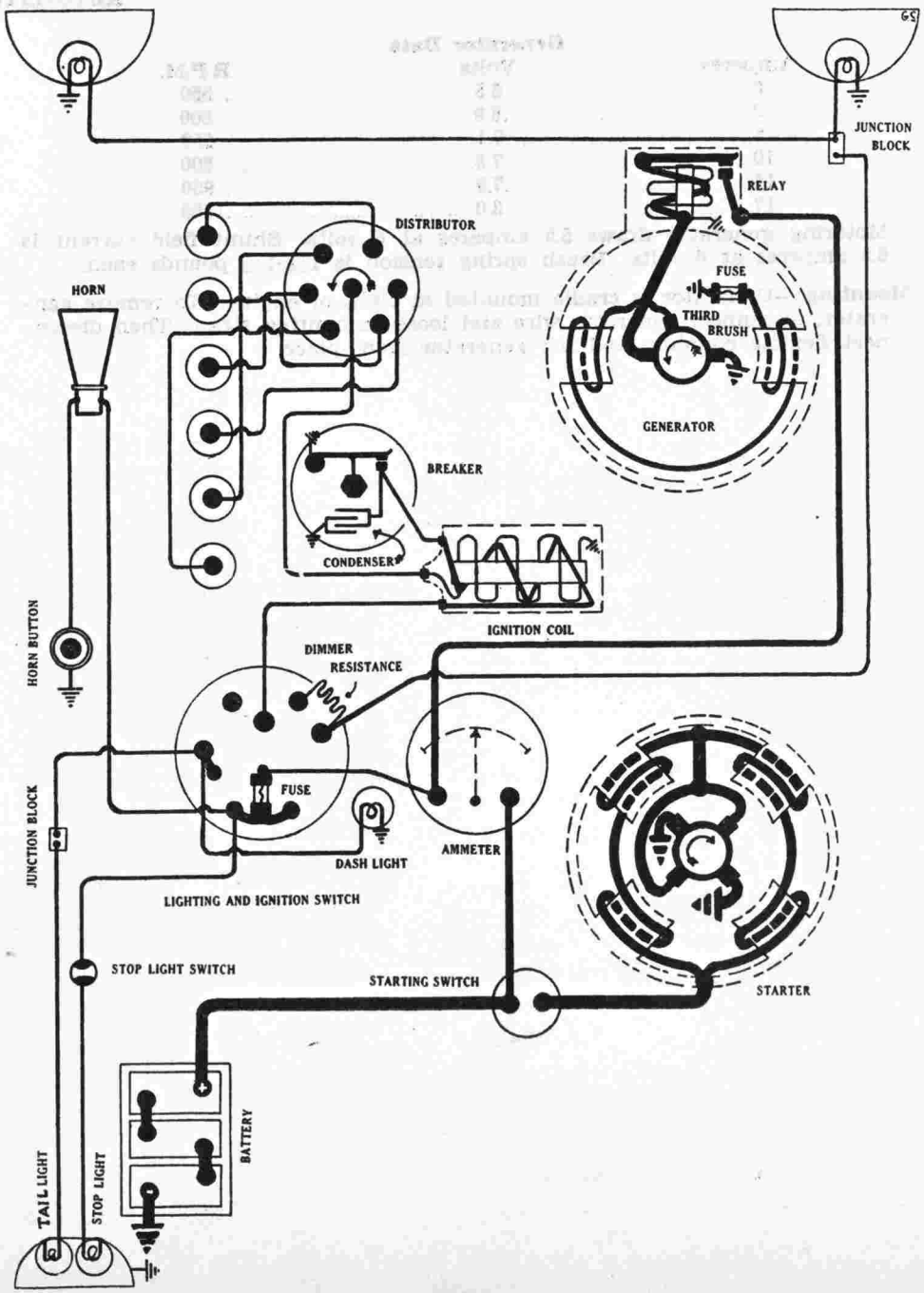
Oiling:—Fill the grease cup on the side of the distributor housing with pure vaseline and turn down one turn each week or every 250 miles. Every 5000 miles remove the rotor button and saturate the wick oiler with light engine oil. Put a small bit of vaseline on the face of the breaker cam under the fiber bumper of the contact arm.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position .023 inch before top dead center with the manual spark control lever in the fully advanced position. To set timing, crank engine until piston No. 1 enters compression stroke. This may be determined by removing all spark plugs except No. 1 and cranking engine until compression is felt. Continue to crank engine until piston is .023 inch before top dead center. This may be checked by removing clutch inspection plate. The flywheel mark 'IGN' should be opposite the pointer on the flywheel case. This mark is 8° or 51/64 inch before top dead center. To set timing, loosen distributor clamp screw under distributor cup and rotate distributor cup until the contacts begin to separate. Tighten the clamp screw.

Valve Timing:—The Falcon Knight engine is of the sleeve type. To time sleeve valves with eccentric shaft sprocket removed, remove pipe plug in exhaust manifold opposite No. 6 cylinder and scrape carbon from edges of sleeve ports so that the closing of ports can be checked. Then remove clutch inspection plate and crank engine until mark 'EC' on the flywheel is opposite the pointer on the flywheel case. Place electric lamp over spark plug port in cylinder No. 6 and rotate eccentric shaft in a clockwise direction until the upper edge of the port in the outside sleeve passes the lower edge of the port in the cylinder block on the downward stroke. At this point the ray of light from the lamp will be cut off. Then assemble chain on crankshaft, idler and generator sprockets. Insert the eccentric shaft sprocket in chain and change mesh of sprocket in chain until the five cap screws can be inserted without changing the positions of the eccentric shaft or crankshaft. Then tighten the five cap screws thus mounting the eccentric shaft sprocket on the eccentric shaft. To set tension of timing chain, turn idler eccentric bushing spring until all slackness is removed from chain. Then give spring one complete turn and insert end in slot of idler stud.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-S.A.E. Standard. Gaps are .025 inch.



FALCON KNIGHT

MODEL 10 (1927) SERIAL NUMBERS 1000 UP
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

STARTER:—Model ML-4106, superseded by Model MAB-4002. Starter is connected to the engine through a Bendix outboard drive. The direction of rotation is clockwise on Model ML-4106, looking at the commutator end. On Model MAB-4002 the direction of rotation of armature shaft is counter-clockwise. Starter cranks the engine at 140 R.P.M. drawing 180 amperes at 5.2 volts. Starter switch is Model SW-4001. Starter brush tension 2-3 pounds each on Model ML-4106 and 1¾-2¼ pounds each on Model MAB-4002.

Starter Data—Model ML-4106

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	5.5	45 (Without Bendix)
0 "	Free	5.5	50 (With Bendix)
2 "	1430	5.2	150
3.4 "	1100	5.0	200
4.9 "	880	4.7	250
6.5 "	700	4.5	300
8.3 "	540	4.2	350
10.1 "	420	4.0	400
17.0 "	Lock	3.0	520

Starter Data—Model MAB-4002

Torque	R.P.M.	Volts	Amperes
.6 lb. ft.	1900	----	100
3.5 "	1100	----	200
6.6 "	700	----	300
10.2 "	410	----	400
24 "	Lock	4	725

Mounting:—Starter is sleeve mounted at rear of flywheel case at right side of transmission case. To remove starter, remove front floor boards and disconnect starter cable. Then remove large pilot mounting screw and slide starter to rear. Lift from place.

Oiling:—Put 7 or 8 drops of light engine oil in each of the starter bearing oilers every two weeks or each 500 miles.

GENERATOR:—Model GYA-4202, superseded by GYA-4202-A. The direction of rotation is counter-clockwise, looking at commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove commutator cover band and shift third brush by tapping the mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any desired position by friction between the third brush mounting bracket and the generator end plate. The maximum charging rate is 19 amperes (cold) at 8 volts.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes		R.P.M.
2	6.6	620	2	----	700
5	7.0	700	5	----	840
10	7.3	860	10	----	1100
14	7.7	1050	14	----	1600
16	7.9	1200			

Generator motoring draws 5 amperes at 6 volts. Shunt field current is 3.8 amperes at 6.2 volts. Brush spring tension is 1½-2 pounds. A five ampere field fuse is mounted on the generator end plate.

Mounting:—Generator is cradle mounted on the right side of engine. To remove generator, disconnect generator lead and remove two strap mounting nuts. Then slide generator to rear and lift from place.

Oiling:—Put 7 or 8 drops of light engine oil in the oiler on each end of the generator every week or each 250 miles.

RELAY:—Model CB-4007. Relay is mounted on top of the generator. Relay closes when the voltage of the generator reaches 7-7.5 volts and opens with a discharge current of .5-2.5 amperes. Charging current at closing of contacts must not exceed 2 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING:—Clum Switch. Head lamps are 6-8 volt, 21 cp. S.C. Stop lamp is 6-8 volt, 15 cp. S.C. Dome lamp is 6-8 volt, 4 cp. D.C. Dash and tail lamps are 6-8 volt, 3 cp. S.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuse is 20 amperes.

FALCON KNIGHT

MODEL 12 (1928) SERIAL NUMBERS 12000 UP
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L., Type 3-HVX-7X, 6 volt, 15 plates. Starting capacity (20 minute rate) is 148.5 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 28.4 hours. The negative (—) terminal is grounded. Battery is mounted under the front floor board on the left side.

IGNITION:—Coil Model IG-4065. Coil is mounted on right side of engine at rear of distributor. Ignition current is 1-3 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped.

Distributor Model IGA-4021. Breaker contacts separate .020-.024 inch. Resurface contacts on a medium hard oilstone or with a fine flat contact file. Breaker arm spring tension is 20 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 800 R.P.M. (engine). Maximum automatic advance is 20 degrees (engine) reached at 2400 R.P.M.

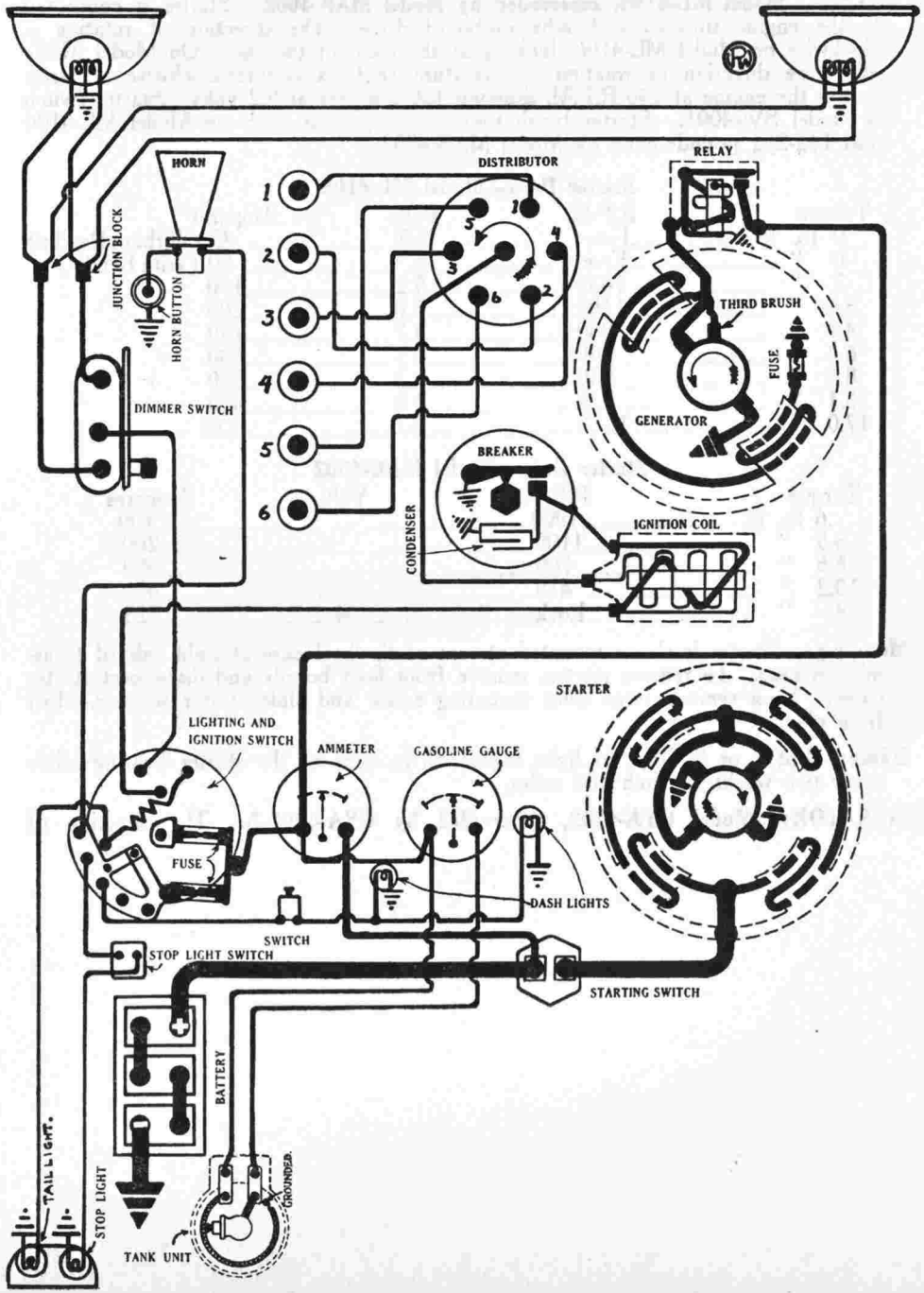
Mounting:—Ignition coil is grounded through case and all paint and grease must be kept from inside the strap mounting. Distributor is mounted on right side of engine block at forward end of engine. To remove distributor, disconnect manual advance rod and all distributor wires or remove distributor head. Then remove two mounting cap screws and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor housing with pure vaseline and turn down one turn each week or every 250 miles. Every 5000 miles remove the rotor button and saturate the wick oiler with light engine oil. Put a small bit of vaseline on the face of the breaker cam under the fiber bumper of the contact arm.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position .023 inch before top dead center with the manual spark control lever in the fully advanced position. To set timing, crank engine until piston No. 1 enters compression stroke. This may be determined by removing all spark plugs except No. 1 and cranking engine until compression is felt. Continue to crank engine until piston is .023 inch before top dead center. This may be checked by removing clutch inspection plate. The flywheel mark 'IGN' should be opposite the pointer on the flywheel case. This mark is 8 degrees or 51/64 inch before top dead center. The allowable variation is 1 degree or 3/32 inch measured on the flywheel. Then loosen distributor clamp screw under distributor cup and rotate distributor cup until the contacts begin to separate. Tighten the clamp screw. Connect segment opposite rotor to spark plug in cylinder No. 1 and connect remaining plugs in order 5-3-6-2-4 counter-clockwise around head.

VALVE TIMING:—The Falcon Knight engine is of the sleeve valve type. Intake ports open 10 degrees or 1 inch on flywheel past top dead center with piston .035 inch down on intake stroke and close 35 degrees or 5 inches on flywheel past lower dead center with piston .277 inch up on compression stroke. Exhaust valves open 50 degrees or 5 inches on flywheel before lower dead center with piston on power stroke and close 5 degrees or ½ inch on flywheel after top dead center with piston .009 inch down on intake stroke.

Adjustment:—To time sleeve valves with eccentric shaft sprocket removed, remove pipe plug in exhaust manifold opposite No. 6 cylinder and scrape carbon from edges of sleeve ports so that the closing of ports can be checked. Then remove clutch inspection plate and crank engine until mark 'EC' on the flywheel is opposite the pointer on the flywheel case. Place electric lamp over spark plug port in cylinder No. 6 and rotate eccentric shaft in a clockwise direction until the upper edge of the port in the outside sleeve passes the lower edge of the port in the cylinder block on the downward stroke. At this point the ray of light from the lamp will be cut off. Then assemble chain on crankshaft, idler and generator



sprockets. Insert the eccentric shaft sprocket in chain and change mesh of sprocket in chain until the five cap screws can be inserted without changing the positions of the eccentric shaft or crankshaft. Then tighten the five cap screws thus mounting the eccentric shaft sprocket on the eccentric shaft. To set tension of timing chain, turn idler eccentric bushing spring until all slackness is removed from chain. Then give spring one complete turn and insert end in slot of idler stud.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

STARTER:—Model MAB-4002. Starter is connected to the engine through a Bendix outboard drive. The direction of rotation is clockwise, looking at the commutator end. Starter cranks the engine at 200 R.P.M. drawing 100 amperes at 5.5 volts. Starter switch is Model SW-4001. Starter brush tension is 1¾-2¼ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
.6 lb. ft.	1900		100
3.5 "	1100		200
6.6 "	700		300
10.2 "	410		400
24.0 "	Lock	4	725

Mounting:—Starter is sleeve mounted at rear of flywheel case at right side of transmission case. To remove starter, remove front floor boards and disconnect starter cable. Then remove large pilot mounting screw and slide starter to rear. Lift from place.

Oiling:—Put 7 or 8 drops of light engine oil in each of the starter bearing oilers every two weeks or each 500 miles.

GENERATOR:—Model GYA-4202-A. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove commutator cover band and shift third brush by tapping the mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any desired position by friction between the third brush mounting bracket and the generator end plate. The maximum charging rate is 19 amperes (cold) at 8 volts.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
2	6.6	620	2		700
5	7.0	700	5		840
10	7.3	860	10		1100
14	7.7	1050	14		1600
16	7.9	1200			

Generator motoring draws 5 amperes at 6 volts. Shunt field current is 3.8 amperes at 6.2 volts. Brush spring tension is 1½-2 pounds. A five ampere field fuse is mounted on the generator end plate.

Mounting:—Generator is cradle mounted on the right side of the engine. To remove generator, disconnect generator lead and remove two strap mounting nuts. Then slide generator to rear and lift from place.

Oiling:—Put 7 or 8 drops of light engine oil in the oiler on each end of the generator every week or each 250 miles.

RELAY:—Model CB-4007. Relay is mounted on top of the generator. Relay closes at 8-10 M.P.H. when the voltage of the generator reaches 7-7.5 volts and opens with a discharge current of .5-2.5 amperes. Charging current at closing of contacts must not exceed 2 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING:—Clum Switch. Head lights are 6-8 volt, 21-21 cp. (double filament double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Dome light is 6-8 volt, 6 cp. D.C. Mazda No. 82. Dash and tail lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87.

FERRIS

MODEL C-20 (1919-20-21). SERIAL NOS. C-500 TO C-1500
LEECE-NEVILLE GENERATING, STARTING AND LIGHTING SYSTEM
SPLITDORF IGNITION

BATTERY.—Willard, SJRN-4, 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Aero, Type 649. Breaker contacts separate .020 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 3 or 4 drops of light engine oil in each of the magneto bearing oilers every month. Put one drop of oil in the bearing of the breaker bar. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is ½ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Diameter ⅞ inch. Spark plug gaps are .025 inch.

STARTER.—Model 347-M. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 110-150 R.P.M., taking 150-250 amperes. Running freely, starter takes 60 amperes, armature revolving at 4000 R.P.M. Lock torque is 16 pound-feet, current being 700 amperes at 3.5 volts.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR:—Model 338-G, 350-G. Generator current regulation is by third brush system. Maximum charging rate is 15 amperes, reached at 1200 R.P.M. of the armature or 20 miles per hour. Charging rate is varied by adjustment of the third brush setting. To make an adjustment, first loosen the lockscrew at the rear end of the generator, and then turn the thumb wheel. Turn to the right to increase the charging rate and to the left to decrease the charging rate. Tighten the locking screw after the adjustment is made.

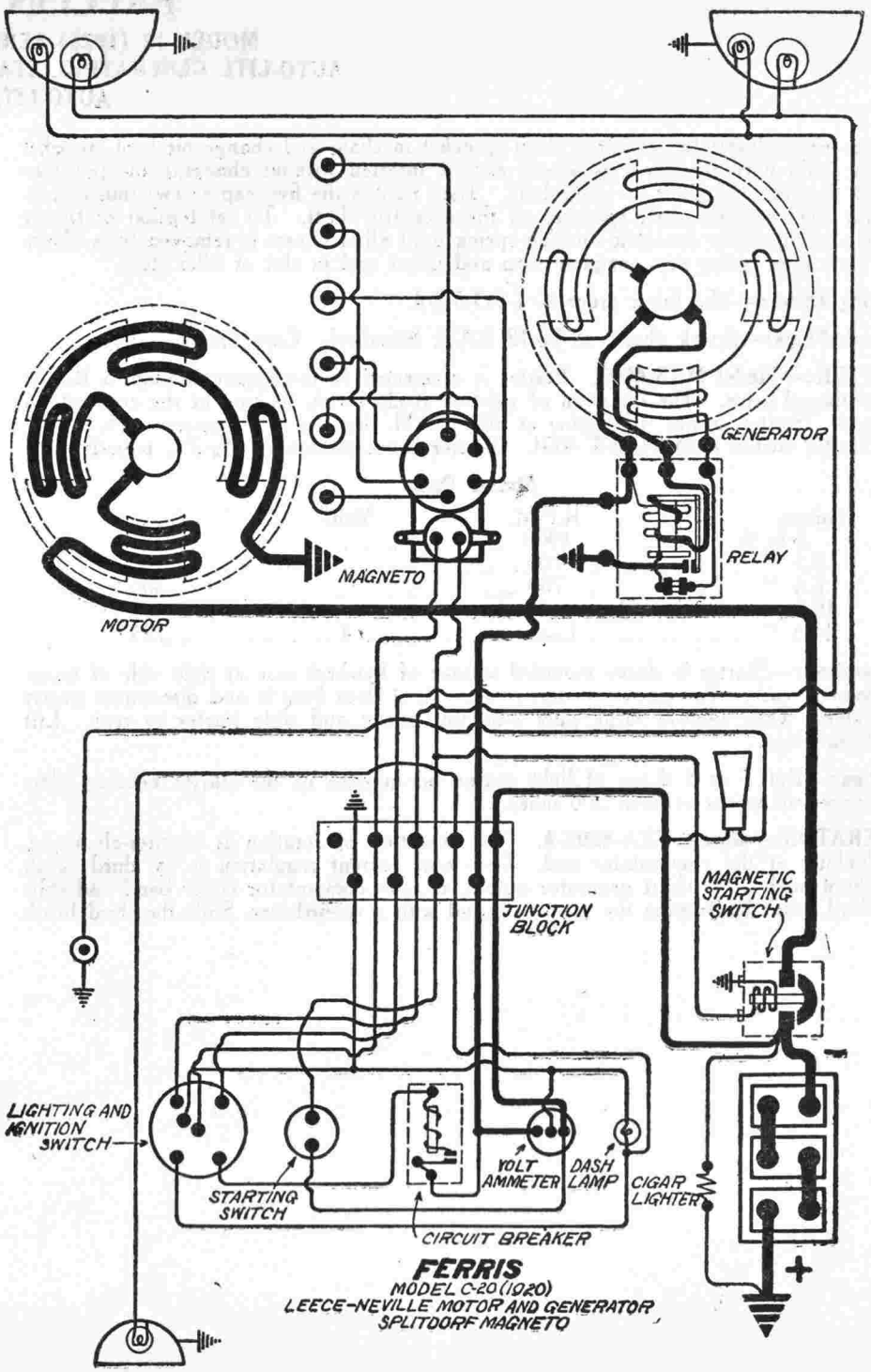
OILING.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every
25 amperes to cause the circuit breaker to operate.
500 miles.

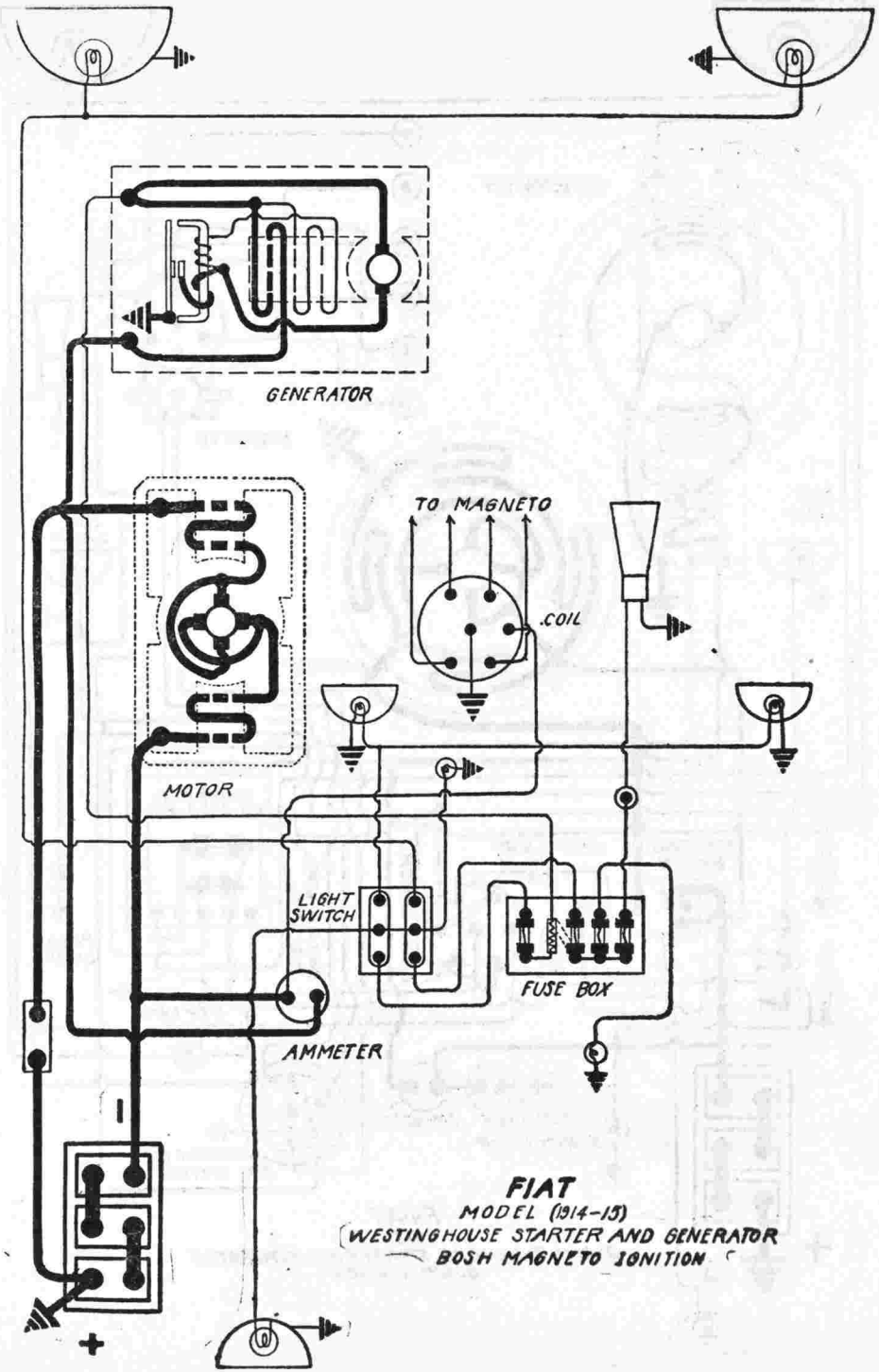
RELAY.—Model 130-C. Relay closes at 8-10 miles per hour or 450-500 R.P.M. of the armature and opens at 6-8 miles per hour or 400-450 R.P.M. of the armature. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 4 cp. Tail lamp is 6-8 volt, 2 cp.

FUSES.—Generator fuse, mounted on relay base, is 5 ampere.

CIRCUIT BREAKER.—A locking type circuit breaker takes the place of fuses. It requires 25 amperes to cause the circuit breaker to operate.





FIAT

MODELS 54, 55, 56 (1914-15)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH MAGNETO IGNITION

Battery.—Battery is 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Magneto breaker contacts should separate .014 inch to .016 inch. Should they become badly burned or pitted, affecting the ignition, resurface them with a fine, flat jeweler's file or a piece of worn No. 00 sand paper. Type ZR magneto is treated on Page 186.

Timing.—Magneto breaker contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order of the six cylinder cars is 1, 4, 2, 6, 3, 5. The firing order of the four cylinder cars is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps should be .018 inch to .022 inch.

Oiling.—Put 3 or 4 drops of light machine oil in each of the magneto oilers every two weeks. At the same time, put a very small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick, If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Starter.—Starter is connected to the engine by a pinion shifted by the operator. Cold engine, heavy oil, tight bearings or other obstructions or damp, grounded or short circuited motor windings or commutator bars will cause high current and low speed during the cranking operation.

Oiling.—Put several drops of light engine oil in each of the starter oilers every month. Keep the pinion and all sliding surfaces well oiled.

Generator.—Generator charging current regulation is by reverse field. Current taken by the lamps does not flow through the series field hence has but little effect on the charging rate.

GENERATOR DATA, FRAME NOS. 202, 203, 230 AND 240.

Speed in R. P. M.	Total Output Lamp and Charging Current Amperes	Charging Current Lamps Out Amperes
400	2	1.0- 1.5
500	5- 6	2.5- 3.0
750	10	6.0- 6.5
1000	13	8.5- 9.0
1250	15-16	9.5-10.0
1500	16-17	10.5-11.0
2000	18	11.0-12.0
3000	19	12.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 17 cp. Dimmer and side lamps are 6-8 volts, 5 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp. Dome lamp is 6-8 volts, 2-4 cp. Pillar lamps are 6-8 volts, 4 cp.

Fuses.—On the 1914-15 cars small fuses are 5 ampere and the large fuses are 15 ampere. On the 1916-17 cars, 30 ampere fuses are used.

FIAT

MODELS 50, 55 (1915-16) GB (1917-18)
BOSCH-RUSHMORE GENERATING AND LIGHTING SYSTEM
BOSCH MAGNETO IGNITION

Battery.—Battery is 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate .014 inch to .016 inch. If badly burned or pitted, affecting the ignition, resurface with a fine, flat jeweler's file or a strip of worn No. 00 sand paper.

Timing.—The fiber bumper on the contact arm should be entering the highest part of the cam when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps should be .018 inch to .023 inch.

Oiling.—Put several drops of light machine oil in each of the magneto oilers every two weeks. At the same time put a very small amount of vaseline on the fiber bumper, using a toothpick. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

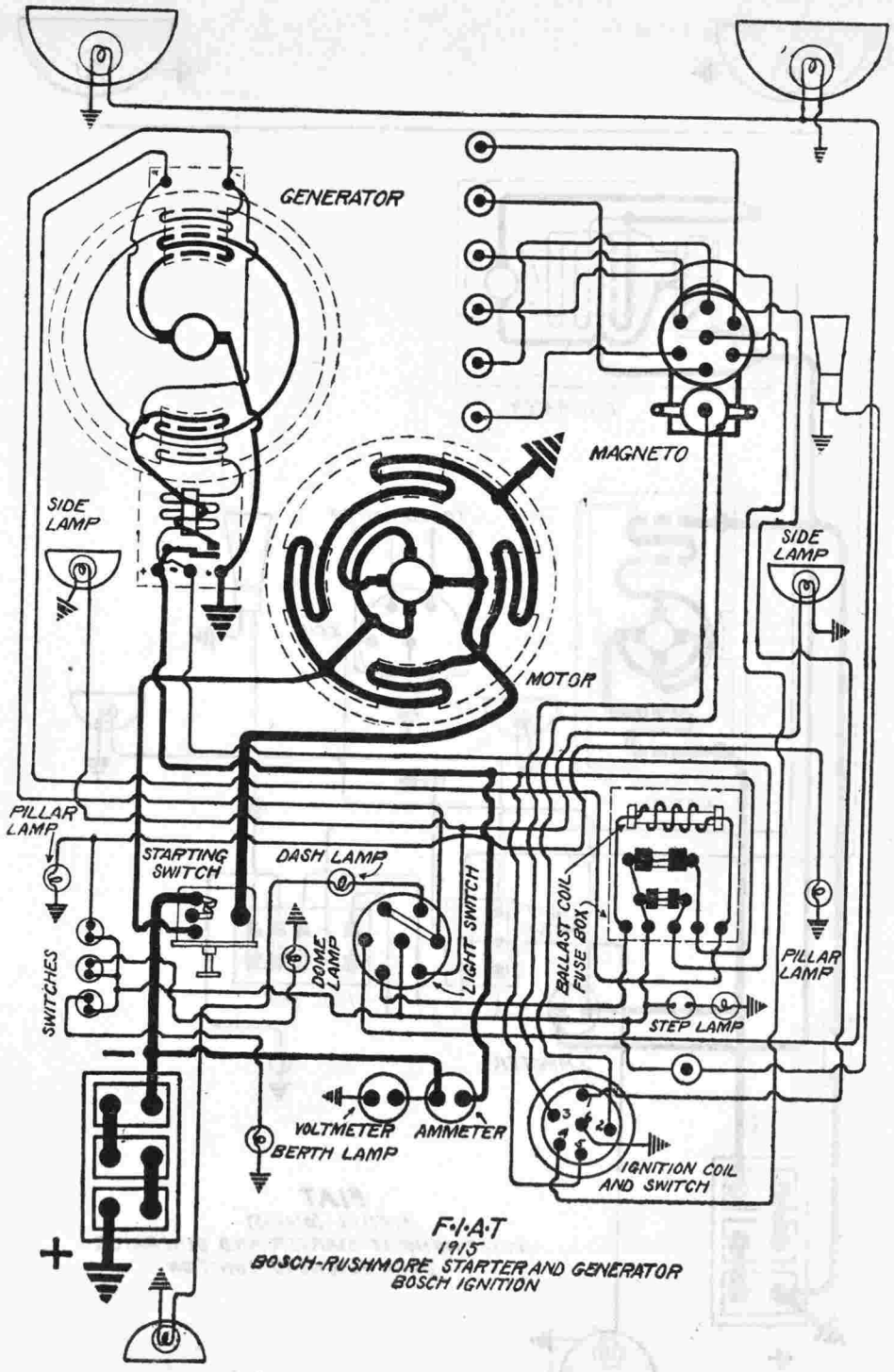
Starter.—The starter pinion is meshed with the flywheel gear by moving of the armature. The armature is constructed so that it has considerable end play. A spring at the commutator end normally holds the armature in such a position that the gears are demeshed. When the starting switch is moved so as to connect the first and second contacts a large current is allowed to flow through the motor field and a small current through the armature causing it to turn slowly, facilitating meshing of the gears. The strong attraction between the armature and field draws the armature further into the frame, meshing the gears. The switch is so constructed that when the gears are meshed the entire current flows through the armature and field windings in series so that the starter has its full power to crank the engine. When the engine starts, the current taken by the starter decreases sufficiently to allow the spring to force the armature out, demeshing the gears.

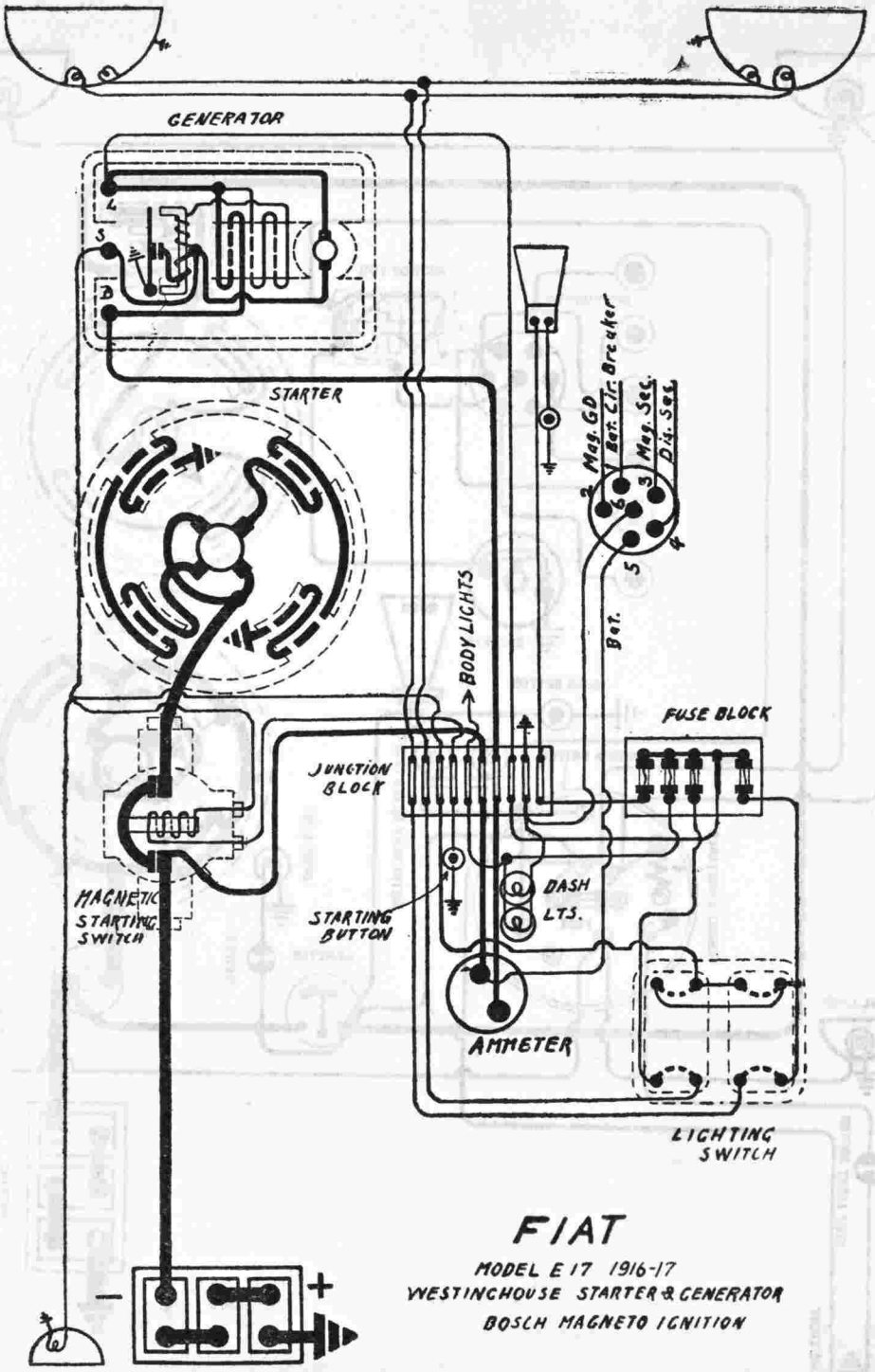
Oiling.—Put 5 or 6 drops of light engine oil in each of the starter oilers every two weeks. Remove the plug under the driving end bearing, clean out and renew the packing once or twice a season.

Generator.—Generator current regulation is by reverse series field and a regulating resistance. This regulation resistance is connected in shunt with the reverse series field. When cold, this unit has a very small resistance, but when hot it has a greatly increased resistance. When cold, it forms practically a short circuit across the series field terminals, allowing but little current to flow through the series field. As the current through the resistance increases, the temperature and resistance increases, causing more current to flow through the reverse winding, reducing the voltage. As the resistance of the regulating coil increases in proportion to the current through it, the current is held practically constant at speeds above that necessary to produce the maximum output. The output is changed by changing the regulating resistance unit.

Oiling.—Put several drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 24 cp. Side lamps are 6-8 volts, 4 cp. Dash and tail lamps are in series. They are each 3-4 volts, 2 cp.





FIAT

1916-17

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH MAGNETO IGNITION

BATTERY.—Battery is 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type ZR, Dual. Magneto breaker contacts separate .015 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or well worn No. 00 sandpaper.

OILING.—Put 2 or 3 drops of light machine oil in the magneto oilers every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Magneto breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5, or 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .018 to .022 inch.

STARTER.—Frame No. 775 or 750. Starter is connected to the engine through a magnetically shifted pinion. The starting switch is also of the magnetic type, operated by a push button on the dash. Frame No. 750 develops 17.5 pound-feet lock torque taking 500 amperes at 4.25 volts. The lock torque of Frame No. 755 is 22 pound-feet, current being 485 amperes at 3.9 volts. Running freely, Frame No. 750 takes 40 ampere at 5.5 volts, armature revolving at 3500-5000 R.P.M. Running freely Frame No. 775 takes 36 amperes at 6.25 volts, armature revolving at 4000 R.P.M. Pinion must be pulled into mesh by 125 amperes and must not be held in by 40 amperes. Pressure of brushes on the commutator is 1 to 1¼ pounds.

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR.—Frame No. 208. Generator current regulation is by reverse series field. Maximum charging rate is 11-15 amperes, reached at 1500 R.P.M. of the armature or 25 miles per hour.

Amperes	Generator Data	R.P.M.
0		425
8		650
11-15		1500

Shunt field current is 1.5-2.5 amperes at 6-6.3 volts. Operating freely as a motor generator takes 2.5-3.5 amperes at 6-6.3 volts. The current taken by the lamps does not pass through the reverse series field, hence has but little effect on the charging rate.

OILING.—Put 5 or 6 drops of light engine oil in the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in the generator frame. Relay closes at 425-475 R.P.M. of the armature or 8-10 miles per hour and opens at 375-425 R.P.M. of the armature or 6-8 miles per hour. Adjust relay to open with a discharge current of 0-2 amperes from the battery, and close when the voltage of the generator reaches 7 to 7.5 volts, battery disconnected. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 5 cp. Tail and dash lamps are 6-8 volt, 2 cp.

FUSES.—Fuses are 30 amperes

FLINT

MODEL 6-40 (1924-25)

AUTO-LITE, GENERATING, STARTING AND LIGHTING SYSTEM.

AUTO-LITE IGNITION.

BATTERY: — U. S. L. 3-HVX-5X, 6 volt, 92 ampere-hour capacity. The starting capacity is 105 amperes for 20 minutes. The lighting capacity is 5 amperes for 18.4 hours. The negative (-) terminal is grounded.

IGNITION: — Coil Model 1G-4047. Distributor Model 1G-4003-A. Breaker contacts separate .015 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oil stone.

OILING: — Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every week or each 250 miles.

TIMING: — Breaker contacts begin to separate when the piston entering power stroke is on top dead center, with the spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER: — The firing order is 1-5-3-6-2-4.

SPARK PLUGS: — Spark plug diameters are 7/8 inch, SAE standard. Gaps are .022 to .025 inch.

STARTER: — Model MG-4004. The starter in connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 160 R. P. M. taking 145 amperes at 5.3 volts.

Starter Data

Torque.	R. P. M.	Volts.	Amperes.
1 lb. ft	2300	5.5	100
3 lb. ft.	1200	5.0	200
5.9 lb. ft.	650	4.5	300
8.7 lb. ft.	150	4.0	400
18 lb. ft.	Lock.	5.0	650

The starter brush tension should be 2¼ to 3 pounds each.

OILING: — The commutator end of the starter is fitted with an oilless bearing. Put 4 or 5 drops of light engine oil in the oiler at the drive end of the starter every two weeks or each 500 miles.

GENERATOR:—Model GJ-4014. The direction of rotation is counter-clockwise, looking at the commutator end of the generator. Current regulation is by the third brush system. To adjust the charging rate turn the third brush shifting screw located on the generator end plate. Turning the screw to the right increases the charging rate, and to the left decreases the charging rate. The maximum charging rate of 16 amperes is reached at 1700 R. P. M. of the armature or 25 M. P. H. car speed in high gear.

Generator Data

Cold Test. (25°C)			Hot Test (75°C)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
2	6.25	575	2	6.95	700
6	6.4	700	6	7.1	875
10	6.55	900	10	7.25	1200
14	6.7	1250	12	7.35	1650
15.5	6.8	1700	12	7.35	1850

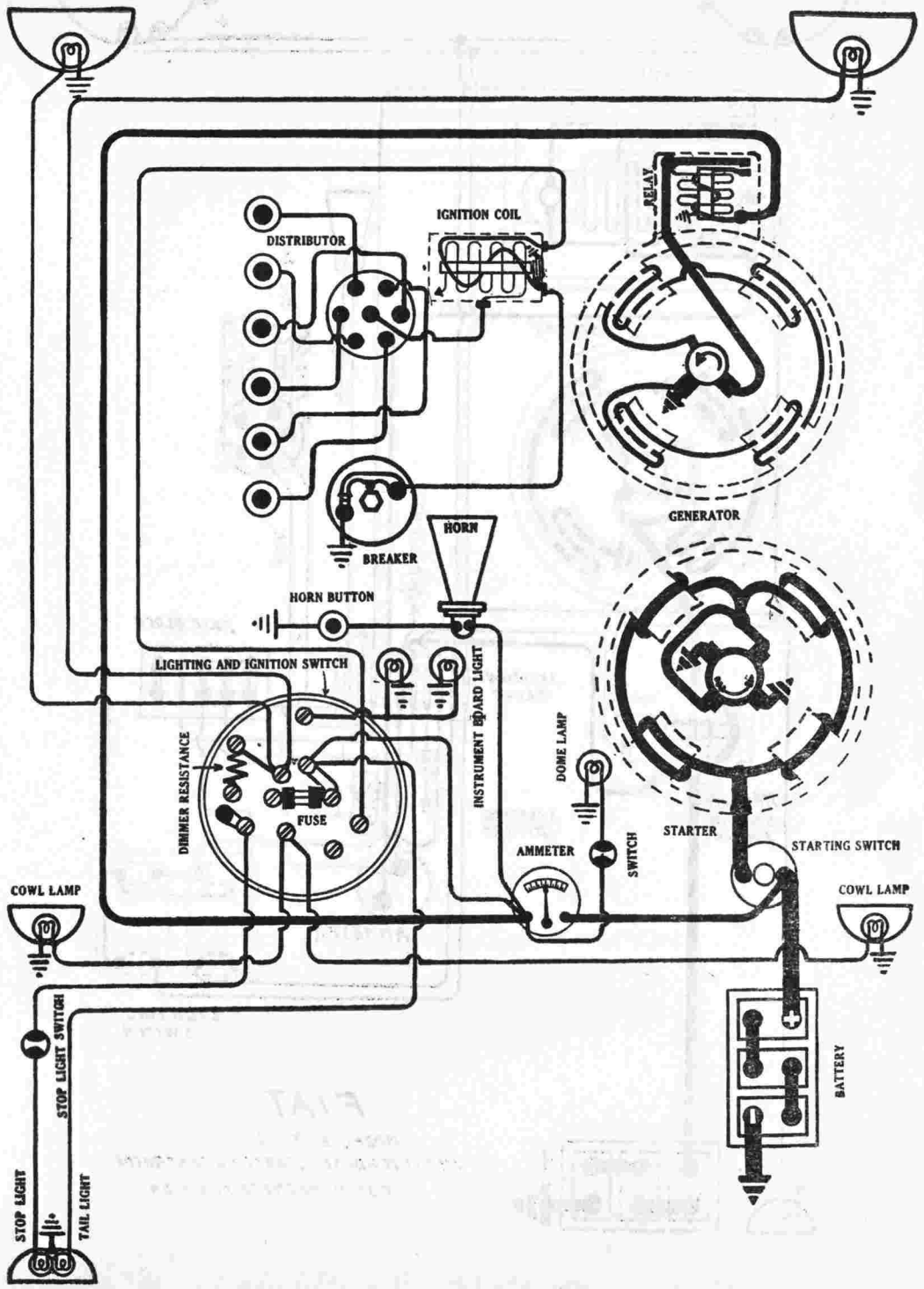
The generator running freely as a motor at 300-400 R. P. M. takes 3.24-4.0 amperes at 6.35 volts. Shunt field current is 1.9-2.2 amperes at 6.2 volts. A single coil will draw 7.6 to 8.8 amperes at 6.2 volts. The brush tension should be 1½-2 pounds each.

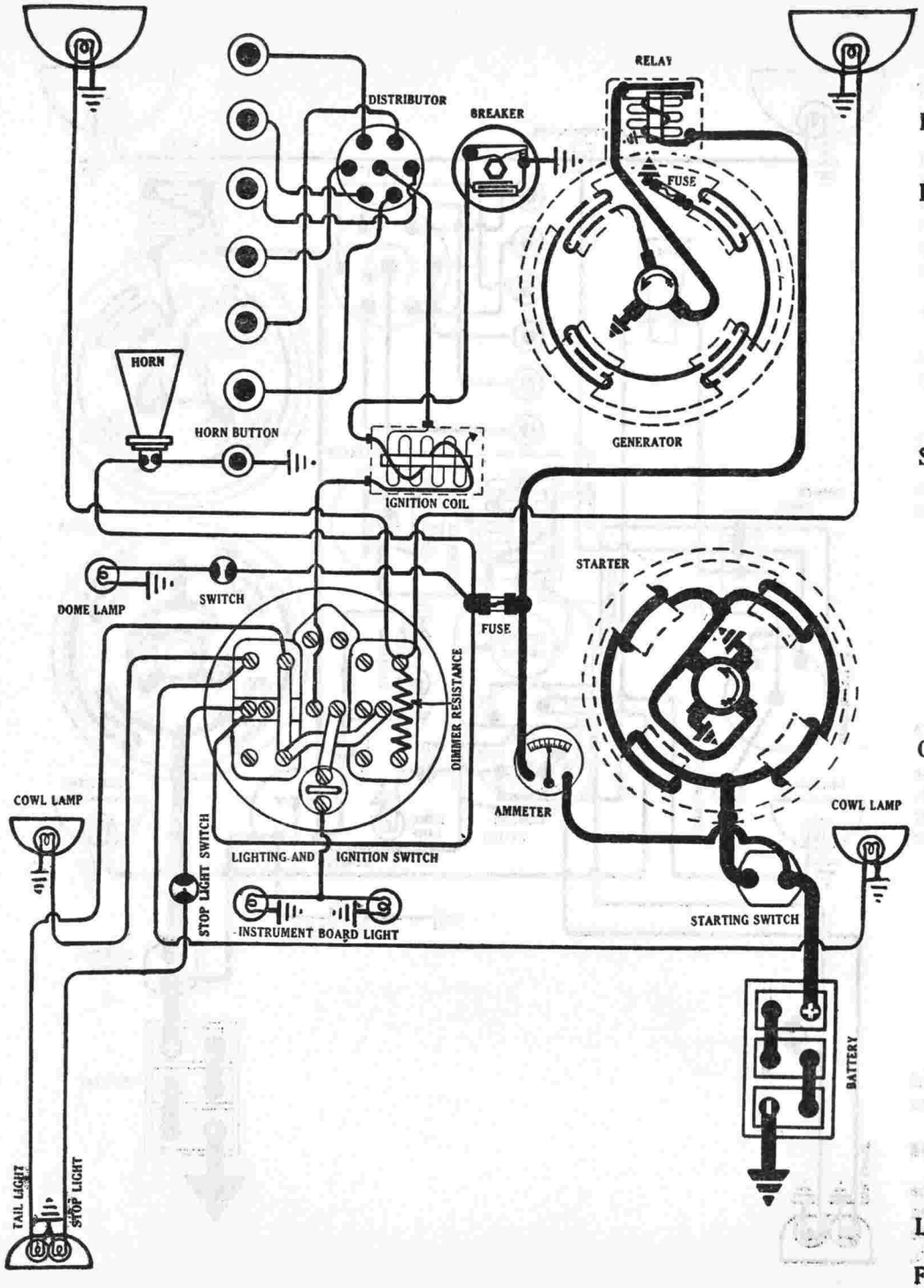
OILING: — The front bearing is oiled by the splash from the chain case. Put 4 or 5 drops of light engine oil in the oiler on the rear end of the generator every two weeks or each 500 miles.

RELAY:—Auto-Lite. Model CB-4009. Relay closes at 600 R. P. M. of the armature at 8.9 M. P. H. with a generator voltage of 7-9 volts, and opens at 400 R. P. M. or 6 M. P. H. with a discharge current of ½ to 2½ amperes. Relay contacts separate .025-.035 inch and the air gap between relay armature and coil core is .015-.030 inch, contacts closed.

LIGHTING: — Clum Combination Switch. Head and stop lamps are 6-8 volt, 21 cp. Dash, tail and side lamps are 6-8 volt, 2 cp. Dome lamp is 6-8 volt, 2 cp.

FUSES: — No generator field fuse is used. Lighting fuse is 20 amperes.





FLINT

MODEL 6-55 (1924-25)
DE JON GENERATING, STARTING, LIGHTING SYSTEM
DE JON IGNITION

BATTERY:—U.S.L. Type 3-HVX-6X. 6 volt, 117 ampere hour capacity. The starting capacity is 127 amperes for 20 minutes. The lighting capacity is 5 amperes for 23.4 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. CA 4001. Distributor Model No. 1A-4001. Breaker contacts separate .015 inch. They are made of tungsten. When the condition of the contacts affects the ignition remove and resurface with a fine flat jeweler's file.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every week or each 250 miles.

Timing:—Breaker contacts separate when piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. S.A.E. standard. Gaps are .022 to .025 inch.

STARTER:—Model No. SA-4001. The starter is connected to the engine by means of a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.		5.0	40
.5 "	2800	5.5	100
2.5 "	1600	5.0	200
4.7 "	1000	4.5	300
7.3 "	600	4.0	400
20.0 "	Lock	4.0	800

Oiling:—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every two weeks or each 500 miles.

GENERATOR:—Model No. DR-4001. The direction of rotation is counter-clockwise, looking at the commutator end. Current regulation is by the third brush system. To adjust the charging rate turn the third brush screw located on the generator end plate. Turning the screw to the right increases the charging rate and to the left decreases the charging rate.

Generator Data

Hot Test		Cold Test	
Amperes	R.P.M.	Amperes	R.P.M.
3.75	500	1.2	500
12.25	800	9.0	800
15.5	1200	12.0	1200
13.75	1600	7.0	2400
5.5	3600	4.75	3600
8.25	2400		

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—De Jon Model RA-4001. Relay contacts close at 425 R.P.M. of the generator armature when the voltage of the generator reaches 7-8 volts, and open at 375 R.P.M. of the armature or 0-2 amperes discharge. Relay contacts separate .025-.035 inch. The air gap between the relay armature and coil core is .015 inch, contacts closed.

LIGHTING:—Connecticut Toggle Switch. Head and stop lamps are 6-8 volt, 21 cp. Dash, tail and side lamps are each 6-8 volt, 2 cp. Dome lamp is 6-8 volt, 2 cp.

FUSES:—Generator field fuse is 5 amperes. Lighting fuse is 20 amperes.

FLINT

MODEL E-80 (1926)
DE JON GENERATING, STARTING, LIGHTING SYSTEM.
DE JON IGNITION.

BATTERY: — U. S. L. Type 3-HVX-6X 6 volt, 117 ampere hour capacity. The starting capacity is 127 amperes for 20 minutes. The lighting capacity is 5 amperes for 23.4 hours. The negative (-) terminal is grounded.

IGNITION: — Coil Model No. CA 4001. Distributor Model No. 1A-4001. Breaker contacts separate .015 inch. They are made of tungsten. When the condition of the contacts affects the ignition remove and resurface with a fine, flat jeweler's file. Ignition current is 6.3-6.5 amperes at 6 volts with ballast resistance cold. With resistance hot, ignition current is 3.5-3.6 amperes. On bench test secondary current will jump .391 inch between needle points and at atmospheric pressure with a distributor R.P.M. of 1000.

OILING: — Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every week or each 250 miles.

TIMING: — Breaker contacts separate when piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER: — The firing order is 1-5-3-6-2-4.

SPARK PLUGS: — Spark plug diameters are 7/8 inch. SAE standard. Gaps are .022 to .025 inch.

STARTER: — Model No. SA-4001. The starter is connected to the engine by means of a Bendix drive. The direction of rotation is counter-clockwise looking at the commutator end.

Starter Data

Torque.	R. P. M.	Volts.	Amperes.
0 lb. ft.		5.0	40
.5 „	2800	5.5	100
2.5 „	1600	5.0	200
4.7 „	1000	4.5	300
7.3 „	600	4.0	400
20.0 „	Lock.	4.0	800

OILING: — Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every two weeks or each 500 miles.

GENERATOR: — Model No. DA-4001. The direction of rotation is counter-clockwise looking at the commutator end. Current regulation is by the third brush system. To adjust the charging rate turn the third brush screw located on the generator end plate. Turning the screw to the right increases the charging rate and to the left decreases the charging rate.

Generator Data

Cold Test		Hot Test	
Amperes	R. P. M.	Amperes	R. P. M.
3.75	500	1.2	500
12.25	800	9.0	800
15.5	1200	12.0	1200
13.75	1600	7.0	2400
5.5	3600	4.75	3600
8.25	2400		

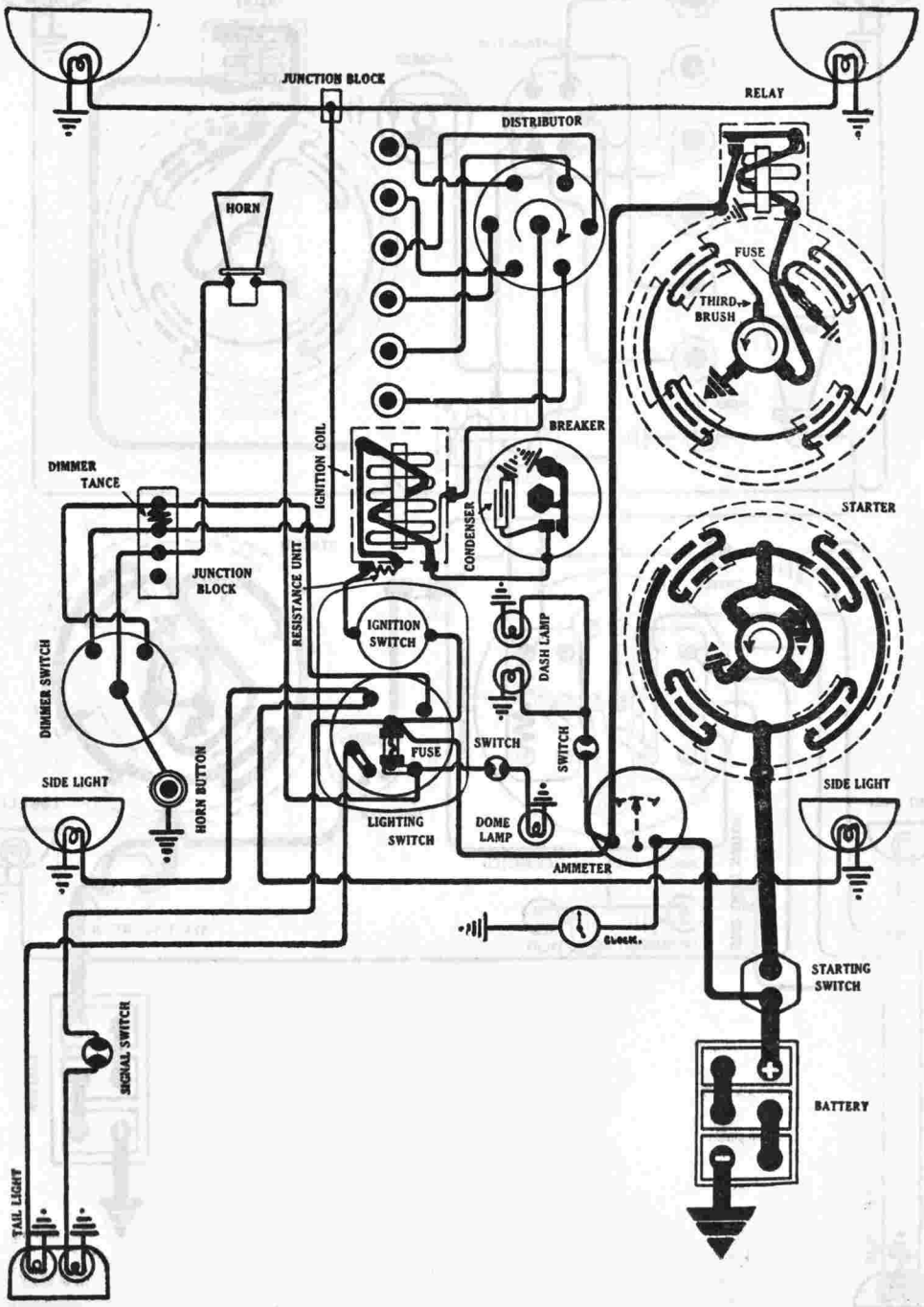
Motoring freely at 150 R.P.M. generator draws 5 amperes at 6 volts. Shunt field current is 2.4 amperes at 6 volts. Each coil tested separately draws 9.6 amperes at 6 volts. Brush tension should be 1-1¼ pounds each.

OILING: — Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

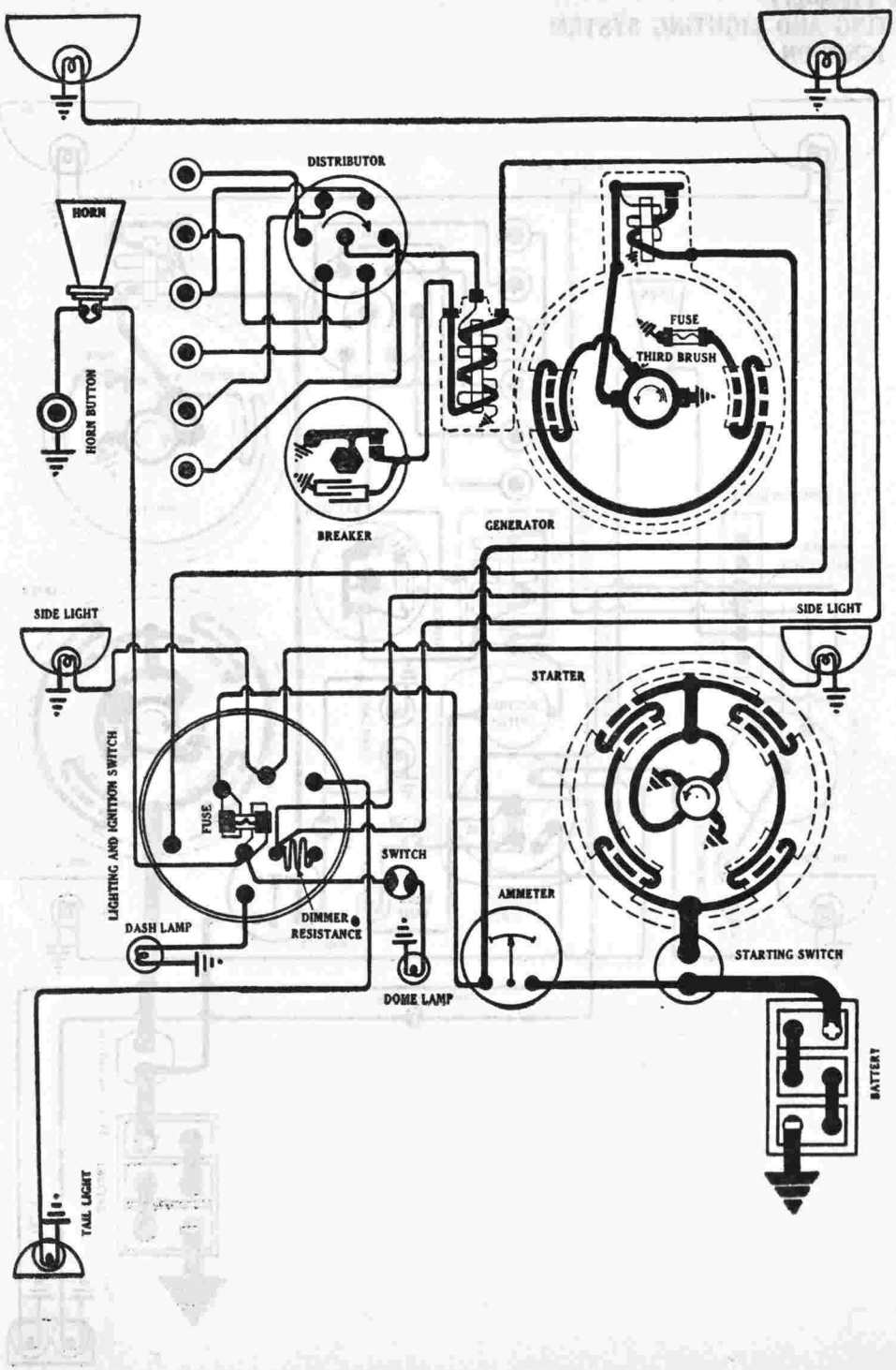
RELAY: — De Jon Model RA-4001. Relay contacts close at 425 R. P. M. of the generator armature when the voltage of the generator reaches 7-8 volts, and open at 375 R. P. M. of the armature or 0-2 amperes discharge. Relay contacts separate .025-.035 inch. The air gap between the relay armature and coil core is .015 inch, contacts closed.

LIGHTING.—Clum Switch Model 10549. Head and stop lamps are each 6-8 volts, 21 cp. S. C. Dash, dome, side and tail lamps are each 6-8 volt, 2 cp. S. C.

FUSES: — Generator field fuse is 5 amperes. Lighting fuse is 20 ampere.



JUNIOR MODEL Z-18 (1926-27) SERIAL NOS. 101 UP
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION



BATTERY:—U. S. L. Type 3-HVX-5X, 6 volt. Starting capacity is 106 amperes for 20 minutes. Lighting capacity is 5 amperes for 18-4 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model IG-4063. Distributor Model IG-4118-A-C. Breaker contacts separate .020-.024 inch. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Ignition current is 1-3 amperes with engine running and 3.4-5 amperes with engine stopped. Distributor is of the semi-automatic type. Manual advance is 20°. Automatic advance begins at 350 R.P.M. and reaches a maximum of 20° at 3200 R.P.M.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every week or each 250 miles. Put a small bit of vaseline on the face of the breaker cam every month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

STARTER:—Models MP-4102 and MN-4111. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter Model MP cranks the engine at 160 R.P.M. taking 145 amperes at 5 volts. Generator brush spring tension is 24-28 ounces.

Starter Data—Model MP

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	5	78
2 "	2050	5	200
4 "	1320	4.5	300
8 "	300	3.5	500
11.5 "	Lock	2.6	530

Mounting:—Starter is mounted at right of engine. To remove starter, remove the mounting cap screws and slide starter forward from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the drive end of the starter every two weeks or each 500 miles.

GENERATOR:—Model GY-4102-A. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust output, remove commutator cover band and move third brush mounting stud by tapping with a screwdriver. Shifting the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. Maximum charging rate is 15 amperes reached at 1500 R.P.M. or 23 M.P.H. Generator brush tension should be 1¼-1½ pounds each.

Generator Data

Cold Test				Hot Test			
Amperes	Volts	R.P.M.	M.P.H.	Amperes	Volts	R.P.M.	M.P.H.
0	6.4	550	8	0	6.5	650	9
2	6.6	640	9	2	6.5	720	11
10	7.4	940	14	10	7.5	1200	11
15	7.85	1500	23	12	7.9	1700	26
12	7.6	2200	33	10	7.7	2400	36

Motoring freely at 150 R.P.M. generator draws 4.5 amperes at 6 volts. Shunt field current is 3.25 amperes at 6 volts. Generator brush tension should be 1 pound each.

Mounting:—Generator is mounted at right of engine by a bell housing. To remove, remove mounting cap screws and lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every 1000 miles.

RELAY:—Model CB-4007. Relay is mounted on top of generator. Relay contacts close at 550 R.P.M. or 9 M.P.H. when the voltage of the generator reaches 6.4 volts and open at 8 M.P.H. with a discharge current of 1½-2½ amperes. Charging current at closing of contacts is 0-2 amperes. Contacts separate .025 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING:—Clum Switch Model 10544. Head lamps are each 6-8 volt, 21 cp. S.C. Dash, tail, side and dome lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Lighting fuse is 20 amperes.

FLINT

MODEL B-60 (1926-27)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

BATTERY.—U. S. L. Type 3-HVX-5X. 6 volt. Starting capacity is 106 amperes for 20 minutes. Lighting capacity is 5 amperes for 18.4 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model IG-4063. Distributor Model IG-4118-A-C. Breaker contacts separate .020-.024 inch. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Ignition current is 1-3 amperes with engine running and 3.4-5 amperes with engine stopped. Distributor is of the semi-automatic type. Manual advance is 20°. Automatic advance begins at 350 R.P.M. and reaches a maximum of 20° at 3200 R.P.M.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every week or each 250 miles. Put a small bit of vaseline on the face of the breaker cam every month.

Timing.—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER.—Models MP-4102 and MN-4111. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter Model MP cranks the engine at 160 R.P.M. taking 145 amperes at 5.3 volts. Starter Model MN cranks engine at 120 R.P.M. taking 120 amperes at 5.4 volts. Brush tension should be 1¼-1½ pounds each.

Starter Data—Model MP

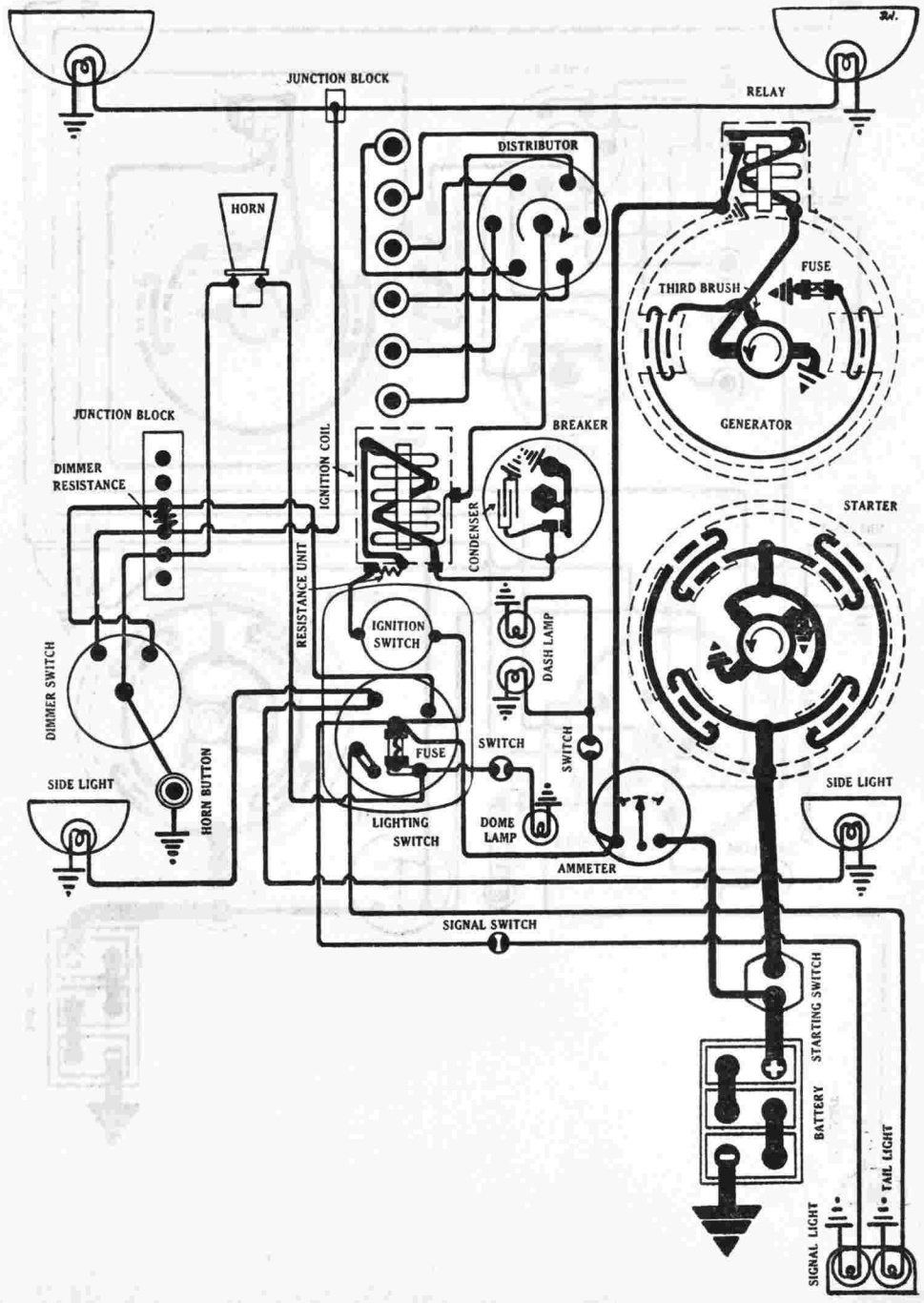
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	5	78
1 "	2800	5.25	150
2 "	2050	5	200
4 "	1320	4.5	300
8 "	300	3.5	500
11.5 "	Lock	2.6	530

Starter Data—Model MN

Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	Free	5.5	45	(No Bendix)
0 "	Free	5.5	50	(With Bendix)
.5 "	2800	5.5	100	
2.4 "	1450	5.0	200	
4.8 "	950	4.5	300	
7.2 "	650	4	400	
13.5 "	Lock	3	540	

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the drive end of the starter every two weeks or each 500 miles.

GENERATOR.—Model GY-4102-A. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust output, remove commutator cover band and move third brush mounting stud by tapping with a screwdriver. Shifting the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. Maximum charging rate is 15 amperes reached at 1500 R.P.M. or 23 M.P.H. Generator brush tension should be 1¼-1½ pounds each.



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MODEL B-60 (1926-27)

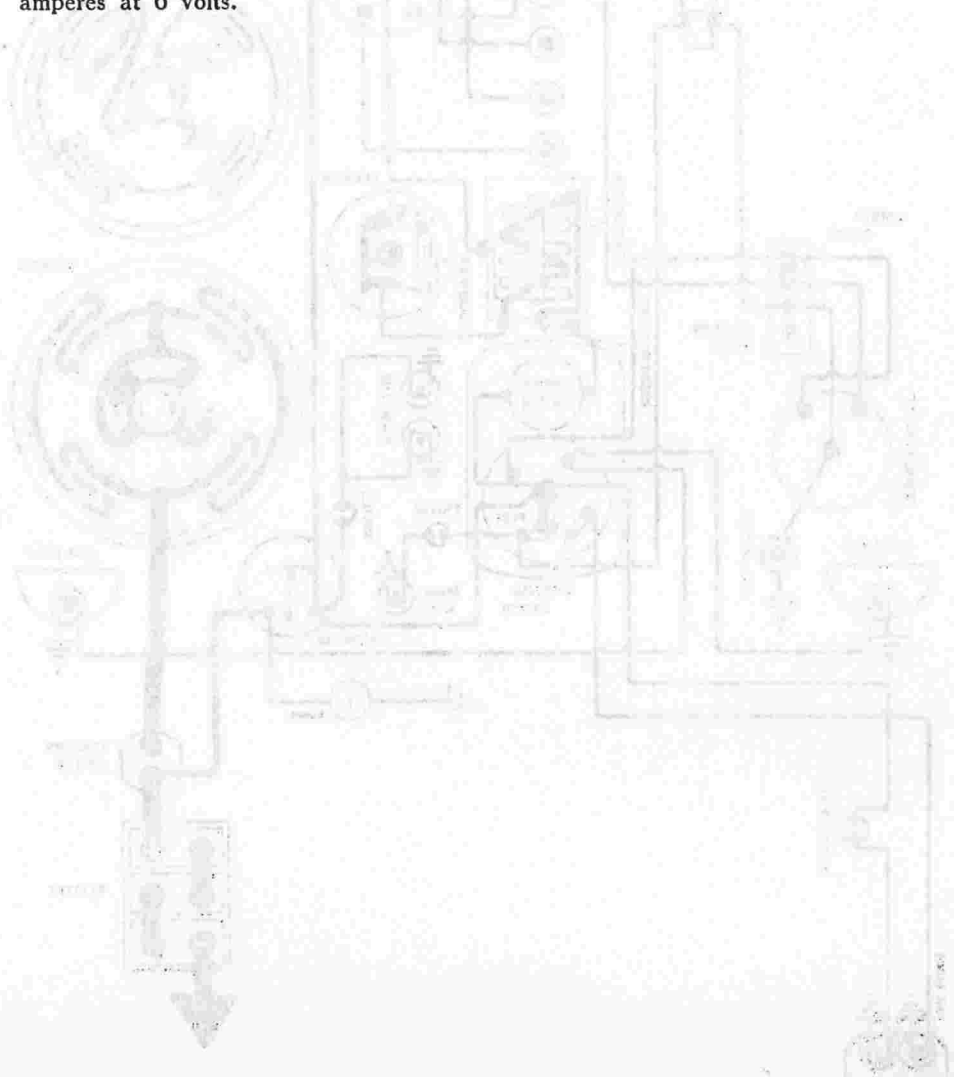
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

Generator Data

Cold Test				Hot Test			
Amperes	Volts	R.P.M.	M.P.H.	Amperes	Volts	R.P.M.	M.P.H.
0	6.4	550	8	0	6.5	650	9
2	6.6	640	9	2	6.6	720	11
10	7.4	940	14	10	7.5	1200	18
15	7.85	1500	23	12	7.9	1700	26
12	7.6	2200	33	10	7.7	2400	36

Motoring freely at 300-400 R.P.M., generator takes 4.5-5 amperes at 6 volts. Shunt field current is 3.25 amperes at 6.2 volts. Tested separately coils draw 7.5 amperes at 6 volts.



Oiling.—Put 4 or 5 drops of light engine oil in oiler on commutator end of the generator every two weeks or each 500 miles.

RELAY.—Model CB-4007. Relay is mounted on top of the generator. Relay closes at 560 R.P.M. or 8 M.P.H. when the voltage of the generator reaches 6.5-7.5 volts and opens at 550 R.P.M. with a discharge current of .5-2.5 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING.—Switch Clum Model 10549. Head and stop lamps are 6-8 volt, 21 cp. S. C. Dash, dome, side and tail lamps are 6-8 volt, 2 cp. S. C.

FUSES.—Generator field fuse is 5 amperes. Lighting fuse is 20 amperes.

FLINT

MODEL E-80 (1926-27)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

BATTERY.—U. S. L., Type 3-HVX-6X. 6 volt. Starting capacity is 127 amperes for 20 minutes. Lighting capacity is 5 amperes for 23.4 hours. The negative (—) terminal is grounded

IGNITION.—Coil Model IG-4062. Distributor Model IG-4121. Breaker contacts separate .020-.024 inch. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Distributor is of the manual type. Manual advance is 50°.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every week or each 250 miles. Put a small bit of vaseline on the face of the breaker cam every month.

Timing.—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER.—Model MN-4110. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 1¼-1½ pounds each. Starter cranks the engine at 160 R.P.M., taking 180 amperes at 5.2 volts.

Starter Data

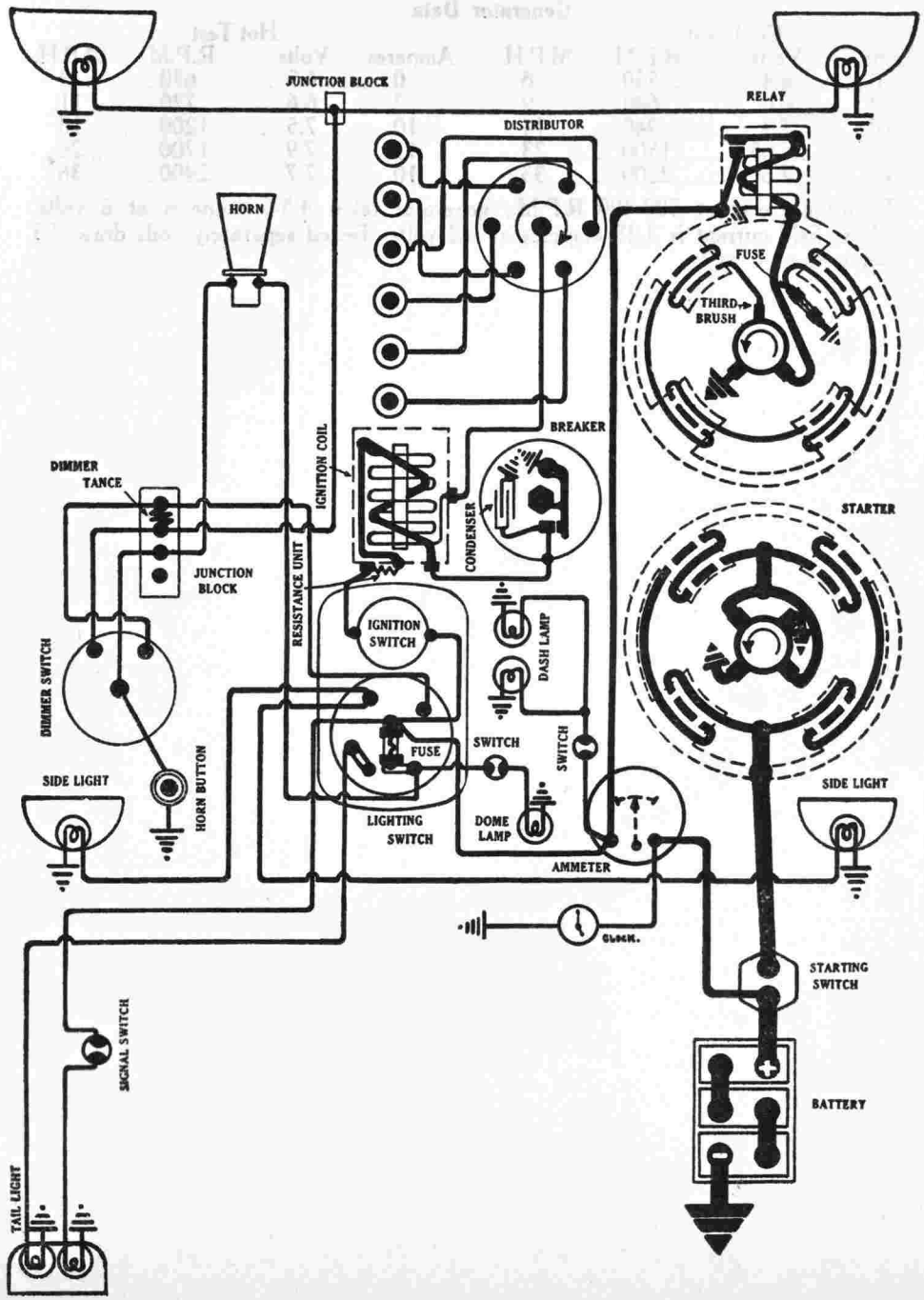
Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	Free	5.5	45	(No Bendix)
0 "	Free	5.5	50	(With Bendix)
0.5 "	2800	5.5	100	
1 "	2100	5.2	130	
2 "	1600	5.1	180	
2.4 "	1450	5	200	
4 "	1100	4.6	265	
4.8 "	950	4.5	300	
7.2 "	650	4	400	
13.5 "	Lock	3	540	

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the drive end of the starter every month or each 1000 miles.

GENERATOR.—Model GRA-4101. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust charging rate, remove commutator cover band and shift third brush mounting stud by prying with a screwdriver. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. Maximum charging rate is 16 amperes, reached at 1300 R.P.M. or 24 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	400	0	6.5	480
2	6.6	450	2	6.8	575
5	6.9	550	5	7.1	650
10	7.4	700	10	7.6	950
15	7.85	1100	12	7.7	1200
16	8	1300	10	7.5	2200
10	7.6	2200			



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MODEL E-80 (1926-27)

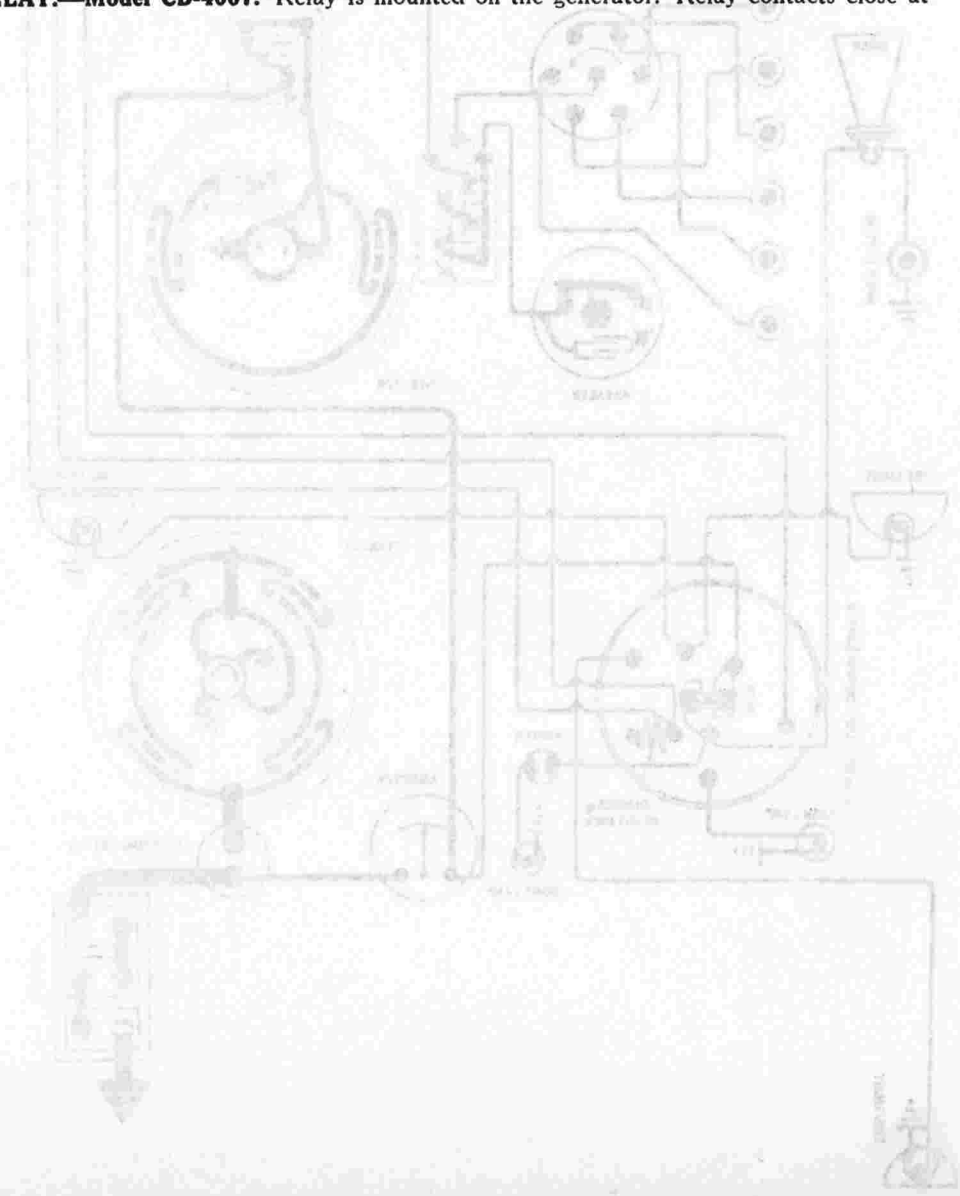
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

Motoring freely at 150 R.P.M. generator draws 5 amperes at 6 volts. Shunt field current is 2.5 amperes at 6.2 volts. Tested separately each coil draws 9.6 amperes at 6 volts. Brush spring tension should be 1¼-1½ pounds each.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY.—Model CB-4007. Relay is mounted on the generator. Relay contacts close at 7.5 M.P.H. when the voltage of the generator reaches 6.4-7.5 volts and opens with a discharge current of .5-2.5 amperes. Contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.



LIGHTING.—Clum Switch Model 10549. Head and stop lamps are each 6-8 volt, 21 cp. S. C. Dash, dome, tail and side lamps are each 6-8 volt, 2 cp. S. C.

FUSES.—Generator field fuse is 5 amperes. Lighting fuse is 20 amperes.

FLINT

JUNIOR MODEL Z-18 (1927)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L. Type 3-CVX-5X, 6 volt, 84 ampere hour. Starting capacity is 96 amperes for 20 minutes. Lighting capacity is 5 amperes for 16.8 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model IG-4070. Distributor Model IG-4118-A. Breaker contacts separate .020-.024 inch. Resurface contacts whenever necessary with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Maximum manual advance is 20° (engine). Automatic advance begins at 350 R.P.M. (engine). Maximum automatic advance is 20° reached at 3200 R.P.M. Breaker arm spring tension is 20 ounces. Ignition current is 1-3 amperes with engine running and 3.4-5 amperes with engine stopped.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every 250 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position.

Mounting:—Distributor is mounted on the rear of the generator. To remove distributor, remove the set screw and lift unit from place.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Model MP-4102. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension is 1¼-1½ pounds each. Starter cranks the engine at 175 R.P.M. taking 180 amperes at 4.5 volts.

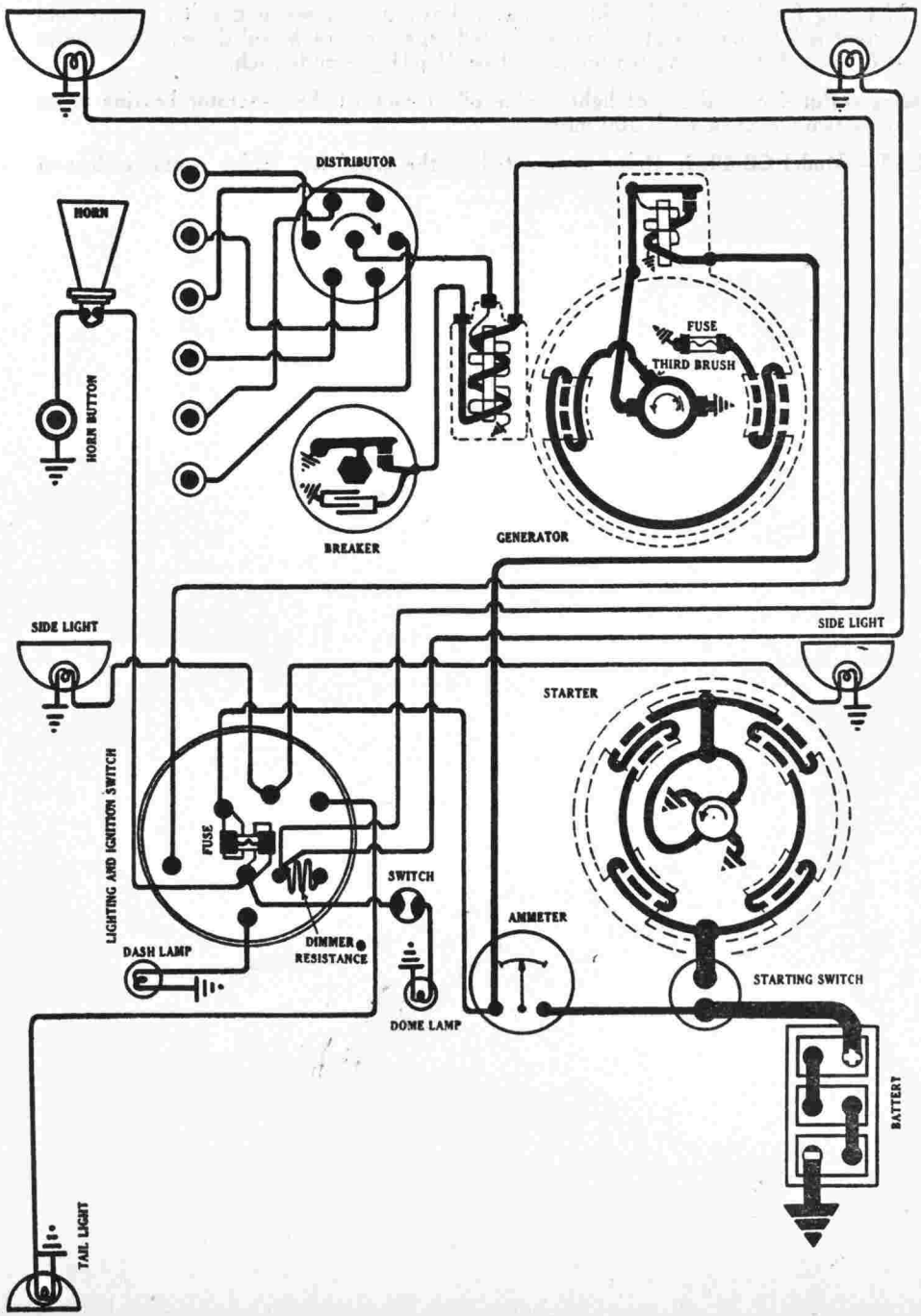
Starter Data

Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	4000	5	45	(Without Bendix)
0 "	4000	5	50	(With Bendix)
1 "	2800	5.2	150	
2 "	2050	5	200	
4 "	1320	4.5	300	
8 "	300	3.5	500	
12.5 "	Lock	3	650	

Mounting:—Starter is mounted at right of engine. To remove starter, remove the mounting cap screws and slide starter forward from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the drive end of the starter every 1000 miles.

GENERATOR:—Model GYA-4204. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the charging rate, remove the generator cover band and shift the third brush. Shifting the brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. The maximum charging rate is 15 amperes reached at 1500 R.P.M of the generator or 25 M.P.H.



FLINT

JUNIOR MODEL Z-18 (1927)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

Generator Data

Cold Test (78°)			Hot Test (240°)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	550	0	6.5	650
2	6.6	640	2	6.6	720
10	7.4	940	10	7.5	1200
15	7.85	1500	12	7.9	1700
12	7.6	2200	10	7.7	2400

Motoring freely at 150 R.P.M. generator draws 4.5 amperes at 6 volts. Shunt field current is 3.25 amperes at 6 volts. Generator brush tension should be 1 pound each.

Mounting:—Generator is mounted at right of engine by a bell housing. To remove, remove mounting cap screws and lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every 100 miles.

RELAY:—Model CB-4007. Relay is mounted on top of the generator. Relay contacts close at 550 R.P.M. or 9 M.P.H. when the voltage of the generator reaches 7-7.5 volts and open at 8 M.P.H. with a discharge current of 1½-2½ amperes. Charging current at closing of contacts is 0-2 amperes. Contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING:—Clum Switch Model 10544. Head lamps are each 6-8 volt, 21 cp. S.C. Dash, tail, side and dome lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Lighting fuse is 20 amperes.

FLINT

MODEL B-60 (1927-28)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L. Type 3-HVX-5X, 6 volt, 92 ampere hour. Starting capacity is 106 amperes for 20 minutes. Lighting capacity is 5 amperes for 18.4 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model IG-4063. Distributor Model IG-4118-C. Breaker contacts separate .020-.024 inch. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Ignition current is 1-3 amperes with engine running and 3.4-5 amperes with engine stopped. Distributor is of the semi-automatic type. Manual advance is 20°. Automatic advance begins at 350 R.P.M. and reaches a maximum of 20° at 3200 R.P.M.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every week or each 250 miles. Put a small bit of vaseline on the face of the breaker cam every month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Model MN-4111. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 1¼-1½ pounds each. Starter cranks the engine at 120 R.P.M. taking 120 amperes at 5.4 volts.

Starter Data

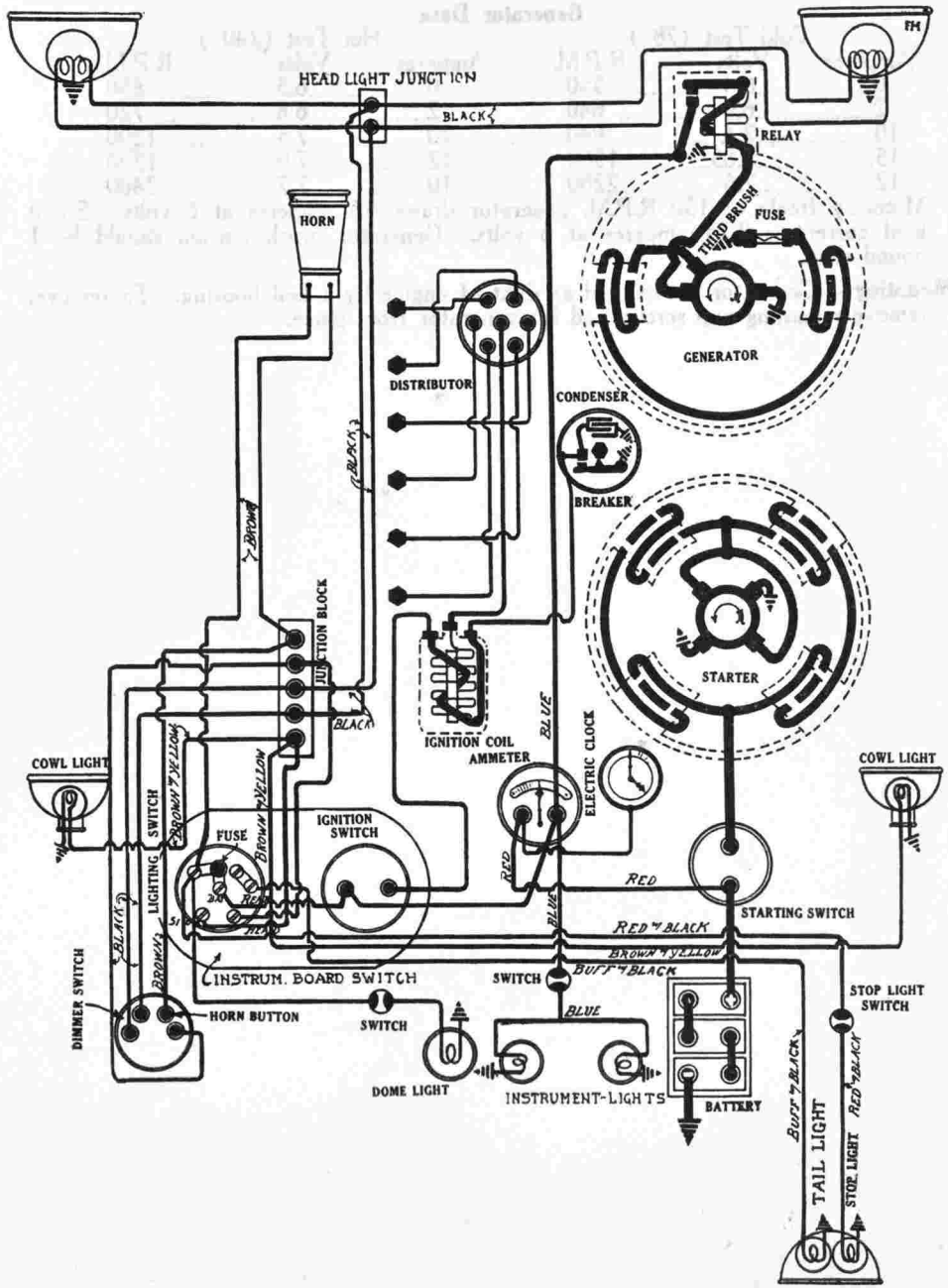
Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	Free	5.5	45	(No Bendix)
0 "	Free	5.5	50	(With Bendix)
.5 "	2800	5.5	100	
2.4 "	1450	5.0	200	
4.8 "	950	4.5	300	
7.2 "	650	4	400	
13.5 "	Lock	3	540	

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the drive end of the starter every two weeks or each 500 miles.

GENERATOR:—Model GYA-4203-A. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust output, remove commutator cover band and move third brush mounting stud by tapping with a screwdriver. Shifting the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. Maximum charging rate is 15 amperes reached at 1500 R.P.M. or 23 M.P.H. Generator brush tension should be 1¼-1½ pounds each.

Generator Data

Cold Test				Hot Test			
Amperes	Volts	R.P.M.	M.P.H.	Amperes	Volts	R.P.M.	M.P.H.
0	6.4	550	8	0	6.5	650	9
2	6.6	640	9	2	6.6	720	11
10	7.4	940	14	10	7.5	1200	18
15	7.85	1500	23	12	7.9	1700	26
12	7.6	2200	33	10	7.7	2400	36



FLINT

MODEL B-60 (1927-28)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

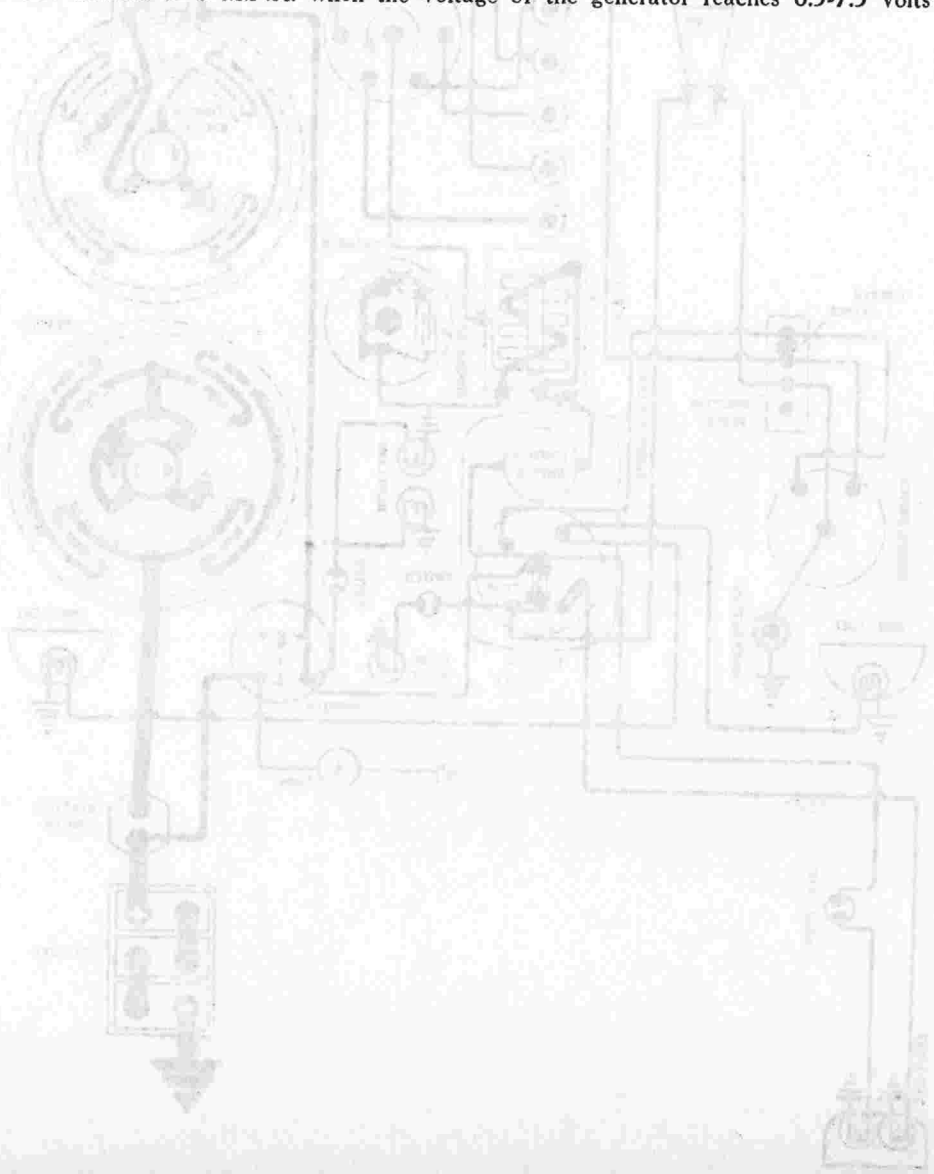
Motoring freely at 300-400 R.P.M. generator takes 4.5-5 amperes at 6 volts. Shunt field current is 3.25 amperes at 6.2 volts. Tested separately coils draw 7.5 amperes at 6 volts.

Oiling:—Put 4 or 5 drops of light engine oil in oiler on commutator end of the generator every two weeks or each 500 miles.

RELAY:—Model CB-4007. Relay is mounted on top of the generator. Relay closes at 560 R.P.M. or 8 M.P.H. when the voltage of the generator reaches 6.5-7.5 volts and opens at 550 R.P.M. with a discharge current of .5-2.5 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING:—Clum Switch Model 10549. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Stop lamp is 6-8 volt, 21 cp. S.C. Dash, dome, side and tail lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuse on switch is 20 amperes.



FLINT

MODEL E-80 (1927-28)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION COIL—DE JON DISTRIBUTOR

BATTERY:—U.S.L., Type 3-HVX-6X, 6 volt. Starting capacity is 127 amperes for 20 minutes. Lighting capacity is 5 amperes for 23.4 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model IG-4062. Distributor Model IA-4001. Breaker contacts separate .015 inch. They are made of tungsten. Resurface contacts whenever necessary with a fine flat contact file or on a medium hard oilstone.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every week or each 250 miles. Put a small bit of vaseline on the face of the breaker cam every month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position. To set timing, crank engine until piston No. 1 reaches top dead center on compression stroke (the upstroke with both valves closed). Loosen taper screw in center of breaker cam and rotate cam until contacts begin to separate. Tighten the screw. Make certain that the arrow on the cam points in the direction of rotation (clockwise).

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

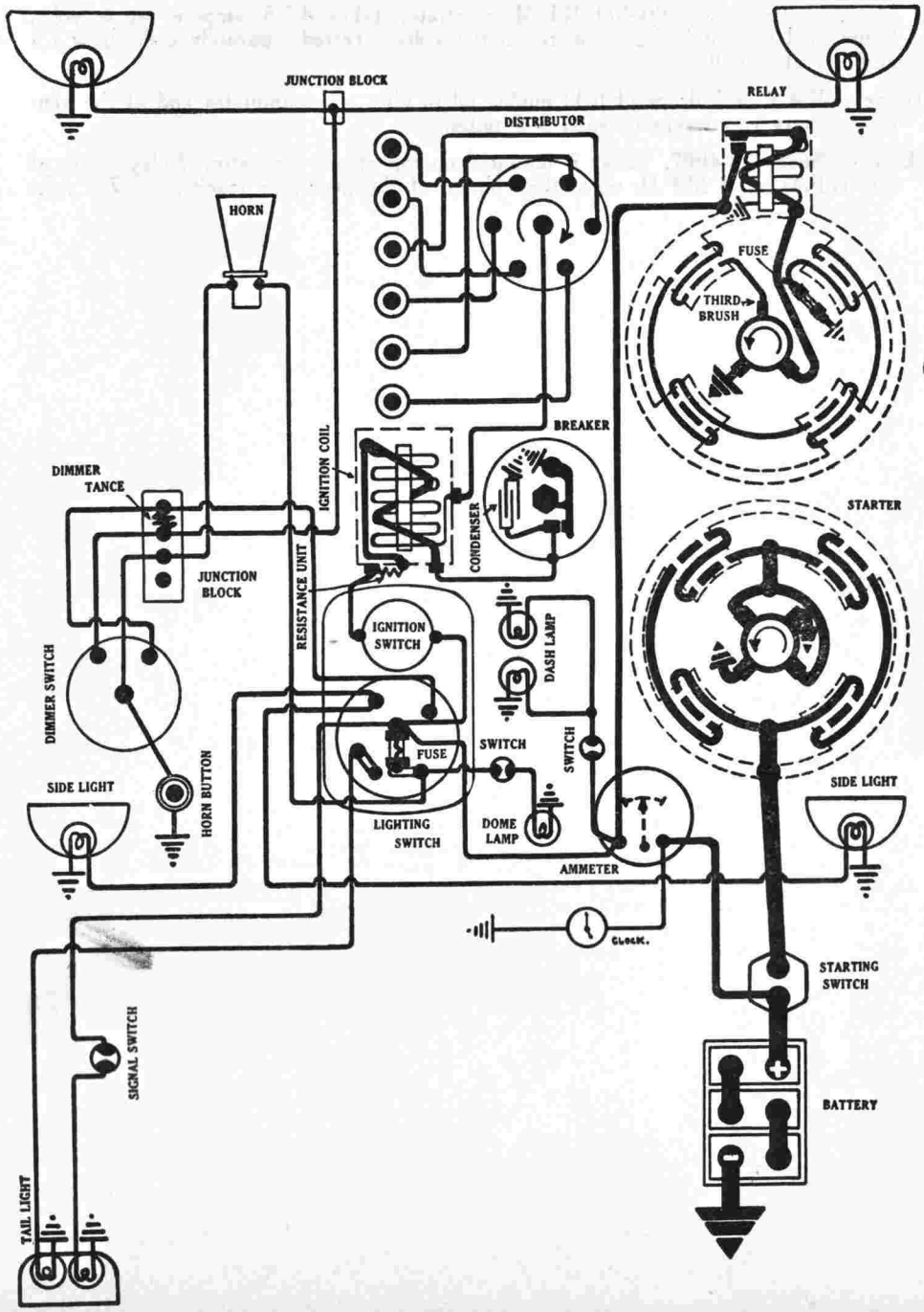
STARTER:—Model MN-4110. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 1¼-1½ pounds each. Starter cranks the engine at 160 R.P.M., taking 180 amperes at 5.2 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	Free	5.5	45	(No Bendix)
0 "	Free	5.5	50	(With Bendix)
0.5 "	2800	5.5	100	
1 "	2100	5.2	130	
2 "	1600	5.1	180	
2.4 "	1450	5	200	
4 "	1100	4.6	265	
4.8 "	950	4.5	300	
7.2 "	650	4	400	
13.5 "	Lock	3	540	

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the drive end of the starter every month or each 100 miles.

GENERATOR:—Model GRA-4101. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust charging rate, remove commutator cover band and shift third brush mounting stud by prying with a screwdriver. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. Maximum charging rate is 16 amperes, reached at 1300 R.P.M. or 24 M.P.H.



FLINT

MODEL E-80 (1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION COIL — DE JON DISTRIBUTOR

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	400	0	6.5	480
2	6.6	450	2	6.8	575
5	6.9	550	5	7.1	650
10	7.4	700	10	7.6	950
15	7.85	1100	12	7.7	1200
16	8	1300	10	7.5	2200
10	7.6	2200			

Motoring freely at 150 R.P.M. generator draws 5 amperes at 6 volts. Shunt field current is 2.5 amperes at 6.2 volts. Tested separately each coil draws 9.6 amperes at 6 volts. Brush spring tension should be 1¼-1½ pounds each.

Oiling: Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Model CB-4007. Relay is mounted on the generator. Relay contacts close at 7.5 M.P.H. when the voltage of the generator reaches 6.4-7.5 volts and opens with a discharge current of .5-2.5 amperes. Contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING:—Clum Switch Model 10549. Head and stop lamps are each 6-8 volt, 21 cp. S.C. Dash, dome, tail and side lamps are each 6-8 volt, 2 cp. S.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuse is 20 amperes.

Ford

Model T

Ford Generating, Lighting and Ignition System

Magneto.—The magneto is carried in the flywheel housing. It delivers alternating currents to four vibrator coils as the timer closes the circuit in the proper sequence. Sixteen permanent horse shoe magnets, mounted on the flywheel, revolve in front of sixteen stationary coils. The clearance between the soft iron cores of the coils, and the pole pieces of the revolving element should be .031 inch (1-32 inch). To remove the magneto it is necessary to remove the engine, crank case and transmission cover. Then take out the four cap screws that hold the flywheel to the crank shaft. When a new set of magnets is received from the service station, they are arranged on a board in their proper order. Like poles of adjacent magnets must be together. To take out the old magnets, simply remove the cap and bronze screws which hold them in place. See that the connection between terminal of magneto winding and binding post connection in top of crank case cover is clean.

Timer.—Timer spring should be strong enough to insure a good contact between roller and segments. If badly worn, timer should be replaced. To remove timer, remove cotter pin from spark control rod and detach latter. Loosen cap screw which goes through breather pipe. This will loosen the spring which holds the timer in place, and it can easily be removed. Unscrew lock nut, withdraw steel brush cap and drive out the retaining pin. It can then be removed from the cam shaft. In replacing the brush, be sure that the exhaust valve on No. 1 cylinder is closed when the brush points upward. This may be done by removing valve door and watching No. 1 valve.

Oiling.—Timer must be kept clean and well oiled at all times. Put 8 or 10 drops of light engine oil in the oiler every two weeks. In very cold weather, about one-fourth kerosene and three-fourths lubricating oil should be used in timer, as oil alone will often form a film over contacts which roller cannot remove, preventing electrical connection.

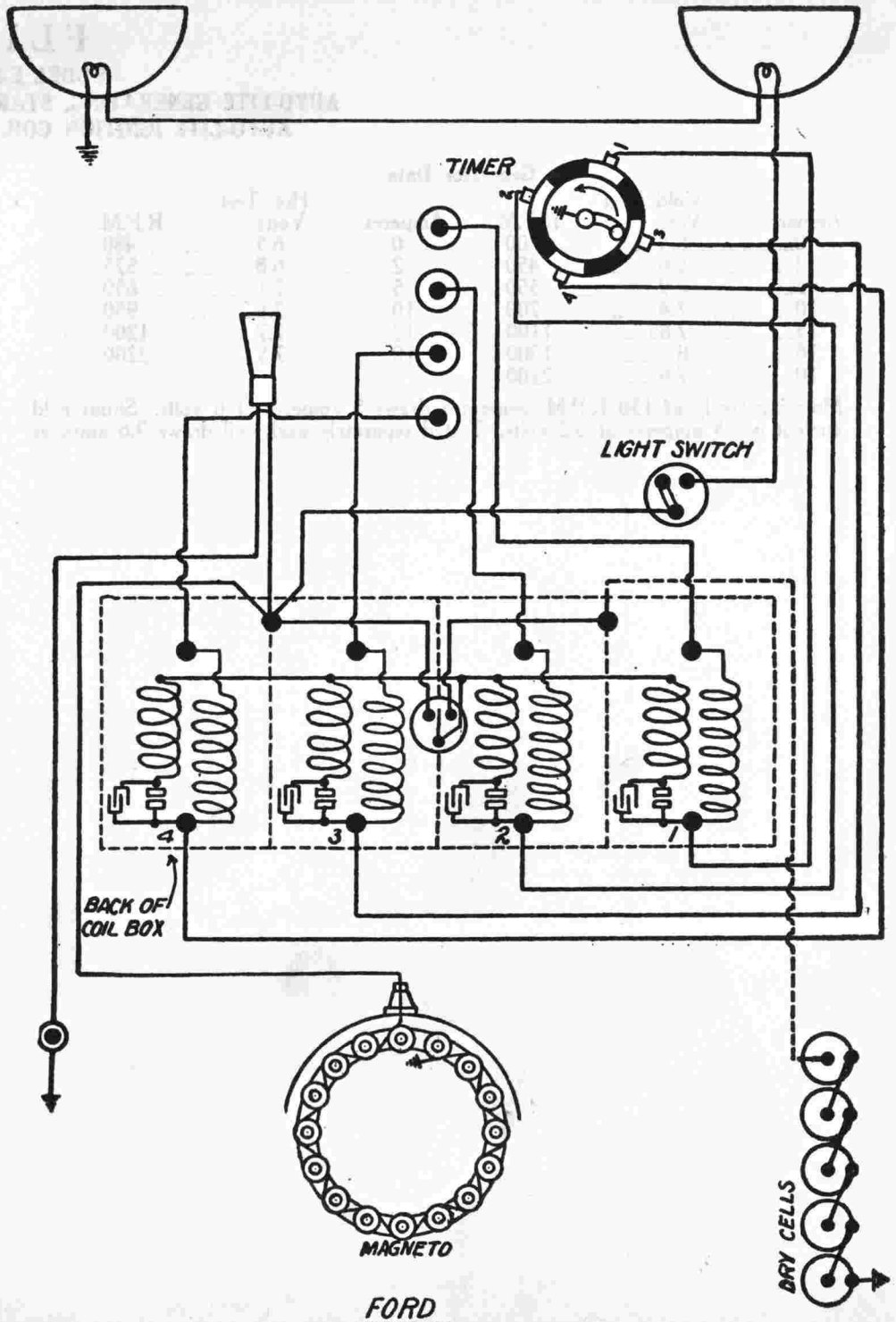
Timing.—Timer roller should just make connection with the segment connected to No. 1 coil when No. 1 piston is on top dead center entering power stroke, spark control lever and timer housing in the fully retarded position.

Firing Order.—The firing order is 1, 2, 4, 3.

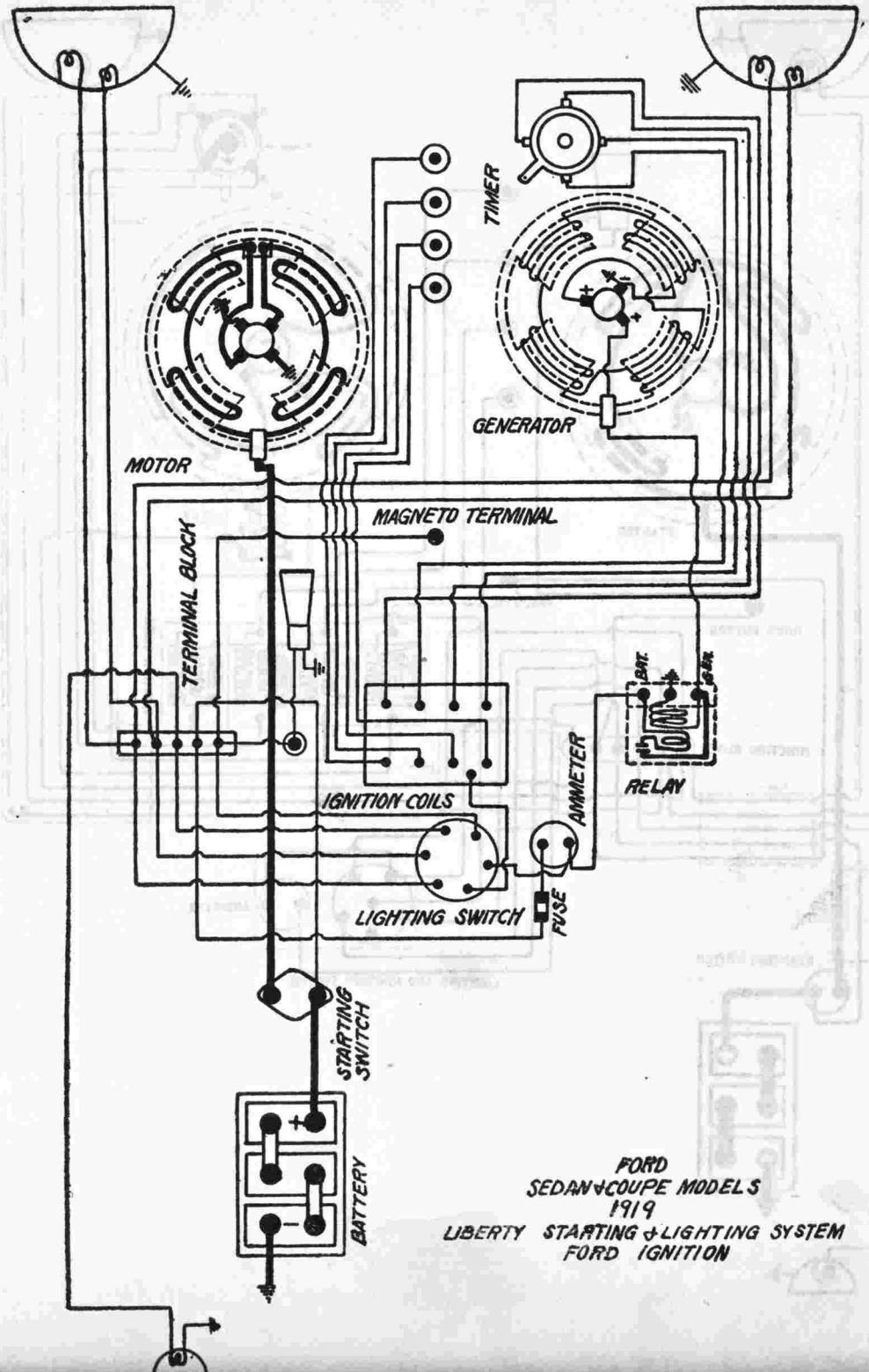
Spark Plug Gaps.—Spark plug gaps should be .030 inch to .032 inch.

Vibrator Coils.—When the vibrating arms are held down, the gap between the contacts should be .027 inch to .030 inch. An adjusting nut and lock nut are provided on the stationary arm for making this adjustment. Clean vibrator contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a fine, flat jeweler's file or a strip of well worn No. 00 sand paper. Draw a piece of unglazed paper between them to remove all grit, and adjust before again putting into service. Constant buzzing of one or more coils will indicate a ground in wiring from timer. If the spring on the vibrator is too tight, it will take an excessive amount of current to pull it down, making starting hard. Pitted or dirty contacts will cause missing. To find a missing cylinder, hold down vibrators on No. 1 and No. 4 coils. If cylinders 2 and 3 fire irregularly, hold down vibrators on coils 1 and 2, and free 1 and 4. If one of the two then free to operate is missing, hold down one more vibrator. Examine spark plug, wiring and vibrator of the missing cylinder.

To Install Dry Cells.—Five dry cells should be used, connected in series. Ground one terminal to the car frame, and connect the other battery terminal to the lower left hand post on the coil box, when viewed from the back of the dash.



FORD
MODEL T
FORD IGNITION AND LIGHTING SYSTEM



FORD

MODEL T—SEDAN AND COUPE MODELS (1919-20)
LIBERTY F. A. STARTING AND LIGHTING SYSTEM
FORD IGNITION

BATTERY:—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION:—See ignition data on preceding page.

Starter.—The starter is connected to the engine through a Bendix drive. Without load, starter should draw 70 amperes at 5.7 volts. It should crank the normal engine at 150 R. P. M., taking 160 amperes at 5 volts. Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current.

To remove the starter it is necessary to first remove the engine pan on the left hand side of the engine. Then remove the starter shaft cover from the transmission cover by taking out the four small screws. Turn the Bendix drive shaft around so that the set screw on the end of the shaft is in a horizontal position and points outward. Under the set screw is a lock washer with two extensions on opposite sides, one being turned against the collar and the other against the side of the set screw head. Bend back the extension which has been forced against the screw and remove the latter. Then pull the Bendix assembly out of the housing. Next remove the four screws which hold the starter housing to the transmission cover and pull out the starter, taking it down through the chassis.

Oiling.—Starter requires no oiling. The rear bearing receives oil by splash from the flywheel, and the forward bearing is of the oilless type.

Generator.—Generator current regulation is by third brush method. Normal maximum output should be 10 amperes at 20 miles per hour, or 1200 R. P. M., of generator armature. Maximum output may be varied from 8 to 12 amperes by altering the position of the third brush. Third brush holder is fastened to the brush ring by a bolt which is free to move in a slot in the ring, when its nut is loosened. Cold resistance of the four field coils should be 2.45 ohms. The generator is removed by taking out the three cap screws holding it to the front end cover, and forcing it backward and downward by inserting a screw driver between the generator and front end cover. If engine is run with battery disconnected from the generator, be sure to ground the generator terminal to the frame or engine.

Oiling.—Put 4 or 5 drops of light engine oil in the rear bearing oiler every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—Relay is mounted either on the dash (see Plate 423), or on top of generator frame (Plate 424). Relay should close at 10 miles per hour or 600 R. P. M., of generator armature, and should open at 8 miles per hour, or 480 R. P. M., of generator armature. Charging current at closing should be 2-3 amperes, and discharge current 0-2 amperes at opening of relay contacts. Relay may be adjusted by bending the spring on the movable arm or by adjusting the distance between the contacts. The contact points should separate .032 inch. Clean relay contacts by drawing a piece of unglazed paper between, them. If badly burned or pitted, resurface with a strip of worn No. 00 sand paper and then draw a piece of unglazed paper between them to remove all grit and adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

FORD

1921-1922

LIBERTY GENERATING, STARTING AND LIGHTING SYSTEM
FORD IGNITION

BATTERY.—Ford, Exide, U. S. L., or Prest-O-Lite, 6 volt, 80 ampere--hour. The negative (—) terminal is grounded.

IGNITION:—The magneto is carried in the flywheel housing. There should be a clearance of .031 inch between the coil cores and the magnet pole pieces. The magneto delivers alternating current to four vibrator ignition coils, one connected to each spark plug, as the timer closes the circuit in the proper sequence. When the vibrator arm is held down, the contacts should separate .030 inch. If the contacts are badly burned or pitted, resurface with a fine, flat jeweler's file or on a medium hard oilstone. Coils should be adjusted to draw 1.3 amperes at 6 volts.

Oiling:—Put several drops of light engine oil in the spring oiler of the timer every two weeks. In cold weather a mixture of ¼ kerosene and ¾ light engine oil should be used.

Timing:—Timer roller should just make connection with segment connected to Number 1 coil when the piston in Number 1 cylinder is on top dead center of the power stroke, spark control lever and timer housing in the fully retarded position.

Firing Order:—The firing order is 1-2-4-3.

Spark Plug Gaps:—The spark plug gaps are .030 to .032 inch.

STARTER:—Type F.A. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 150 R.P.M., taking 160 amperes at 5 volts.

Starter Data—F.A.

Torque	R.P.M.	Volts	Amperes
1 lb. ft.	2500	5.5	125
5 lb. ft.	1050	4.4	330
9 lb. ft.	425	3.6	465
13 lb. ft.	Lock	3.0	580

Oiling:—Starter requires no oiling.

GENERATOR:—Type F.A. Generator current regulation is by the third brush system. Direction of rotation is counter-clockwise, looking at the commutator end.

Generator Data—F.A.

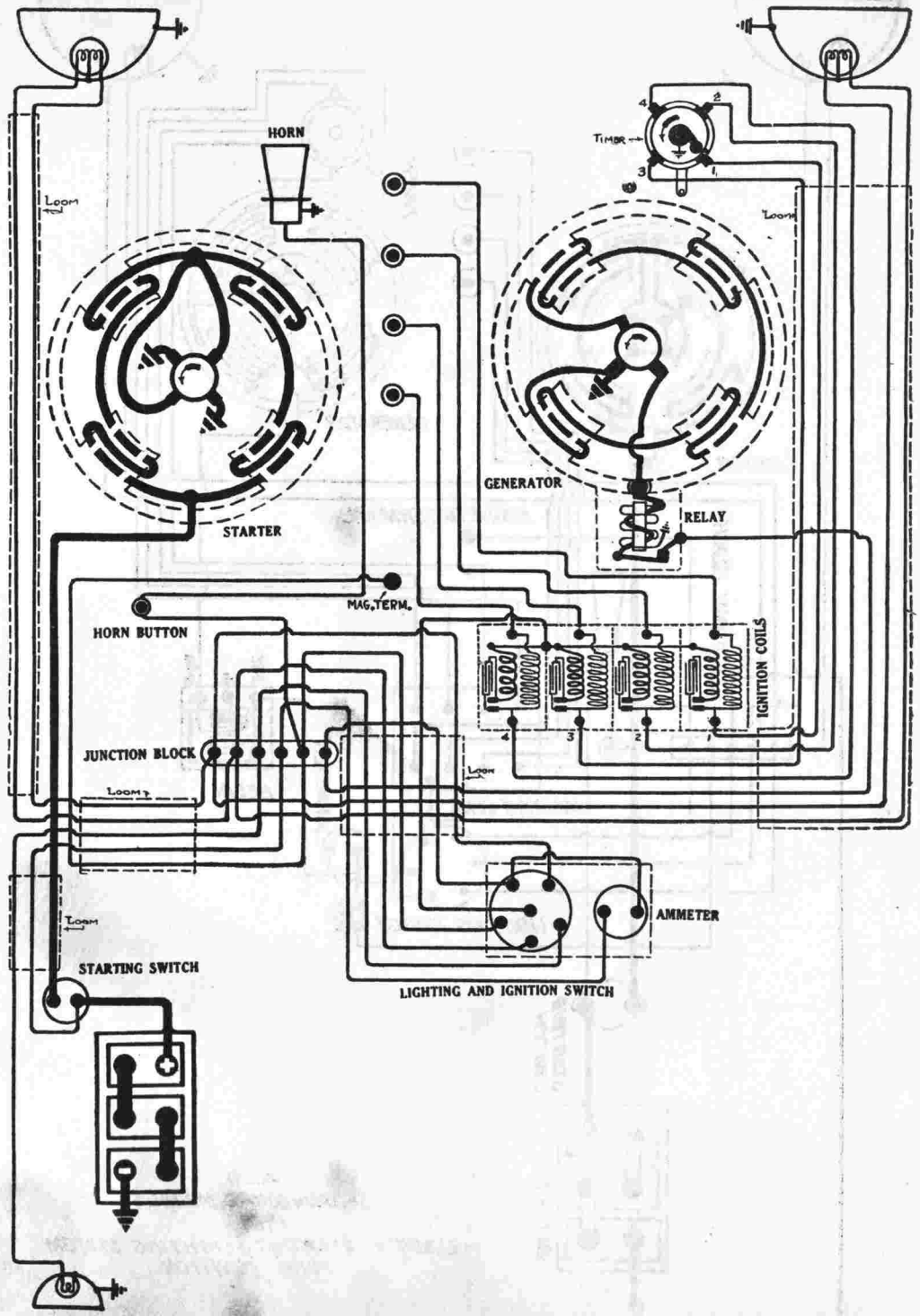
Amperes	Volts	R.P.M.
4.1	6.6	800
9.0	7.4	1100
11.5	7.9	1400
12.5	8.2	1700
11.0	8.1	2000

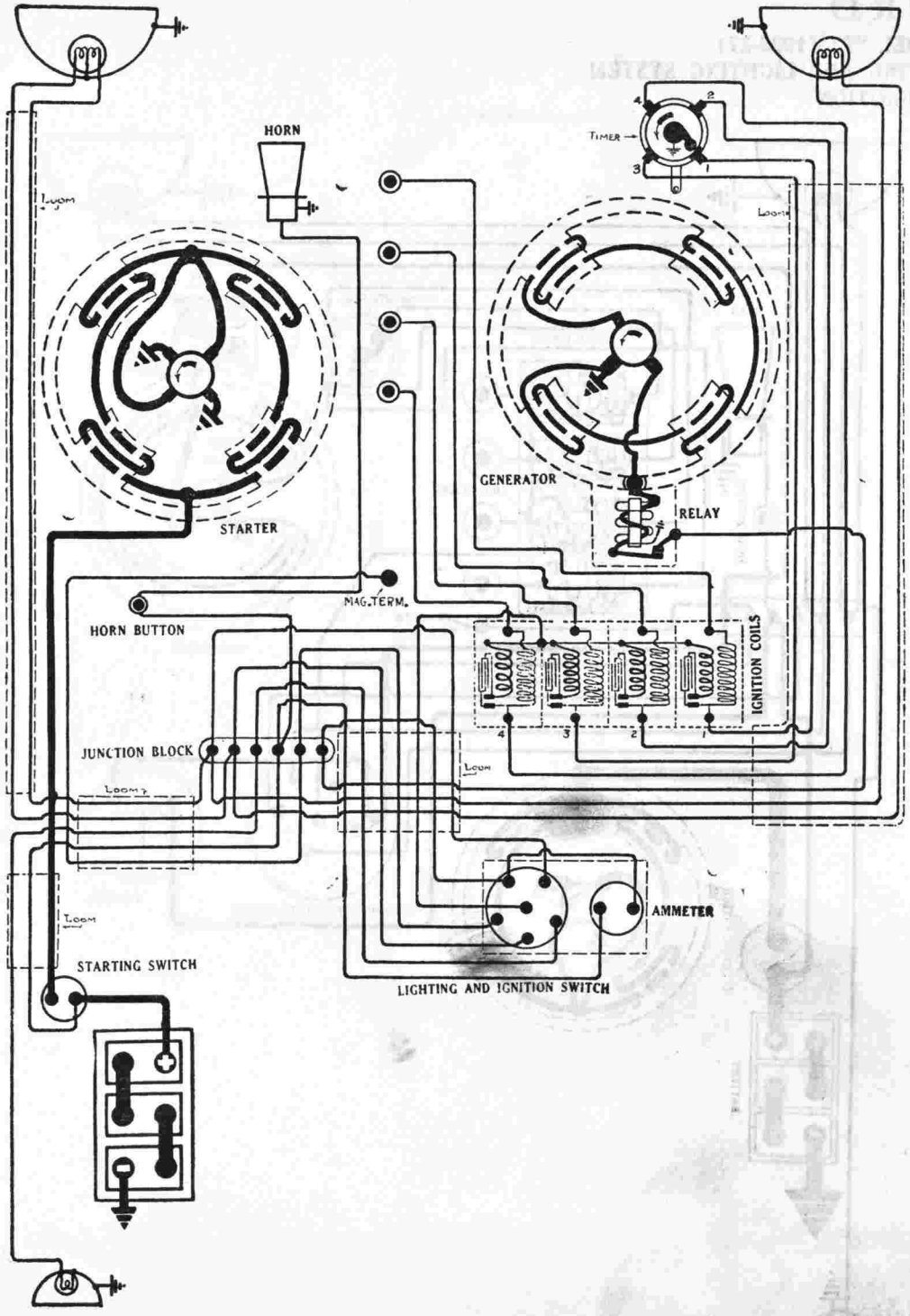
Charging rate is varied by adjustment of the third brush setting. Loosen the clamp nut holding the third brush holder. More third brush in the direction of armature rotation to increase the charging rate, or in the opposite direction to decrease the charging rate. Clamp the third brush after position adjustment. The generator fields draw 2.4 amperes at 6 volts.

Oiling:—Put 4 or 5 drops of light engine oil in the rear generator bearing oiler every two weeks. If the car is driven more than 500 miles in 2 weeks, the oiling must be done every 500 miles.

RELAY:—Relay is mounted on the generator frame. Relay closes at 600-650 R.P.M. of armature or 8-10 miles per hour, and opens at 550-600 R.P.M. of armature or 6-8 miles per hour, the discharge current being 0-2 amperes. Relay contacts separate .032 inch. If badly burned or pitted resurface with worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS:—Head lamps are 6-8 volt, 21 cp. Dimmer and tail lamps are 6-8 volt, 2 cp.





FORD

MODEL T (1923-24-25-26)
FORD GENERATING, STARTING AND LIGHTING SYTSEM
FORD IGNITION

BATTERY.—Ford or U. S. L. Type 3-HVX-5X, 6 volt. The starting capacity is 105 amperes for 20 minutes. Lighting capacity is 5 amperes for 18.4 hours. The negative (—) terminal is grounded.

IGNITION:—The magneto is carried in the flywheel housing. There should be a clearance of .031 inch, between the coil cores and the magnet pole pieces. The magneto delivers alternating current to four vibrator ignition coils, one connected to each spark plug, as the timer closes the circuit in the proper sequence. When the vibrator arm is held down, the contacts should separate .030 inch. If the contacts are badly burned or pitted resurface with a fine flat jeweler's file or on a medium hard oilstone. Coils should be adjusted to draw 1-3 amperes at 6 volts.

Oiling:—Put several drops of light engine oil in the spring oiler of the timer every two weeks. In cold weather a mixture of ¼ kerosene and ¾ light engine oil should be used.

Timing:—Timer roller should just make connection with segment connected to Number 1 coil when the piston in Number 1 cylinder is on top dead center of the power stroke, spark control lever and timer housing in the fully retarded position.

Firing Order:—The firing order is 1-2-4-3.

Spark Plug Gaps:—The spark plug gaps are .030 to .032 inch.

STARTER:—Type F.A. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks engine at 150 R.P.M., taking 160 amperes at 5 volts.

Starter Data—F.A.

Torque	R.P.M.	Volts	Amperes
1 lb. ft.	2500	5.5	125
5 lb. ft.	1050	4.4	330
9 lb. ft.	425	3.6	580
13 lb. ft.	Lock	3.0	580

Oiling:—Starter requires no oiling.

GENERATOR:—Type F.A. Generator current regulation is by the third brush system. Direction of rotation is counter-clockwise, looking at the commutator end.

Generator Data—F.A.

Amperes	Volts	R.P.M.
4.1	6.6	800
9.0	7.4	1100
11.5	7.9	1400
12.5	8.2	1700
11.0	8.1	2000

Charging rate is varied by adjustment of the third brush setting. Loosen the clamp nut holding the third brush holder. Move third brush in the direction of armature rotation to increase the charging rate, or in the opposite direction to decrease the charging rate. Clamp the third brush after position adjustment. The generator fields draw 2.4 amperes at 6 volts.

Oiling:—Put 4 or 5 drops of light engine oil in the rear generator bearing oiler every two weeks. If the car is driven more than 500 miles in 2 weeks, the oiling must be done every 500 miles.

RELAY:—Relay is mounted on the generator frame. Relay closes at 600-650 R.P.M. of armature or 8-10 miles per hour, and opens at 550-600 R.P.M. of armature or 6-8 miles per hour, the discharge current being 0-2 amperes. Relay contacts separate .032 inch. If badly burned or pitted resurface with worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS:—Head lamps are 6-8 volt, 21 cp. Dimmer and tail lamps are 6-8 volt, 2 cp.

FORD

IMPROVED MODEL "T" (1926-27)
FORD GENERATING, STARTING AND LIGHTING SYSTEM
FORD IGNITION

BATTERY:—Ford. 6 volt. Starting capacity is 98 amperes for 20 minutes. Lighting capacity is 5 amperes for 17 hours. The negative (—) terminal is grounded. Battery is mounted on the left frame member under the floor boards.

IGNITION.—The magneto is carried in the flywheel housing. There should be a clearance of .031 inch, between the coil cores and the magnet pole pieces. The magneto delivers alternating current to four vibrator ignition coils, one connected to each spark plug, as the timer closes the circuit in the proper sequence. When the vibrator arm is held down, the contacts should separate .030 inch. If the contacts are badly burned or pitted, resurface with a fine, flat jeweler's file or on a medium hard oilstone. Coils should be adjusted to draw 1.3 amperes at 6 volts.

Mounting:—Timer or commutator is mounted at front of engine on the forward end of the cam shaft. It is held in place by the commutator spring, a flat piece of metal bolted to the oil filler.

Oiling.—Put several drops of light engine oil in the spring oiler of the timer every two weeks. In cold weather a mixture of 1/4 kerosene and 3/4 light engine oil should be used.

Timing.—Timer roller should just make connection with segment connected to Number 1 coil when the piston in Number 1 cylinder is on top dead center of the power stroke, spark control lever and timer assembly in the fully retarded position. Number 1 coil is nearest the front of the engine and number 1 segment is the upper left hand terminal viewing timer from the front. Intake closes when piston is 3 1/8 inches below face of cylinder block on compression stroke. Exhaust opens when piston is 3 3/8 inches below face of cylinder block on power stroke.

Valve Timing:—INLET VALVES:—Head diameter, 1 15/32 inches; stem diameter, .3105 to .312 inch; stem length, 4.974 inches; tappet clearance, 1/32 to 1/64 inch; spring pressure, 30 to 34 pounds (open); valve lift, .225 inch; intake opens at 1/16 inch after top dead center and closes 9/16 inch past lower dead center. EXHAUST VALVES:—Head diameter, 1 15/32 inches; stem diameter, .3105 to .312 inch; stem length, 4.974 inches; tappet clearance, 1/32 inch to 1/64 inch; spring pressure, 30 to 34 pounds (open); valve lift, .225 inch; exhaust opens 5/16 inch before lower dead center and closes at top dead center. The guide stems are not removable. Oversize valve stems are made. A variance of .312 inch is allowed in stem diameter.

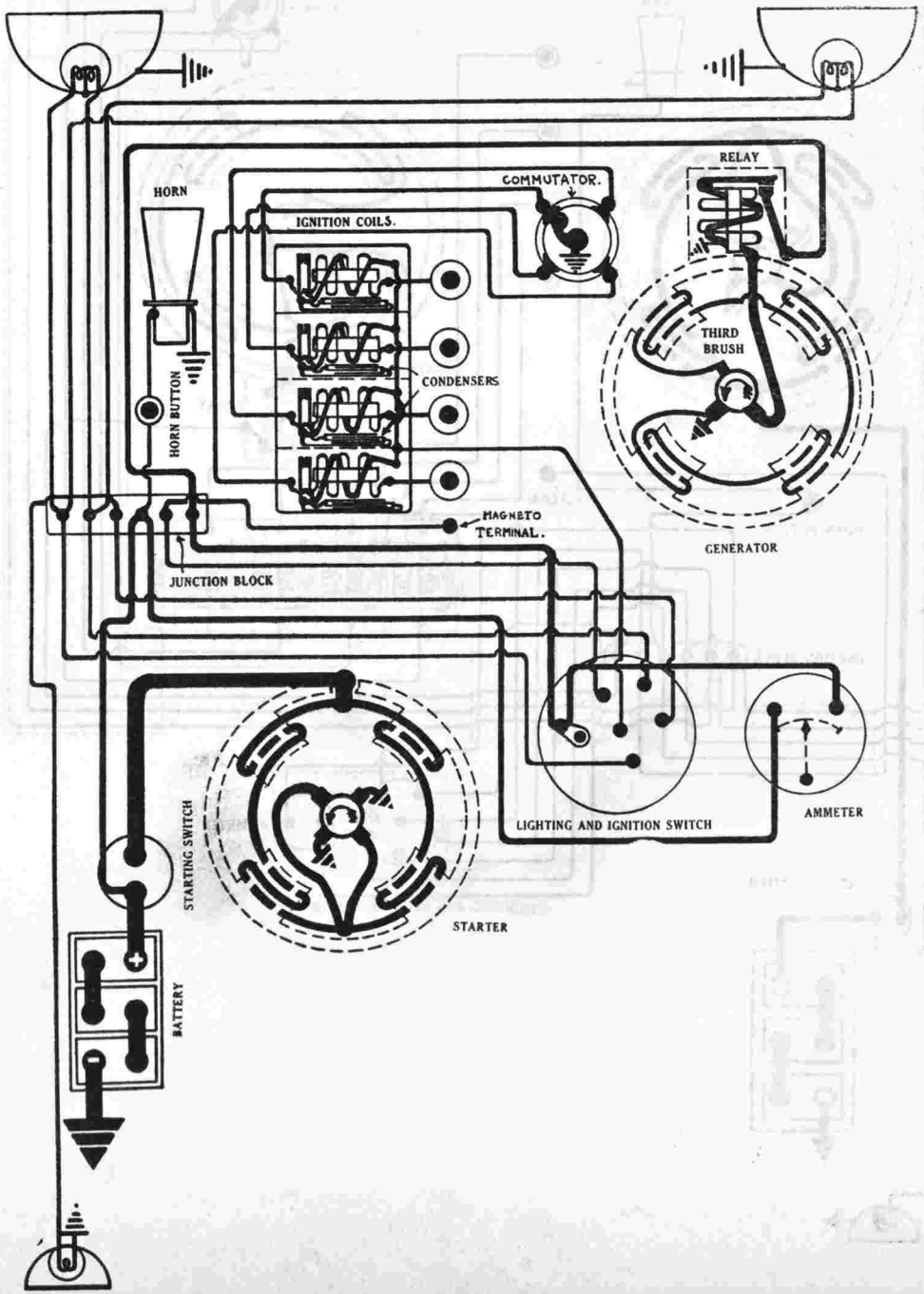
Firing Order.—The firing order is 1, 2, 4, 3.

Spark Plug Gaps.—The spark plug gaps are .030 to .032 inch.

STARTER.—Type F.A. Starter is connected to the engine through a Bendix drive. **The direction of rotation is counter-clockwise, looking at the commutator end** Starter cranks the engine at 500 R.P.M., taking 200 amperes at 3.4 volts. Starter brush tension is 1 1/4-1 3/4 pounds for 50° to 70° deflection.

Starter Data.—F.A.

Torque	R.P.M.	Volts	Amperes
1 lb. ft.	2500	5.5	125
5 lb. ft.	1050	4.4	330
9 lb. ft.	425	3.6	465
13 lb. ft.	Lock	3.0	580



FORD

IMPROVED MODEL "T" (1926-27)
FORD GENERATING, STARTING AND LIGHTING SYSTEM
FORD IGNITION

Mounting:—Starter is mounted at left of engine on forward side of transmission case. To remove starter, remove four small screws holding Bendix drive cover at rear of transmission case. Remove cover and withdraw Bendix drive assembly after backing out set screw in end of starter shaft. Then remove four flange mounting screws holding starter on forward side of transmission case and slide starter forward. Starter can then be lifted from place.

Oiling.—Starter requires no oiling.

GENERATOR.—Type F A. Generator current regulation is by the third brush system. Direction of rotation is counter-clockwise, looking at the commutator end.

Charging rate is varied by adjustment of the third brush setting. Loosen the clamp nut holding the third brush holder. Move third brush in the direction of armature rotation to increase the charging rate, or in the opposite direction to decrease the charging rate. Clamp the third brush after position adjustment. The generator fields draw 2.4 amperes at 6 volts.

Generator Data.—F.A.

Amperes	Volts	R.P.M.
4.1	6.6	800
9.0	7.4	1100
11.5	7.9	1400
12.5	8.2	1700
11.0	8.1	2000

Generator motoring freely takes a current of 3 amperes at 6 volts. The generator brush tension is 2½ to 3 pounds for 50° to 70° deflection.

Mounting:—Generator is flange mounted at right of engine at the rear of the gear case. To remove generator, back out four flange mounting screws. Then pry generator to rear and lift from place.

Oiling.—Put 4 or 5 drops of light engine oil in the rear generator bearing oiler every two weeks. If the car is driven more than 500 miles in 2 weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes at 600-650 R.P.M. of armature or 8-10 miles per hour, and opens at 550-600 R.P.M. of armature or 6-8 miles per hour, the discharge current being 0-2 amperes. Relay contacts separate .032 inch. If badly burned or pitted resurface with worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LIGHTING:—Ford Lighting Switch. Head lamps are 6-8 volt, 21 and 2 cp. D.C. Double filament using the 2 cp. filament for dimming. Dash and tail lamps are each 6-8 volt, 3 cp. S.C.

FORD

MODEL A (1928)

FORD GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE COIL, AMERICAN BOSCH DISTRIBUTOR

BATTERY:—Ford, 6 volt, 80 ampere hour. Starting capacity is 98 amperes for 20 minutes. Lighting capacity is 5 amperes for 16 hours. The positive (+) terminal is grounded. Battery is mounted on left frame member under the floor boards of the front compartment. The terminal assemble is opposite to that of the battery used on the Model T and for this reason the two batteries are not interchangeable.

IGNITION:—Breaker contacts separate .018-.022 inch. They are made of tungsten. Resurface contacs with a fine flat contact file or on a medium hard oilstone. Distributor is of the manual type. Maximum manual advance is 20°. Breaker arm spring tension is 14-20 ounces. Ignition current is 6 amperes at 7 volts with engine running and 4.2 amperes at 6 volts with engine stopped.

Oiling:—There is an oiler on the side of the distributor housing. Put a few drops of light engine oil in this oiler every 1000 miles. At the same time wipe the face of the breaker cam with medium heavy cup grease.

Mounting:—Ignition coil is mounted on the engine side of the dash. Distributor is mounted on top of the engine between cylinders 2 and 3. Breaker mounting plate can be removed by removing distributor cap and removing lock screw in center of breaker cam and the breaker cam. Turn plate until groove and projection on housing line up. Then lift breaker plate from place. The ignition circuit is theft-proof with the breaker lead run from the switch to the breaker in an armored cable. It will not be necessary to remove the distributor housing from the cylinder head but this can be done by disconnecting the advance rod and all connections and removing the stud and locknut on the side of the engine block. The ignition switch and distributor housing must be removed as a unit.

Timing:—Breaker contacts separate when the piston entering power stroke reaches top dead center with the breaker fully retarded. To set timing, crank engine over until piston No. 1 enters compression stroke (the upstroke with both valves closed). Then remove timing pin screwed in cover of timing gear case directly over camshaft and reverse pin so that the end of the pin is in contact with the camshaft gear. Crank engine slowly until pin drops in recess on face of the gear. This is the top dead center position for piston No. 1. If breaker contacts are not separating, loosen cam lock screw and rotate breaker cam until contacts separate. Tighten the lock screw. Withdraw the timing pin from the gear recess, reverse and screw in place in the gear housing cover.

Firing Order:—The firing order is 1-2-4-3.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Gaps are .025 inch.

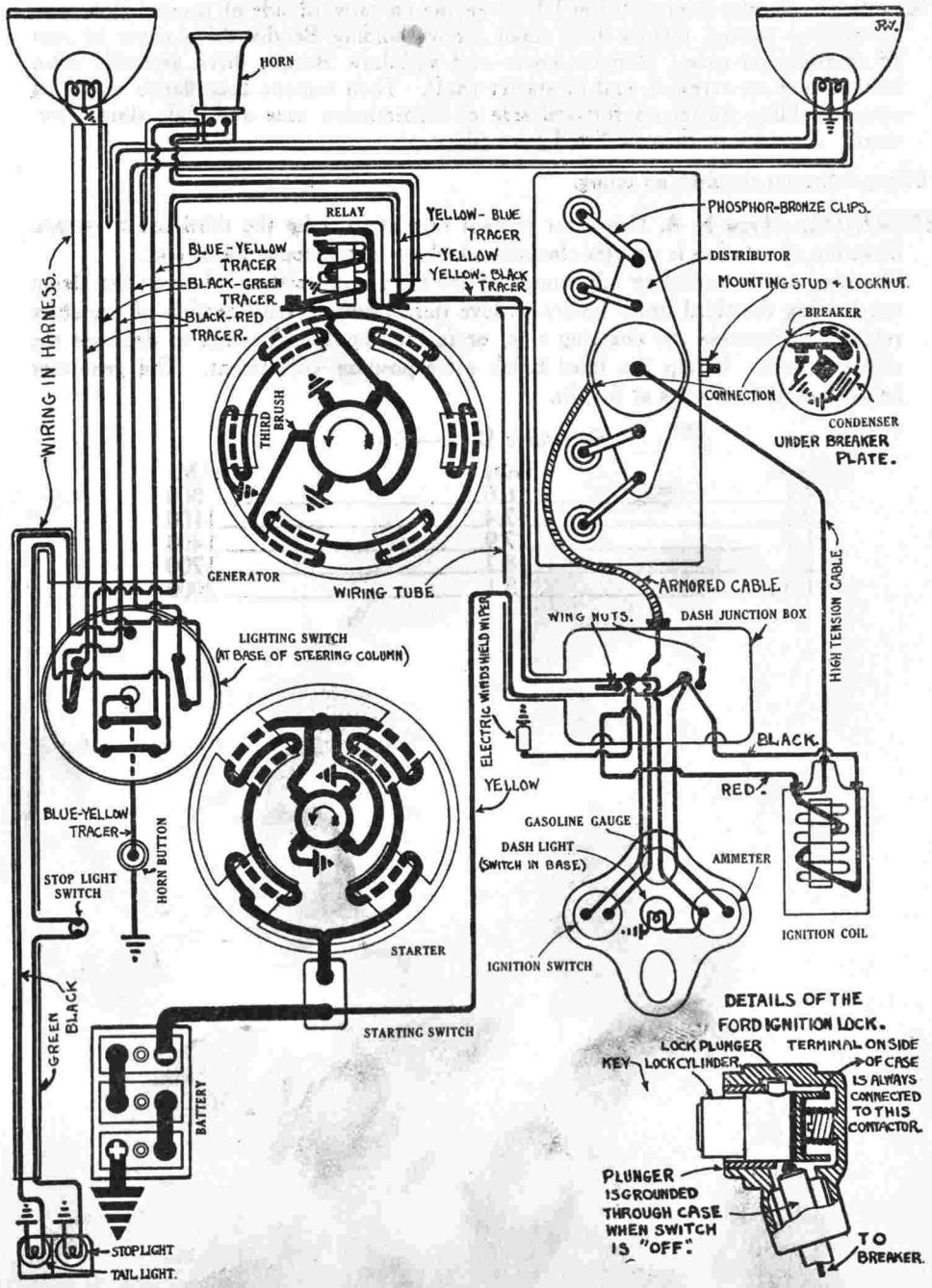
STARTER:—Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush spring tension is 2 pounds.

Stater Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2700	6	50
14 "	Lock	3.75	560

Oiling:—Starter bearings are oilless. They require no attention.

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel case. To remove starter, disconnect starting pedal and cable from starter switch. Then remove three flange mounting screws and pull starter forward. When clear of housing lift starter from place.



FORD

MODEL A (1928)

FORD GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE COIL, AMERICAN BOSCH DISTRIBUTOR

GENERATOR:—The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover cap and loosen the small screw holding the third brush on the fiber mounting ring. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Generator brush spring tension should be 12-16 ounces each.

Generator Data

Amperes	Volts	R.P.M.
12	7	1500

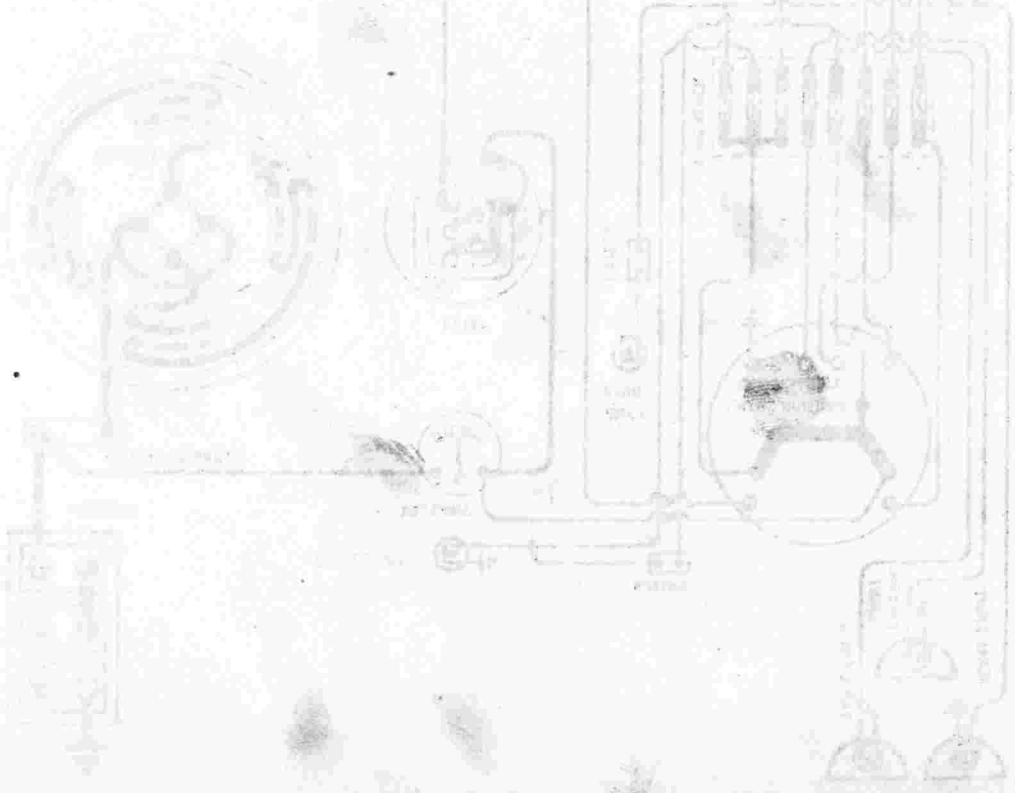
Generator motoring draws 2.5-3 amperes at 6 volts. Shunt field current is 2 amperes at 6 volts. Generator stalled draws 22 amperes at 6 volts.

Oiling:—Generator is equipped with ball bearings packed with cup grease. The grease compartment forms a hollow hub inside the armature and holds sufficient grease so that replenishing is necessary only infrequently. To repack grease compartment it is necessary to remove drive pulley and end cap.

Mounting:—Generator is mounted on left of engine at forward end of engine by special swinging bracket and is belt driven from the crankshaft by the fan belt. To remove generator, disconnect lead and loosen bolts on adjustment bracket and mounting lug under generator. Then swing generator toward engine and slip off drive belt. Remove mounting bolts and lift generator from place. The tension of the drive belt is adjusted by swinging generator on the lower mounting lug. To adjust belt, loosen lower mounting bolt and the bolt on the adjustment bracket extending from the generator to the crankcase. Then swing the generator on the lower bolt as a pivot until the proper tension of the belt is secured and tighten the bolts. The belt must not be too tight or it will crowd the generator bearings.

RELAY:—The relay is mounted on top of the generator.

LIGHTING:—Headlights are standard Ford 6-8 volt, 21 and 2 cp. double filament bulbs using 2 cp. filaments for dimming. Dash and tail lamps are each 6-8 volt, 3 cp. S.C. Stop lamp is 6-8 volt, 21 cp. S.C.



FOX

MODEL 7-F (1920-21)
WESTINGHOUSE GENERATING, STARTING, AND LIGHTING SYSTEM
SCINTILLA MAGNETO IGNITION

BATTERY.—Exide, Type 3-XC-17-1, 6 volts, 117.5 ampere-hour capacity. The starting capacity is 130 amperes for 20 minutes. The lighting capacity is 5 amperes for 23.4 hours. The positive (+) terminal is grounded.

IGNITION:—Scintilla Magneto Model AM-6. Breaker contacts separate .010 inch. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone, as they are made of tungsten.

Oiling.—Put 4 or 5 drops of light engine oil into each of the two oil wells every two weeks. **If the car is driven more than 500 miles in two weeks, this care must be** given every 500 miles.

Timing.—Breaker contacts begin to separate when piston No. 1 is on compression stroke, marking "45" on flywheel housing on top dead center, spark control lever and breaker assembly fully advanced.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plugs.—The spark plug diameters are 7/8 inch and the gaps are .020 inch.

STARTER:—Frame No. 711. The starter is connected to the engine by a Bendix drive. The direction of rotation is counter-clockwise, looking at commutator end. Starter cranks the engine at 100-150 R.P.M. taking a current of 175-225 amperes, at 5-5.5 volts.

Starter Test Data

Amperes	Volts	Torque	R.P.M.
38-52	5.5	0	3100-3800
650	4.0	21 lb. ft.	0 (Lock)

Oiling.—Put 4 or 5 drops of light engine oil in each starter oiler once a month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles.

GENERATOR.—Frame No. 760. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. To adjust the charging rate of the generator loosen the nut inside of the generator end bracket opposite the third brush and move the third brush in the direction of rotation (counter-clockwise) to increase the charging rate, and in the opposite direction (clockwise) to decrease the charging rate.

Generator Test Data

Amperes	R.P.M.
0	450
8	675
15-17	1250
10	2000

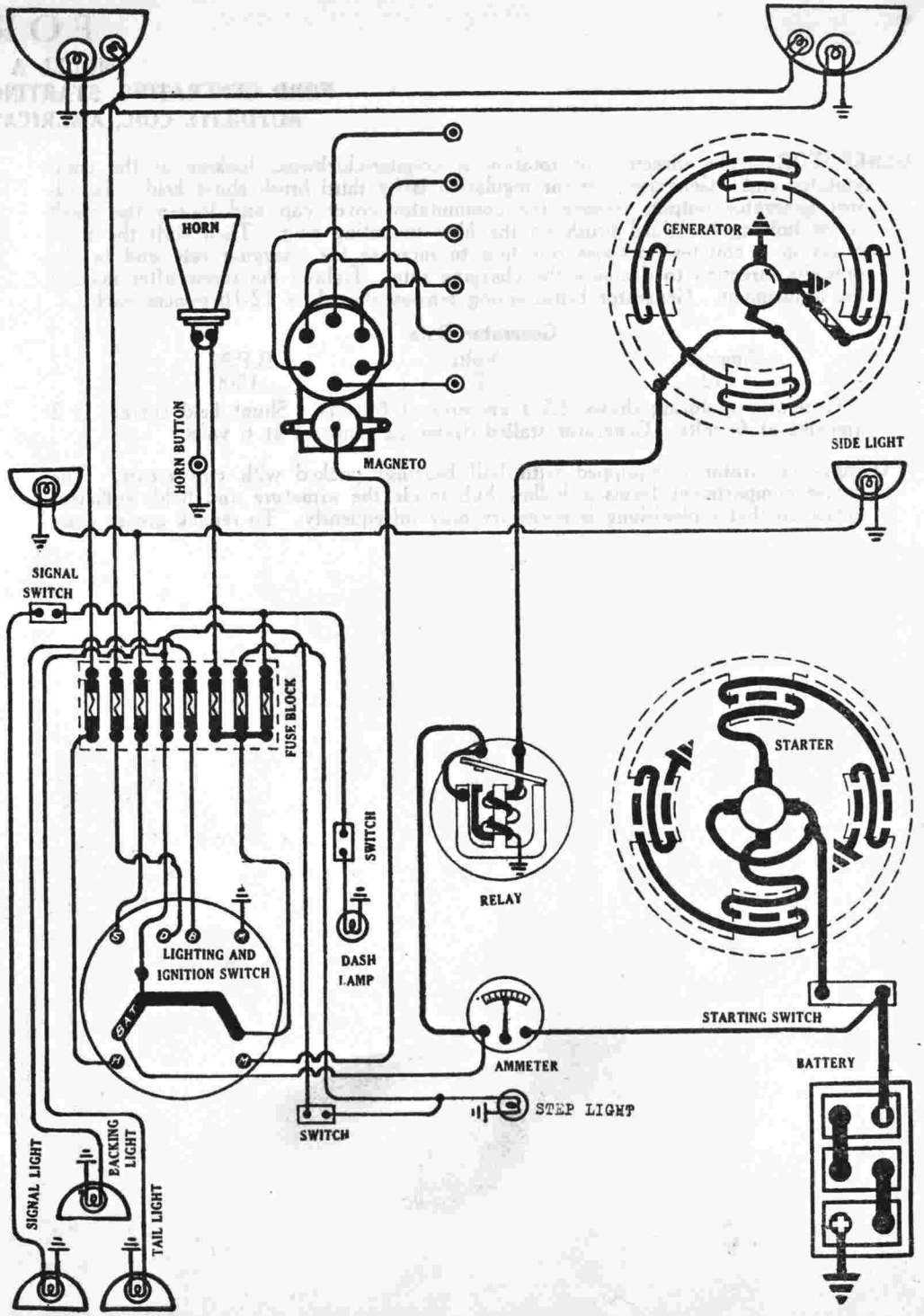
Generator motoring freely, takes a current of 3.5-5 amperes, at 6-6.6 volts and the field draws a current of 2.5 amperes, at 6 volts.

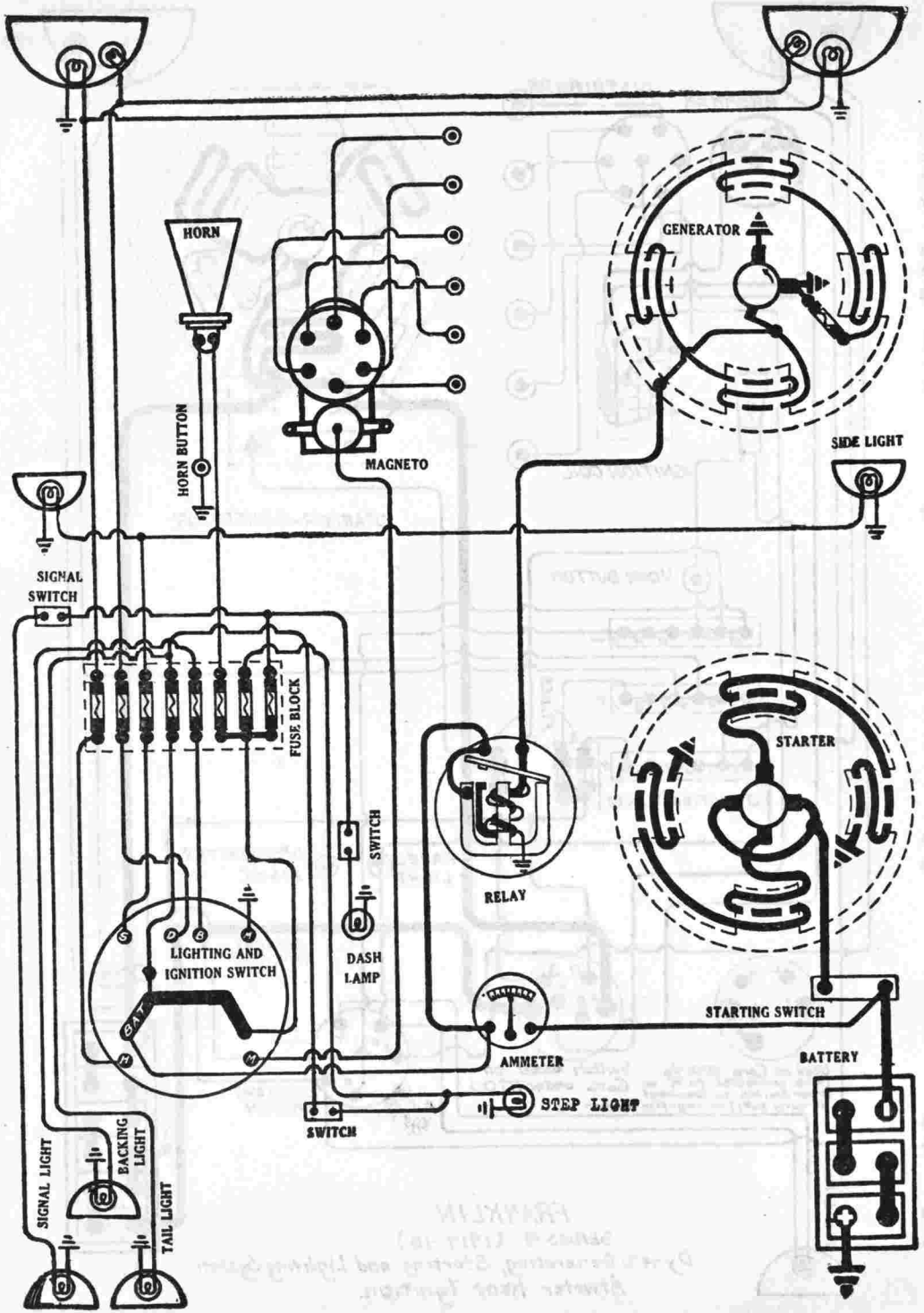
Oiling.—Put 4 or 5 drops of light engine oil into the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Relay closes at 500-550 R.P.M. or 8-10 M.P.H. at 6.2-6.5 volts, and opens at 450-500 R.P.M. or 6-8 M.P.H. with a current discharge of 0-3 amperes. The contact gap is .015-.019 inch, and the air gap between relay armature and coil core is .055-.060 inch.

LIGHTING.—Clum Combination Switch is used. The head lights are each 6-8 volts, 21 cp. S. C. Auxiliary lights are 6-8 volts, 4 cp. S. C. Tail light is 6-8 volts, 4 cp. S. C. Signal and backing lights are each 6-8 volts, 21 cp. S. C. The dash light is 6-8 volts, 2 cp. D. C.

FUSES:—Generator field fuse is 5 ampere. Lighting fuses are 15 ampere.





FOX

MODEL 7F (1922-23-24-25). SERIAL NOS. 150 UP
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
SCINTILLA MAGNETO IGNITION

BATTERY:—Westinghouse, Type 6-C-17. 6 volt, 120 ampere hour. The positive (+) terminal is grounded.

IGNITION:—Scintilla Magneto. Model AM-6. Breaker contacts separate .010 inch. If the condition of the contact point affects the ignition, remove and resurface on a medium hard oilstone, as they are made of tungsten.

Oiling:—Put on 4 or 5 drops of light engine oil into each of the two oil wells every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

Timing:—Breaker contacts begin to separate when piston No. 1 is on compression stroke, marking "45" on flywheel housing on top dead center, spark control lever and breaker assembly fully advanced.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Frame No. 751. The starter is connected to the engine by a Bendix drive. The direction of rotation is counter-clockwise, looking at commutator end. Starter cranks the engine at 100-150 R.P.M. taking a current of 175-225 amperes, at 5-5.5 volts.

Starter Test Data

Amperes	Volts	Torque	R.P.M.
38-52	5.5	0	3100-3800
650	4.0	21 lb. ft.	0 (Lock)

Oiling:—Put 4 or 5 drops of light engine oil in each starter oiler once a month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles.

GENERATOR:—Frame No. 760. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. To adjust the charging rate of the generator loosen the nut inside of the generator end bracket opposite the third brush and move the third brush in the direction of rotation (counter-clockwise) to increase the charging rate, and in the opposite direction (clockwise) to decrease the charging rate.

Generator Test Data

Amperes	R.P.M.
0	450
8	675
15-17	1250
10	2000

Generator motoring freely, takes a current of 3.5-5 amperes, at 6-6.5 volts and the field draws a current of 2.5 amperes, at 6 volts.

Oiling:—Put 4 or 5 drops of light engine oil into the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY:—Relay closes at 500-500 R.P.M. or 8-10 M.P.H. at 6.2-6.5 volts, and opens at 450-500 R.P.M. or 6-8 M.P.H. with a current discharge of 0-3 amperes. The contact gap is .015-.019 inch, and the air gap between relay armature and coil core is .055-.060 inch.

LIGHTING:—Clum Combination Switch is used. The head lights are each 6-8 volts, 21 cp. S.C. Dimmer lamps are 6-8 volt, 4 cp. S.C. Side and tail lamps are 6-8 volt, 4 cp. S.C. Dash and dome lamps are each 6-8 volt, 2 cp. D.C. Stop and backing lamps are 6-8 volt, 21 cp. S.C.

FUSES:—Generator field fuse is 5 ampere. Lighting fuses are 15 amperes.

FRANKLIN

SERIES 8 (1915-16) AND 9 (1917-18)
DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER-KENT OR EISEMANN MAGNETO IGNITION

BATTERY:—Battery is 12 volt, 60 ampere hour. The two wire system is used.

IGNITION:—Breaker contacts separate .010 on the battery ignition and .012 to .015 inch on the magneto. They are made of tungsten. When the condition of the contacts affects the ignition remove and resurface with a fine flat jeweler's file or worn No. 00 sandpaper. Resurface battery ignition contact points on an emery wheel. finishing on a hard oilstone.

OILING:—Put a drop of light engine oil on each of the wearing points of the breaker and 4 or 5 drops in the oiler on the side of the notched shaft every 500 miles or two weeks. With magneto ignition, put several drops of light engine oil in each oiler every 1000 miles or each month.

Timing:—Breaker Contacts begin to separate when the mark "CL-16" on fly wheel is 1¾ inches past indicator spark control lever and breaker assembly in the fully retarded position. With battery ignition the breaker contacts begin to open when the mark is 1½ inches before the indicator.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .023 to .031 inch.

STARTER-GENERATOR.—Starter and generator are combined into one unit. Armature is permanently connected to engine crank shaft.

Starter Data. Model DS L, Size B.

Torque	R.P.M.	Amperes	Volts
0 lb. ft.	800	10	12.0
5 lb. ft.	425	40	11.8
10 lb. ft.	300	65	11.5
15 lb. ft.	230	95	11.2
20 lb. ft.	175	117	11.0
25 lb. ft.	110	140	10.4
30 lb. ft.	75	160	10.2
35 lb. ft.	45	180	10.0
40 lb. ft.	Lock	210	9.6

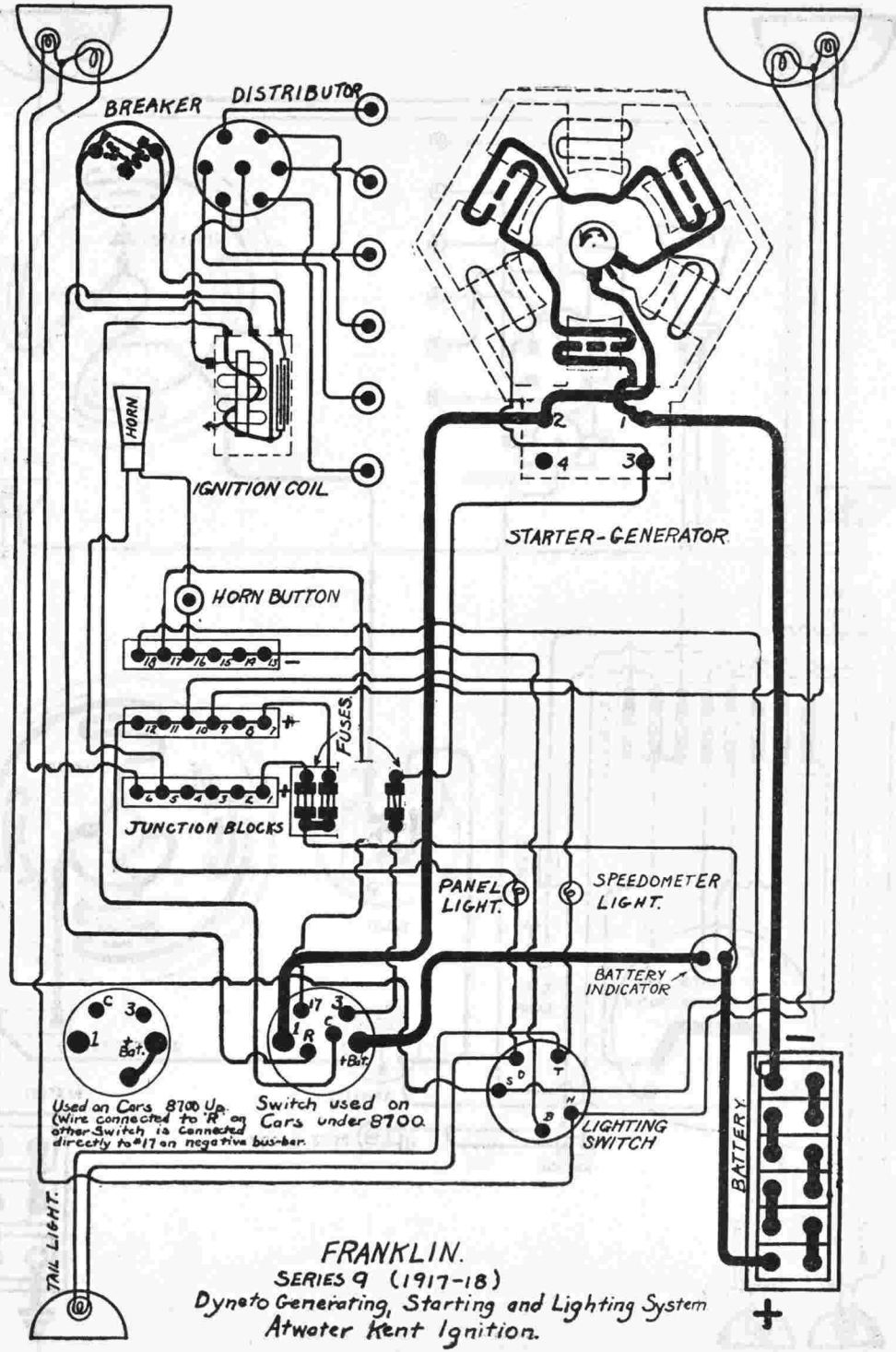
GENERATOR.—Generator current regulation is by reverse series field. Generator begins to supply current at 7-8 miles per hour. Maximum charging rate of 10-12 amperes is reached at 16-20 miles per hour.

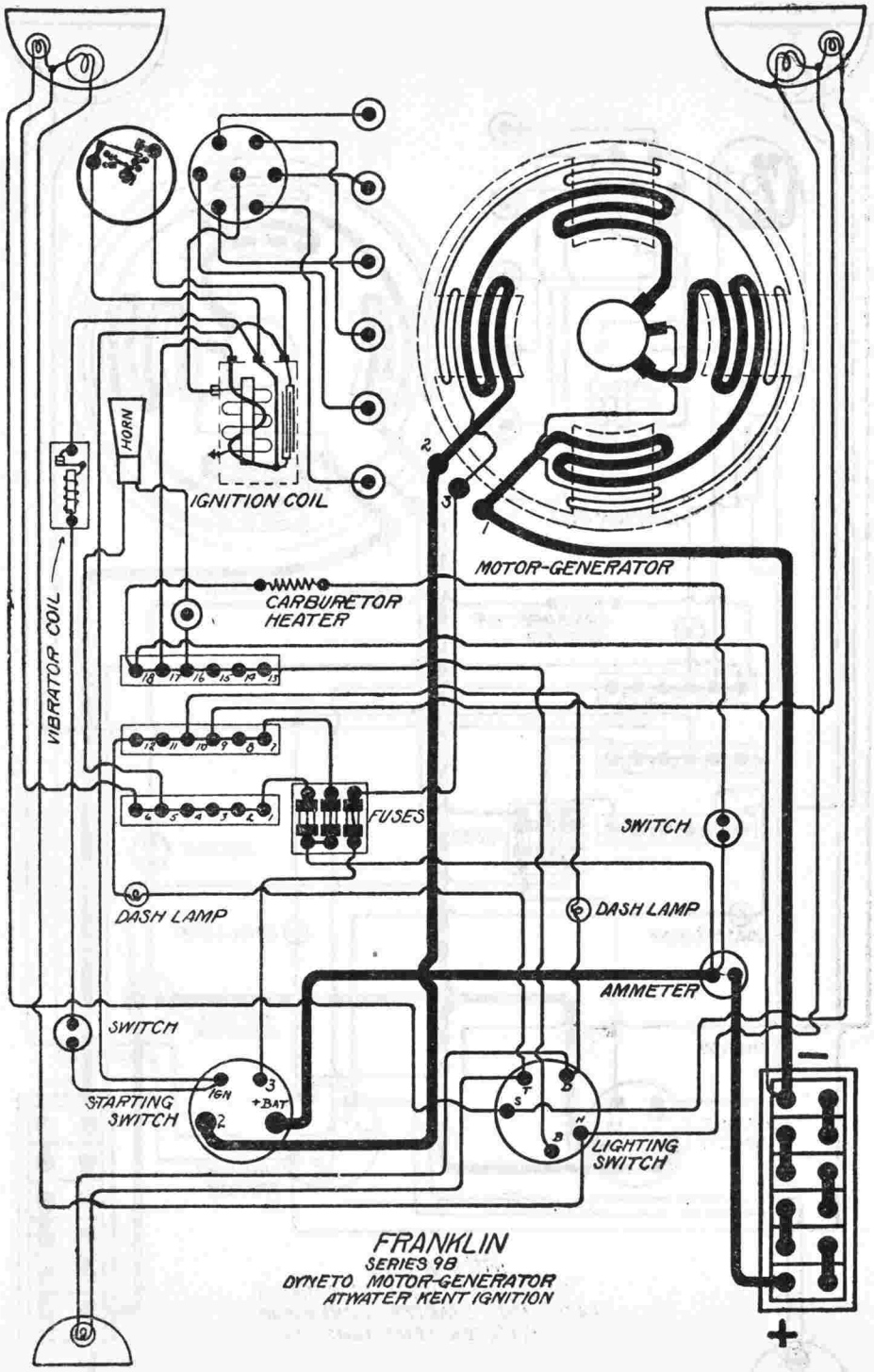
Amperes	Generator Data. Model D.S.L., Size B.	M.P.M.
0.0		7.5
5.0		9.0
7.5		10.0
10.0		12.5
12.5		17.5
10.0		27.5
6.0		50.0

OILING.—Put several drops of light engine oil in each of starter-generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

LAMPS.—Head lamps are 12-16 volt, 18 cp. Dimmer lamps are 12-16 volt, 4 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp. All other lamps are 12-16 volts, 4 cp. On 1917-18 cars, head lamps are 6-8 volt, 21 cp.

FUSES:—Fuses are 10 ampere.





FRANKLIN

SERIES 9-B (1919-20-21)

DYNETO GENERATING, STARTING AND LIGHTING SYSTEM ATWATER KENT IGNITION

BATTERY.—Willard, Type SXR-27, 12 volt, 60-ampere-hour. The two-wire system is used.

IGNITION.—Type K2. Breaker contacts separate .010 to .012 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone. There is also a master vibrator connected into the primary circuit, controlled by a separate switch, intended to produce easy starting. It takes 1.1 amperes when operating from a fully charged battery.

OILING.—Put a drop of light machine oil on each of the 3 wearing points of breaker and put 4 or 5 drops of light machine oil in the oil hole beside the notched shaft every two weeks. Put a very small amount of vaseline on the notched shaft, applying with a toothpick, at the same time. If the car is driven more than 500 miles in two weeks these attentions must be given every 500 miles.

TIMING.—Breaker contacts separate when the top dead center mark $\frac{\text{"C-L"}}{1\text{-}6}$ on the flywheel is $1\frac{1}{2}$ inches before the indicator, breaker fully retarded. Spark control is automatic.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .032 inch.

STARTER-GENERATOR.—Type K1R. Armature shaft is chain-connected to the engine crankshaft. Starter cranks the engine at 144 R.P.M., taking 64 amperes. Lock torque is 32 pound-feet, current being 208 amperes. Running freely, the starter takes 10 amperes, armature revolving at 600 R.P.M.

GENERATOR.—Generator current regulation is by the third brush system. Generator begins to supply current at 850 R.P.M. of the armature or 10 miles per hour. Maximum output is 12-14 amperes at 14.5 volts, reached at 1650 R.P.M. of the armature or 20 miles per hour.

Generator Data

Amperes	R.P.M.	M.P.H.
0	850	10
5	975	12
12-14	1650	20
8	4000	45

Shunt field windng takes 4-6 amperes at 14 volts. Pressure of brushes on the commutator is 4-6 pounds.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter-generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—There is no relay. The circuit between the generator and battery is controlled by the starting switch.

LAMPS.—Head lamps are 12-16 volt, 21 cp. Dimmer lamps are 12-16 volt, 4 cp. Dash and tail lamps are 12-16 volt, 2 cp. On 1920 cars head lamps are 12-16 volt, 15 cp.

FUSES.—Fuses are 10 ampere.

FRANKLIN

SERIES 9-B, LATE 1921-1922 MODEL
NORTH-EAST GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY.—Willard, Type SXR-27, 12 volt, 60 ampere-hour. The two-wire system is used.

IGNITION.—Type CAF. Breaker contacts separate .006 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Remove the distributor cap and put 4 or 5 drops of light engine oil in the exposed oil hole every two weeks. Put a small amount of vaseline on the cam applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts separate when the top dead center mark $\frac{\text{"C-L" on the}}{1\text{-}6}$ fly-wheel is 1½ inches before the indicator, breaker fully retarded. Spark control is automatic.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—Spark plug gaps are .032 inch.

STARTER-GENERATOR.—Model GF, Type 24841. Armature shaft is chain connected to the engine crankshaft. The lock torque is 45 pound-feet.

Starter Data—Model GF

Torque	R.P.M.	Amperes
5 pound feet	420	37
8 pound feet	360	53
12 pound feet	300	75
17 pound feet	240	99

Current when locked is 240 amperes. The brush tension of all brushes is 1½ pounds.

GENERATOR.—Generator current regulation is by the third brush system. Generator begins to supply current at 9 miles per hour. The maximum charging rate is 12 amperes, reached at 18 to 20 miles per hour, or 1500 R.P.M. of the armature.

Generator Data—Model GF

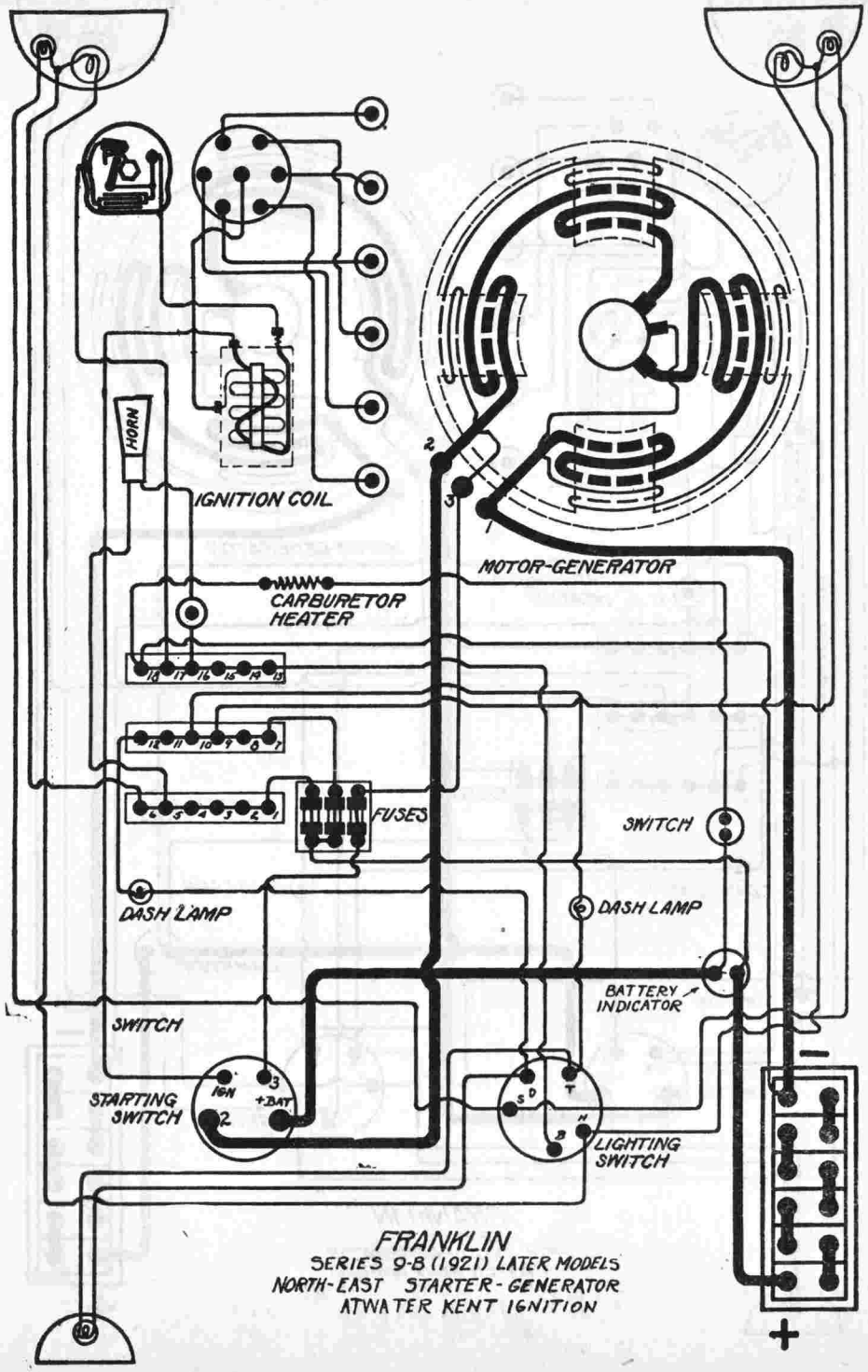
Amperes	R.P.M.	Amperes	R.P.M.
Hot Test		Cold Test	
0	780	0	730
6	1050	6	930
8	1200	10	1130
10	1750	12	1500
9	2500	10	2760

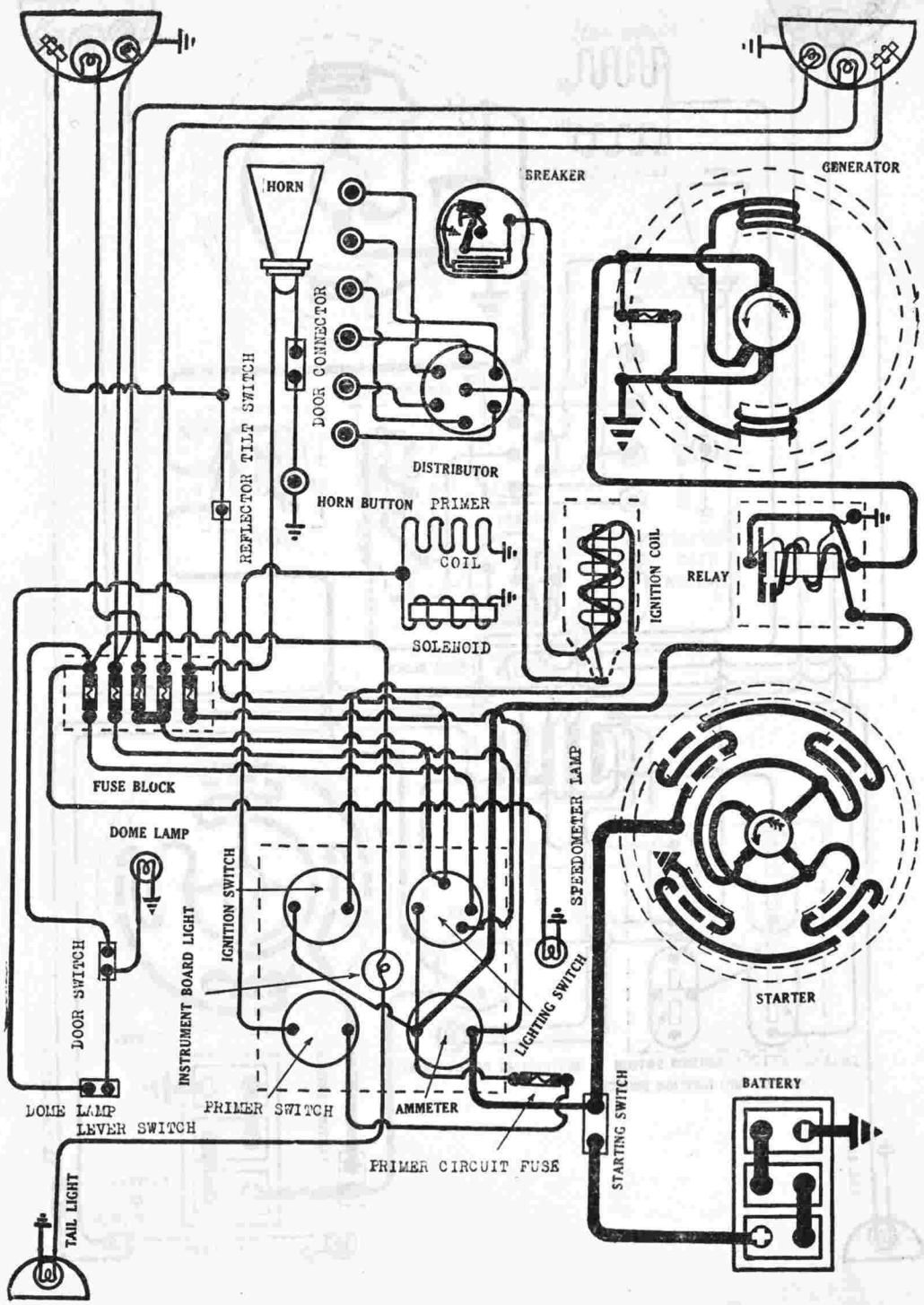
Oiling.—Put 4 or 5 drops of light engine oil in the rear bearing oiler of the starter-generator every month. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

RELAY.—There is no relay. The circuit between the generator and battery is controlled by the starting switch.

LAMPS.—Head lamps are 14 volt, 21 cp. Dimmer, dome and tonneau lamps are 14 volt, 4 cp. Dash and tail lamps are 8 volt, 2 cp.

FUSES.—Fuses are 10 ampere.





FRANKLIN

MODEL 10-A (1922-23)

NORTH EAST GENERATING, STARTING AND LIGHTING SYSTEMS
ATWATER-KENT IGNITION

BATTERY.—Willard, Type SJR-5, 6 volts, 132 ampere-hours. The starting capacity is 145 amperes for 20 minutes. The lighting capacity is 5 amperes for 28 hours. The negative (—) terminal is grounded.

IGNITION.—Atwater-Kent, Type RA. Breaker contacts separate .015 inch, contacts fully separated. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone.

Oiling.—Remove the distributor cap and put 4 or 5 drops of light engine oil in the exposed oil hole every two weeks. If car is driven more than 500 miles in two weeks, this attention must be given every 500 miles. Put a small amount of vaseline on the cam, applying with a toothpick every 1000 miles.

Timing:—Breaker contacts begin to separate when piston No. 1 is one inch before top dead center on compression stroke, measured on the flywheel with the spark control button pushed in. The triangle mark on the fanwheel wil be one inch before the mark on the inside of the fanwheel housing.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plugs—Spark plug diameters are 7/8 inch. Gaps are .030 inch.

STARTER.—Model K. The starter is connected to engine by chain. The direction of rotation is counter-clockwise, looking at commutator end. Motor running free at 5000 R.P.M., takes a current of 50-60 amperes, at 6 volts. Starter cranking the engine at 125 R.P.M., takes a current of 125-200 amperes at 3-4 volts.

Oiling.—Put 4 or 5 drops of light engine oil in each starter oiler every month. If car is driven over 1000 miles in a month, this attention must be given every 1000 miles.

GENERATOR.—Model LA-3938. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. To increase the output of the generator, loosen lock screw on end plate and turn adjusting screw in a clockwise direction. Motoring freely, the generator takes 4-6 amperes at 6 volts. Field current is 3-4 amperes at 6 volts.

Generator Test Data

Amperes	R.P.M.	M.P.H.
0	600	8
Max. 15-20	1600-1800	20
8-10	3000	

Oiling.—Put 4 or 5 drops of light engine oil in each generator oiler every two weeks. If car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Relay closes at 550-600 R.P.M., or 10-12 M.P.H., taking 6.5 voits. Relay opens at 500-550 R.P.M., or 8-10 M.P.H., or 0-2 amperes discharge. Contact gap is .025-.040 inch, and the air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING.—Briggs & Stratton Switch used. Head lamps are 6-8 volts, 21 cp., S.C. Dimmer lamps are 6-8 volts, 4 cp., S.C. Speedometer lamp is 6-8 volts, 2 cp., S.C. Tail and instrument lamps are 3-4 volts, 2 cp., S.C. Dome lamp is 6-8 volts, 2 cp. S.C.

FUSES.—Generator fuse is 6 amperes. Primer fuse only is 115 amperes. All other fuses are 15 amperes.

FRANKLIN

SERIES 10-B (1923)

NORTH EAST GENERATING, STARTING AND LIGHTING SYSTEMS
ATWATER-KENT IGNITION

BATTERY.—Willard, Type SJR-5, 6 volts, 132 ampere-hours. The starting capacity is 145 amperes for 20 minutes. The lighting capacity is 5 amperes for 28 hours. The negative (—) terminal is grounded.

IGNITION.—Atwater-Kent, Type RA. Breaker contacts separate .015 inch, contacts fully separated. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone.

Oiling.—Remove the distributor cap and put 4 or 5 drops of light engine oil in the exposed oil hole every two weeks. If car is driven more than 500 miles in two weeks, this attention must be given every 500 miles. Put a small amount of vaseline on the cam, applying with a toothpick every 1000 miles.

Timing:—Breaker contacts begin to separate when piston No. 1 is one inch before top dead center on compression stroke, measured on the flywheel with the spark control button pushed in. The triangle mark on the fanwheel will be one inch before the mark on the inside of the fanwheel housing.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plugs—Spark plug diameters are 7/8 inch. Gaps are .030 inch.

STARTER.—Model K. The starter is connected to engine by chain. The direction of rotation is counter-clockwise, looking at commutator end. Motor running free at 5000 R.P.M., takes a current of 50-60 amperes, at 6 volts. Starter cranking the engine at 125 R.P.M., takes a current of 125-200 amperes at 3-4 volts.

Oiling.—Put 4 or 5 drops of light engine oil in each starter oiler every month. If car is driven over 1000 miles in a month, this attention must be given every 1000 miles.

GENERATOR.—Model LA-3938. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. To increase the output of the generator, loosen lock screw on end plate and turn adjusting screw in a clockwise direction. Motoring freely, the generator takes 4-6 amperes at 6 volts. Field current is 3-4 amperes at 6 volts.

Generator Test Data

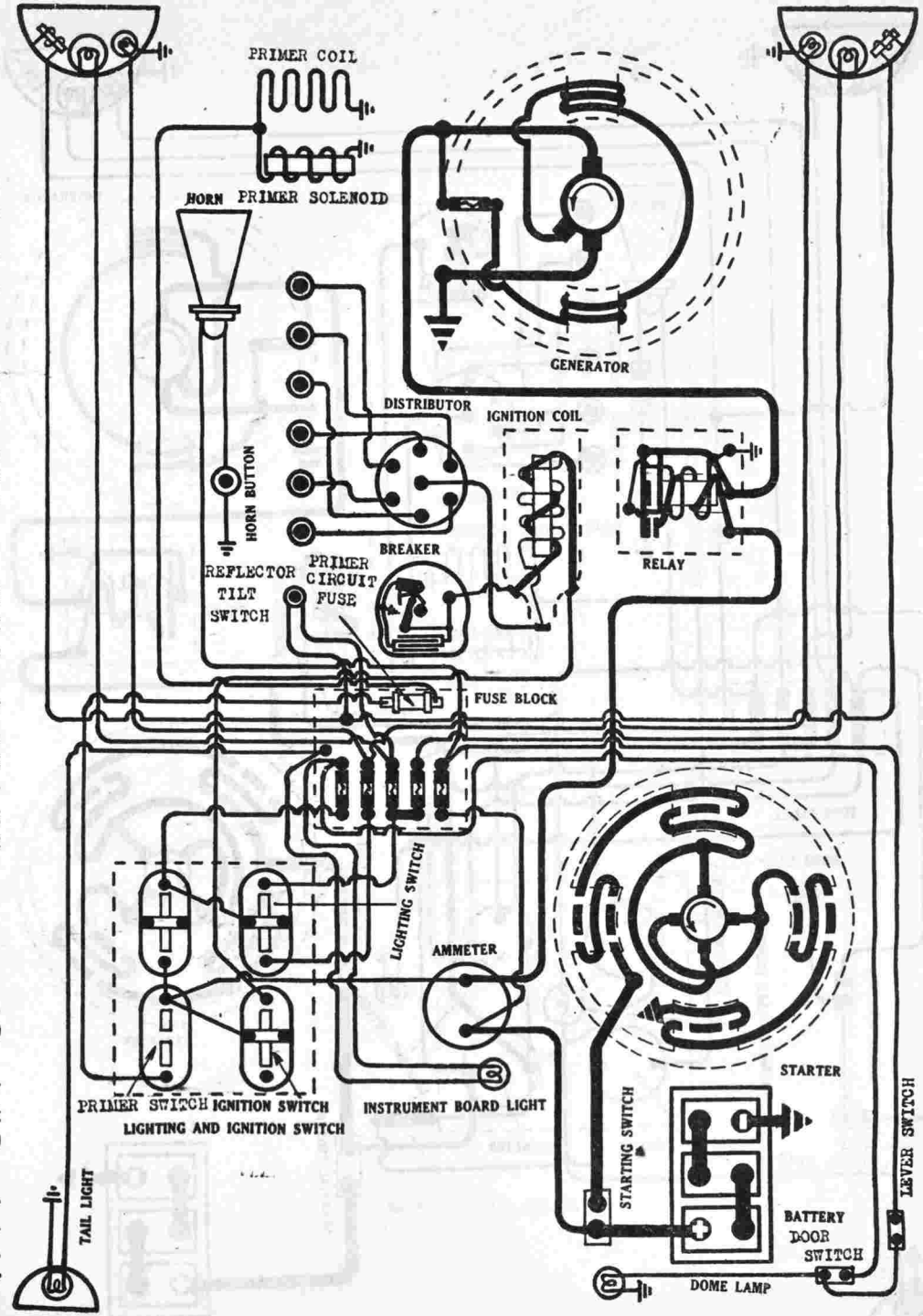
Amperes	R.P.M.	M.P.H.
0	600	8
Max. 15-20	1600-1800	20
8-10	3000	

Oiling.—Put 4 or 5 drops of light engine oil in each generator oiler every two weeks. If car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Relay closes at 550-600 R.P.M., or 10-12 M.P.H., taking 6.5 voits. Relay opens at 500-550 R.P.M., or 8-10 M.P.H., or 0-2 amperes discharge. Contact gap is .025-.040 inch, and the air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING.—Briggs & Stratton Switch used. Head lamps are 6-8 volts, 21 cp., S.C. Dimmer lamps are 6-8 volts, 4 cp., S.C. Speedometer lamp is 6-8 volts, 2 cp., S.C. Tail and instrument lamps are 3-4 volts, 2 cp., S.C. Dome lamp is 6-8 volts, 2 cp. S.C.

FUSES.—Generator fuse is 6 amperes. Primer fuse only is 115 amperes. All other fuses are 15 amperes.



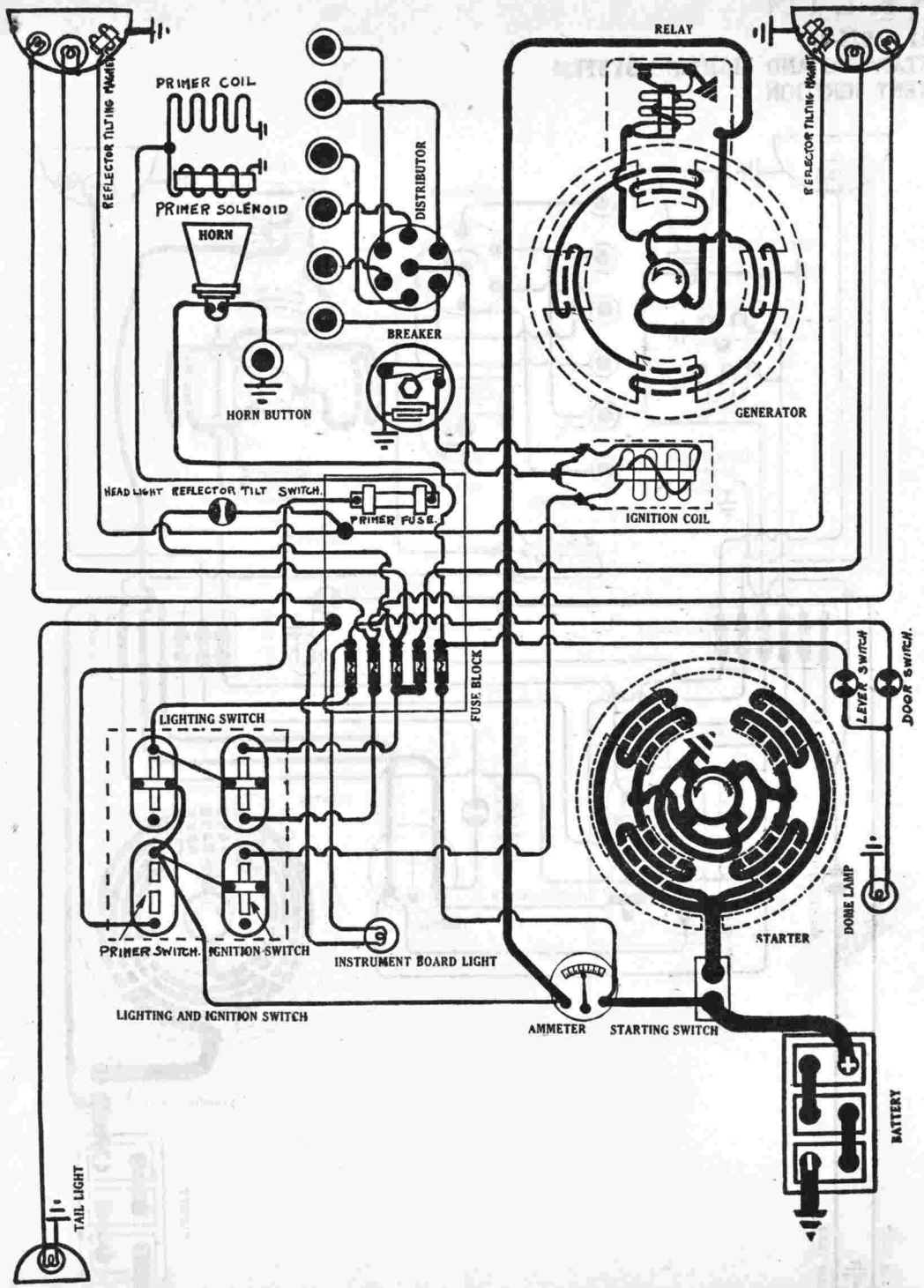
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FRANKLIN

SERIES 10-B & 10-C (1924)

ATWATER KENT GENERATING, STARTING AND LIGHTING SYSTEM.

ATWATER KENT IGNITION.



BATTERY: — **Willard, Type XR-17,** 6 volt, 130 ampere hour. The starting capacity is 130 amperes for 20 minutes. The lighting capacity is 5 amperes for 17 hours. The negative (—) terminal is grounded.

IGNITION: — **Type RA. Coil Model N-7.** The breaker contacts separate .015 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file, or on a medium hard oil stone.

OILING: — Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every month or each 1000 miles. Place a small bit of vaseline on the interrupter cam, applying with a toothpick.

TIMING: — Breaker contacts begin to separate when Piston No. 1 is one inch before top dead center on compression stroke (measured on the flywheel) when the mark 1-6 on the clutch is one inch before top dead center, with the spark control lever and breaker assembly in the fully advanced position. At this point the triangular mark on the fanwheel will be to the right or before the center line on the inside of the fanwheel housing.

FIRING ORDER: — The firing order is 1-4-2-6-3-5.

SPARK PLUGS: — The spark plug diameters are ⅞ inch. Gaps are .031 inch.

STARTER: — **Form 6550.** The starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The starter cranks the engine at 2000 R. P. M. taking 120 amperes at 5.5 volts.

Starter Data.

Torque.	R. P. M.	Amperes.	Volts.
0 lb. ft.	3220	70	5.8
2	1790	130	5.2
3.5	1200	220	5.0
6.0	800	300	4.6
18	Lock.	630	3.0

OILING: ....Put 4 or 5 drops of light engine oil in the starter oilers every two weeks or each 500 miles. At the same time give the oil connection on the Bendix gear housing one charge from the Bowen-Empress oil gun.

GENERATOR: — **Form 5970.** The direction of rotation is counter-clockwise, looking at the commutator end of the generator. The third brush system is used for current regulation. To adjust the charging rate, loosen the commutator cover band and the two screws holding the third brush mounting arm. Then move the third brush assembly in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the two screws after making the adjustment. The maximum charging rate is 14 amperes reached at 1200 R. P. M. of the generator armature or 18.5 M. P. H.

Generator Data.

Amperes	Volts	R. P. M.	Amperes	Volts	R. P. M.
Cold Test (74-100°)			Hot Test (150°)		
0	6.6	560	0	7.05	700
13.3	8.25	1200	8.9	8.1	1400
8.45	8.05	2200	7.1	7.85	2200
5.4	7.75	3200	4.5	7.68	3200
4.1	7.5	4000	4.0	7.7	4000

Oiling.—Put 4 or 5 drops of light engine oil into generator oiler every two weeks. If car is driven over 500 miles in two weeks, this attention must be given once every 500 miles.

RELAY: — Relay contacts close at 10 M. P. H. when the voltage of the generator reaches 6.5 volt, and open at 8 M. P. H. or with a discharge current of 0 to 2 amperes. Generator speed is 550-600 R. P. M. at closing of relay contacts and 500-550 R. P. M. at opening of relay contacts. The contacts separate .025 to .040 inch and the air gap between the relay armature and coil core is .010 inch, contacts closed.

LIGHTING: — **Connecticut Switch.** Head lamps are 6-8 volts, 21 cp. S. C. Dimmer lamps are 6-8 volt, 2 cp. S. C. Dome lamps is 6-8 volts, 4 cp. S. C. Dash and tail lamps are each 6-8 volt, 2 cp. S. C.

FUSES: — The generator does not require a field fuse. Lighting and horn fuses are 20 ampere. Primer fuse is 115 ampere.

FRANKLIN

SERIES 11 (1925-26)
OWEN-DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER-KENT IGNITION

BATTERY:—Willard, Type XR-19. 6 volt, 135 ampere hour. The starting capacity is 146 amperes for 20 minutes. The negative (—) terminal is grounded

IGNITION:—Coil Model N-7, Distributor Model RA. Breaker contacts separate .015 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file or on a medium hard oilstone.

Mounting:—Ignition coil and distributor are mounted at right of engine on the bearing cap. To remove distributor, disconnect breaker lead and manual advance rod and remove distributor head or disconnect spark plug cables. Then remove cap screws holding bearing cap and lift the distributor from place.

Oiing:—Put 4 or 5 drops of light engine oil on the oiler on the side of the distributor housing every month or each 1000 miles if the car is driven more than 1000 miles in a month. Also place a small bit of vaseline on the face of the interrupter cam, applying with a toothpick.

Timing:—Breaker contacts begin to separate when Piston No. 1 entering power stroke is ¾ inch before top dead center (measured on the flywheel) when the mark 1-6 on the clutch is ¾ inch before top dead center with the spark control lever in the fully advanced position. At this point the triangular mark on the fanwheel will be to the right of or before the center line on the fanwheel housing.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .031 inch.

VALVE TIMING:—Inlet valves. Head diameter is 1½ inches; stem diameter is .3375 inch; stem length is 4 27/32 inches. Tappet clearance is .010 inch (hot). Spring pressure is 30 pounds. Inlet valves open at top dead center and close at 57 degrees after lower dead center.

Exhaust Valves:—Head diameter is 1½ inches; stem diameter is .3375 inch; stem length is 4 27/32 inches. Tappet clearance is .010 inch (hot). Spring pressure is 30 pounds. Exhaust valves open at 43½ degrees before lower dead center and close at 25 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

STARTER:—Model DH. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

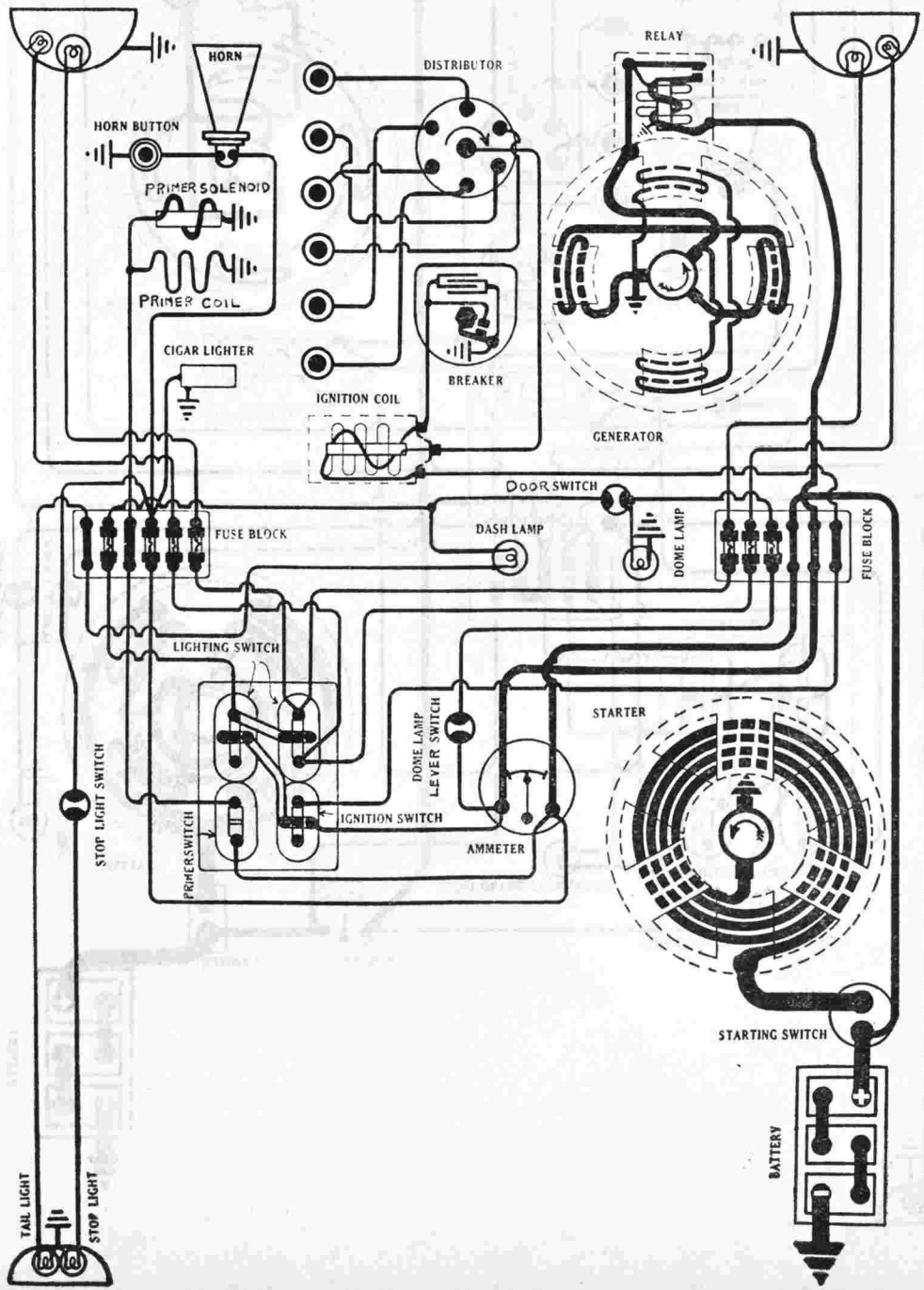
Starter Data.

Torque	R.P.M.	Volts	Amperes.
0 lb. ft.	2300	5.8	80
2 "	1100	5.44	140
3.5 "	980	5.3	185
6 "	610	4.9	256
23.2 "	Lock	3.4	590

The starter is a six pole, two brush machine with one field coil which is so constructed that it winds around three sides of each pole alternately so each pole is surrounded by a "U" shaped section of the coil.

Mounting:—Starter is mounted at right of engine. To remove starter, disconnect starter cable and remove three mounting cap screws. Then lift starter from place.

Oiling:—Starter bearings are of the oilless type. They require no attention. Refill the oiler on the Bendix gear case with the presure gun every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.



FRANKLIN

SERIES 11 (1925-26)
OWEN-DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

GENERATOR:—Model CE. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system operating in conjunction wtih a compensating shunt field. Two shunt fields are used, each being wound on two field poles. The light shunt field is connected between one main brush and the third brush; the battery being connected to these same brushes. The heavy shunt field is connected between the third brush and the other main brush. The light shunt field draws 2 amperes at 6 volts. The heavy shunt field draws 75 amperes at 6 volts.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.6	410			
9.8	7.3	600			
14	8	1000	12	8	800
11.4	8.2	2000			
9.8	8	3200			

To adjust the generator output, loosen the screw in the center of the knurled nut on the generator endplate and turn the nut clockwise to increase the charging rate and counter-clockwise to decrease the charging rate. Tighten the screw after making the adjustment. Raising the third brush does not render the generator inoperative and it should never be run in this condition. Two brushes must be raised.

A Protectostat or circuit breaker designed to break the circuit and ground the generator if it became overheated was built into all CE generators on Franklin cars but it was not found practicable. In many instances it would break the circuit but would not ground the generator, sometimes causing this unit to overheat and become damaged. The Owen Dyneto Corporation recommends that these Protectostats be removed from all generators equipped with them.

To Remove Protectostat:—First remove the commutator end cover from the generator. Disconnect wire from the third brush holder and also wire which is fastened to the body of the Protectostat. Remove cutout cover and cutout, also nuts and washers on terminal screw. Press slightly on terminal screw and the Protectostat may then be removed from the generator through the hand hole. Next remove the terminal screw from the Protectostat which may be done by heating enough to melt the solder, or a new terminal screw may be used if available. Attach to the terminal screw the wire that was taken from the body of the Protectostat. Place insulator and washer on terminal screw and insert screw in its original position in the frame. Be sure fibre washer is in place so as to prevent ground. Next replace washers and nuts, cutout and cutout cover. Connect to third brush holder the wire which was attached to it originally. Also connect the brush lead to the holder. This may be done without removing the generator from the car.

Mounting:—Generator is flange mounted at right of engine to the rear of the timing chain case. To remove generator, loosen locknut on adjusting screw at rear of generator and turn adjusting screw in several turns. Then remove flange mounting cap screws and pry generator to the rear. Lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY:—Relay contacts close at 410 R.P.M. of the armature when the voltage of the generator reaches 6.5 volts and open at 370 R.P.M. with a discharge current of 0-2 amperes. Contacts separate .025 to .040 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING.—Lighting Switch, Connecticut Model 194-Y. Head lamps and stop lamp are 6-8 volt, 21 cp.S.C. Dimmer lamps are 6-8 volt, 4 cp.S.C. Dome lamp is 6-8 volt, 4 cp.S.C. Dash and tail lamps are each 6-8 volt, 2 cp.S.C.

FUSES:—Lighting fuses are 20 ampere.

FRANKLIN

SERIES 11-B (1927—(AFTER DECEMBER 7, 1926)
SERIAL NOS. 164801
OWEN-DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY:—Willard, Type CRR-19. 6 volt. Starting capacity is 146 amperes for 20 minutes. Lighting capacity is 5 amperes for 27 hours. The negative (—) terminal is grounded. Battery is mounted under the right front seat.

IGNITION:—Coil Model N-7, Distributor Model RA. Breaker contacts separate .015 inch They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file or on a medium hard oilstone.

Mounting:—Ignition coil and distributor are mounted at right of engine on the bearing cap. To remove distributor, disconnect breaker lead and manual advance rod and remove distributor head or disconnect spark plug cables. Then remove cap screws holding bearing cap and lift the distributor from place.

Oiling:—Put 4 or 5 drops of light engine oil on the oiler on the side of the distributor housing every month or each 1000 miles if the car is driven more than 1000 miles in a month. Also place a small bit of vaseline on the face of the interrupter cam, applying with a toothpick.

Timing:—Breaker contacts are fully open when piston No. 1 entering power stroke is ¾ inch before top dead center when the mark 1-6 on the clutch ring is ¾ inch before the top dead center mark. The spark control level must be in the fully advanced position. At this point the triangular mark on the fan wheel rim will be ¾ inch to the right of or before the center line on the fanwheel housing.

Valve Timing:—INLET VALVES:—Head diameter, 1½ inches; stem diameter, .3373 inch; stem length, 4 27/32 inches; tappet clearance, .010 inch cold; spring pressure, 30 pounds; valve lift, 11/32 inch; intake opens at top dead center and closes 57° after lower dead center.

EXHAUST VALVES:—Head diameter, 1½ inches; stem diameter, .3373 inch; stem length, 4 27/32 inches; tappet clearance, .010 cold; spring pressure, 30 pounds; valve lift, 5/16 inch; exhaust opens 43½° before lower dead center and closes 25° after top dead center. The guide stems are removable. No oversize valve stems are made.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .031 inch.

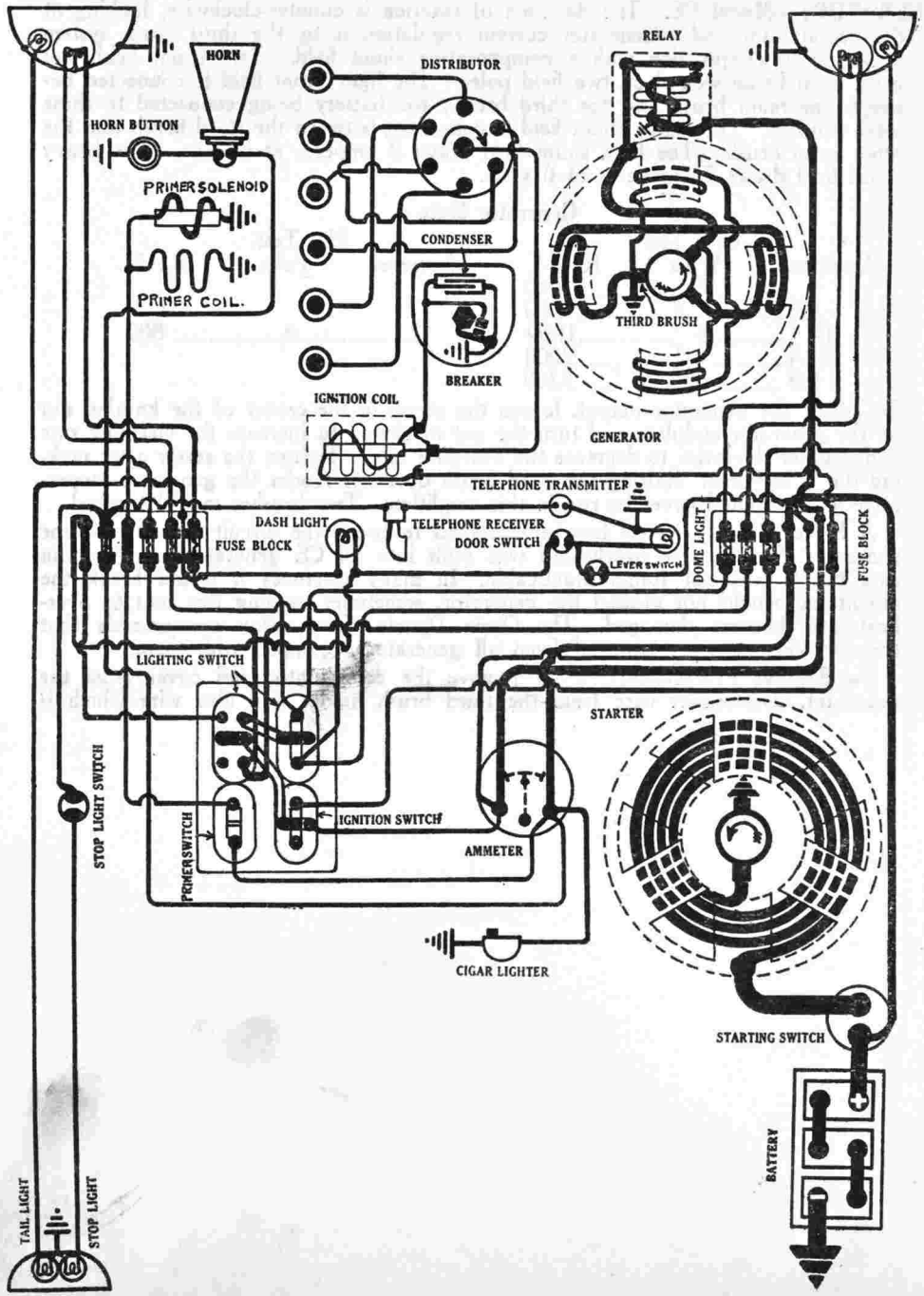
STARTER:—Model DH. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 125 R.P.M., drawing 155 amperes at 5.5 volts.

Starter Data

Torque	R.P.M.	Volts	R.P.M.
0 lb. ft.	2400	5.8	80
2.3 "	1000	5.4	170
5. "	690	5.1	225
11. "	400	4.3	390
24.7 "	Lock	3.7	630

Mounting:—Starter is mounted at right of engine. To remove starter, disconnect starter cable and remove three mounting cap screws. Then lift starter from place.

Oiling:—Starter bearings are of the oilless type. They require no attention. Refill the oiler on the Bendix gear case with the pressure gun every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.



FRANKLIN

SERIES 11-B (1927)—(AFTER DECEMBER 7, 1926)
SERIAL NOS. 164801
OWEN-DYNETO GENERATING, STARTING AND LIGHTING SYSTEM.
ATWATER KENT IGNITION.

GENERATOR:—Model CG-697. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system operating in conjunction with a compensating shunt field. Two shunt fields are used each being wound on two field poles. The light shunt field is connected between one main brush and the third brush; the battery being connected to these same brushes. The heavy shunt field is connected between the third brush and the other main brush. The light shunt field draws 2 amperes at 6 volts. The heavy shunt field draws 75 amperes at 6 volts.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.3	410			
8.6	7.5	600			
14.4	8.0	1000	12	8.	800
11.2	8.1	2000			
9.6	8.0	3200			

To adjust the generator output, loosen the screw in the center of the knurled nut on the generator end plate and turn the nut clockwise to increase the charging rate and counter-clockwise to decrease the charging rate. Tighten the screw after making the adjustment. Raising the third brush does not render the generator inoperative and it must not be run in this condition. Two brushes must be raised and any two will do. If the generator cuts in late and does not generate over 7 amperes at peak, a short probably exists in the armature or the light shunt field is open. If the generator cuts in late and the charging rate continues to increase above 2000 R.P.M. the heavy shunt field is probably open. If the output exceeds 11 amperes at 3000 R. P. M. but does not exceed the peak output, the heavy shunt field is probably shorted.

Mounting:—Generator is flange mounted at right of engine to the rear of the timing chain case. To remove generator, loosen locknut on adjusting screw at rear of generator and turn adjusting screw in several turns. Then remove flange mounting cap screws and pry generator to the rear. Lift generator from place.

Oiling:— Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY:—Relay contacts close at 410 R.P.M. of the armature when the voltage of the generator reaches 6.5 volts and open at 370 R.P.M. with a discharge current of 0-2 amperes. Contacts separate .025 to .040 inch. Air gap between the relay armature and coil core is .010 inch, contacts closed.

LIGHTING:—Connecticut Switch Model 194-Y. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament for dimming. Parking lamps are 6-8 volt, 2 cp. S.C. Stop and extension lamps are each 6-8 volt, 21 cp. S.C. Dome lamp is 6-8 volt, 4 cp. S.C. Dash and tail lamps are in series. They are each 3-4 volt, 2 cp. S.C.

FUSES:—Cigar lighter fuse is 10 amperes, and is mounted on the side of the cigar lighter reel case. All lighting fuses are 20 amperes.

FRANKLIN

SERIES 12 'AIRMAN' (1928)

Production Started October 2, 1927

OWEN-DYNETO GENERATING, STARTING SYSTEM

NORTH EAST IGNITION

BATTERY:—Willard, Type CRR-19, 6 volts, 19 plates. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 146 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 27 hours. Battery is mounted under the right front seat.

IGNITION:—Coil Type 18232. Coil is mounted on the right side of the engine on the crankcase. Ignition current is 1½ amperes at 6 volts with engine running and 5¼ amperes at 6 volts with engine stopped.

Distributor Model TU Type 10770. Breaker contacts separate .020 inch with breaker arm on lobe of cam. Adjust contact gap by loosening lock screw on stationary contact stud and turning up stud until proper gap is secured. Breaker arm spring tension is 18 ounces. Condenser is mounted on breaker plate. Distributor is semi-automatic. Manual advance is 20 degrees (engine). Automatic advance begins at 250 R.P.M. of engine. Maximum automatic advance is 42 degrees reached at 2175 R.P.M.

Mounting:—Distributor is mounted at right of engine on crankcase. The lead from the ignition switch to the breaker is carried in a steel cable and this must be disconnected at the switch before the distributor can be taken off. Then disconnect manual advance rod and remove head with cables intact. Remove set screw from side of shaft housing and lift distributor housing from place. To remove breaker box, remove wax over two screws holding breaker box in housing, take out screws and lift breaker box out. This is necessary to remove either contacts or condenser as leads are fastened to binding post under the breaker box. The binding post nut cannot be reached until the breaker box has been removed.

Oiling:—Put 4 or 5 drops of light oil in oiler on side of distributor housing every 1000 miles. Every 2000 miles remove distributor head and rotor and put a few drops of oil in the wick oiler in the center of the shaft.

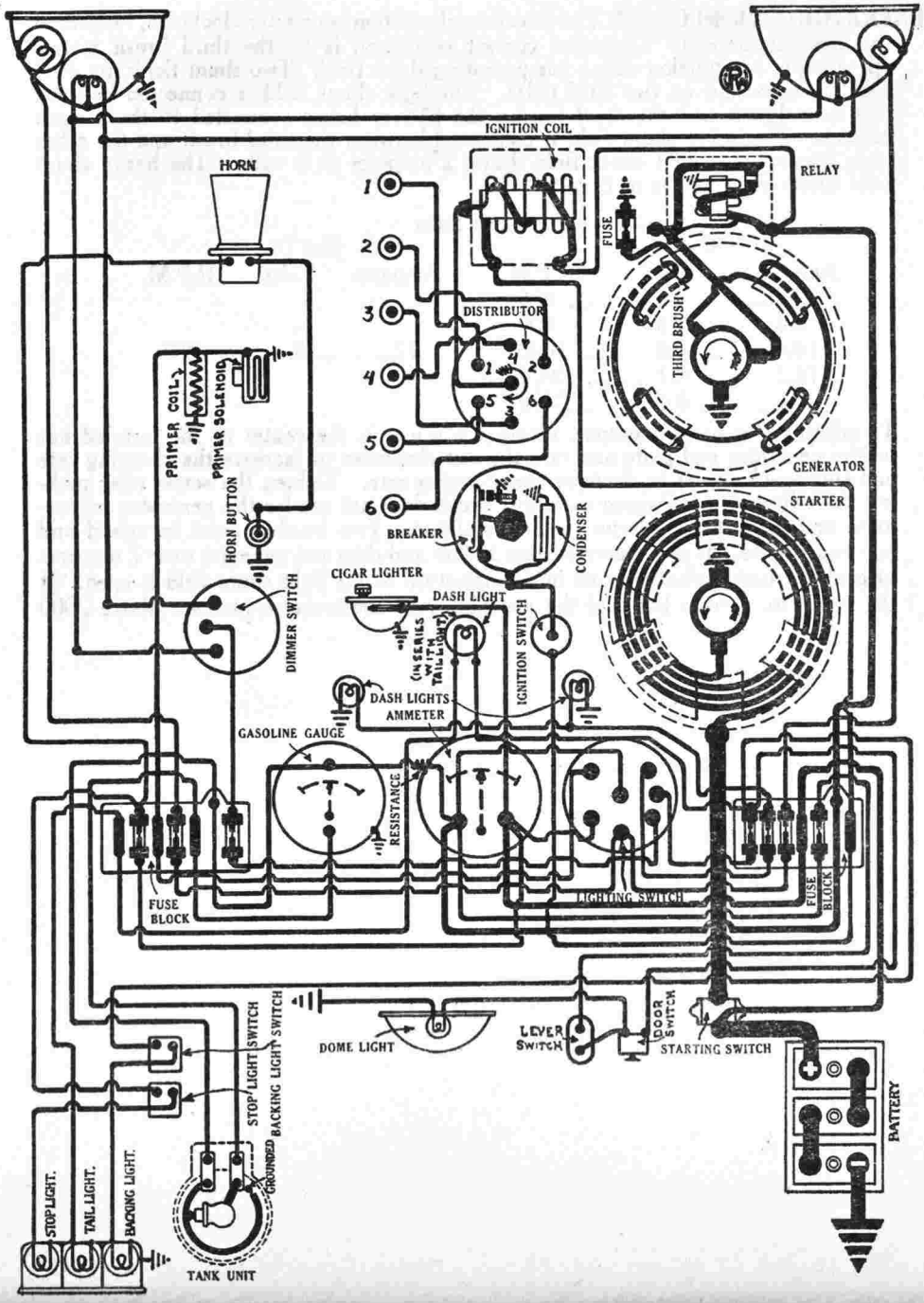
Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position one inch (on the flywheel) before top dead center with the spark control lever in the fully advanced position. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance spark lever. Continue to crank engine until piston is one inch before top dead center when the mark '1-6' on the clutch ring will be one inch before the mark on the clutch housing. The triangular mark on the fan wheel at the front of the engine will be one inch before (or to the left, viewed from the front) the center line on the front of the fan wheel housing. Then loosen advance arm clamp screw and rotate distributor until contacts begin to separate. Tighten the clamp screw. Connect the segment directly over the rotor with the spark plug in cylinder No. 1 and connect remaining spark plugs in order 4-2-6-3-5 clockwise around the distributor head. With correct setting the backlash of the gears should be sufficient to open and close contacts. Rock distributor shaft back and forth and watch dash ammeter. It should swing between '0' and 'Discharge'.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plugs are special Champion 'Franklin'. Gaps are .031 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1 9/16 inches; stem diameter, .338 inch; stem length, 4 13/16 inches. Valve lift, 5/16 inch. Spring pressure, 32-34 pounds. Tappet clearance, .010 inch (cold). Inlet valves open at top dead center and close 57 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1.5 inches; stem diameter, .338 inch;



FRANKLIN

SERIES 12 'AIRMAN' (1928)

Production Started October 2, 1927

OWEN-DYNETO GENERATING, STARTING SYSTEM

NORTH EAST IGNITION

stem length, 4 13/16 inches. Valve lift, 5/16 inch. Spring pressure, 32-34 pounds. Tappet clearance, .010 inch (cold). Exhaust valves open 43½ degrees before lower dead center and close 25 degrees after top dead center. Valve stems guides are removable. Oversize valve stems are not made.

STARTER:—Model DH-696. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 125 R.P.M. drawing 155 amperes at 5.5 volts. Brush spring tension is 3¼ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	6	50
2.3 "	1000	5.4	170
5 "	690	5.1	225
11 "	400	4.3	390
25 "	Lock	3.5	620

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel case. To remove starter, disconnect cable and remove 3 flange mounting cap screws. Pull starter forward and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model CD-788. Generator is a four pole straight shunt field generator with third brush control. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, turn slotted screw on generator frame to shift third brush. Turn the screw in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. It is not necessary to remove cover to change charging rate. With standard car setting, the maximum charging rate is 15 amperes at 8 volts reached at 1100 R.P.M. or 20 miles per hour.

Generator Data

Amperes	Volts	R.P.M.
0	6.4	450
9	7.2	750
15	8.0	1000
7	7.0	3500

Motoring generator draws 7 amperes at 6 volts. Shunt field current is 4 amperes at 6 volts. Brush spring tension is 3 pounds. A five ampere field fuse is located on the commutator end plate of the generator. The generator drive end bearing is located in the engine.

Mounting:—Generator is mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and remove 3 flange mounting cap screws. Pry generator to the rear being careful not to disturb plate between generator and chain case which carries generator bearing and drive sprocket. If this is removed the timing of the valves will be disturbed. The generator must not be run on the test stand without bolting a special bearing on the drive end. This can be secured from the Owen-Dyneto Corporation and is their Part No. 22375.

Oiling:—Put 4 or 5 drops of light oil in the oiler on the commutator end of the generator every month or each 1000 miles. The drive end bearing is oiled by splash from the chain case.

RELAY:—Relay is mounted on the generator. Relay contacts close at 8-10 M.P.H. or 450 R.P.M. when the generator voltage reaches 6.4 volts and open at 7.5-8 M.P.H. or 435 R.P.M. with a discharge current of .5 ampere. Charging current at closing of contacts is approximately 1 ampere. Relay contacts separate .025-.040 inch. Air gap is .010 inch with contacts closed.

LIGHTING:—Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Auxiliary head lights are 6-8 volt, 6 cp. S.C. Mazda No. 81. Stop and backing lights are each 6-8 volt, 21 cp. S.C. Mazda No. 1129. Dome light is 6-8 volt, 3 cp. S.C. Mazda No. 63. Tail light is in series with one dash light. They are each 3-4 volt, 2 cp. S.C. Mazda No. 61. The remaining dash lights are 6-8 volt, 3 cp. S.C. Mazda No. 63.

Switches:—Lighting switch is Soreng-Manigold. It is mounted on the instrument board. A dimmer switch is mounted on the steering column.

FUSES:—All lighting fuses are 20 amperes capacity.

GARDNER

MODEL G (1920)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WESTINGHOUSE IGNITION

BATTERY.—Willard, Type SJWN-3, 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type SC.. Style 290,356. Breaker contacts separate .012 to .016 inch They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery whel, finishing on a hard oilstone. The bumper on the contact spring is 1/8 inch off center from the line through the centers of the shaft and terminal screw, this offset being opposite to the direction of rotation of the cam. The above adjustment is made by bending the solid arm at the terminal block. A pull of 20 to 25 ounces, applied to the movable contact, is required to separate the contacts .020 inch. The spring pressure is adjusted by bending the solid arm at the point of contact with the contact spring. Resistance of the primary winding of the ignition coil is 1 ohm. The resistance of the ballast resistor is .4 ohm. Resistance of the secondary winding is 3700-4700 ohms.

OILING.—Put 4 or 5 drops of light engine oil in the oiler at the side of the breaker box every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps ore .025 inch.

STARTER.—Frame 100. Style 265,774B. Rotation is counter-clockwise, looking at commutator end. Starter is connected to the engine through a Bendix drive. Lock torque is 12 pound-feet, current being 475 amperes at 4 volts. Torque at 1600 R.P.M. is 1.75 pound-feet. Running freely, starter takes 75 amperes, armature revolving at 4000 R.P.M.

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR.—Frame No. 760. Style 271,528-B. Rotation is counter-clockwise looking at the commutator end. Generator current regulation is by the third brush system. Maximum current output is 15-17 amperes at 7.5 volts, reached at 1100-1500 R.P.M. of the armature, or 15-20 miles per hour.

Generator Data

Amperes	R.P.M.	Volts
0	500	6.5
8.0	750	7.0
15-17	1100-1500	7.5

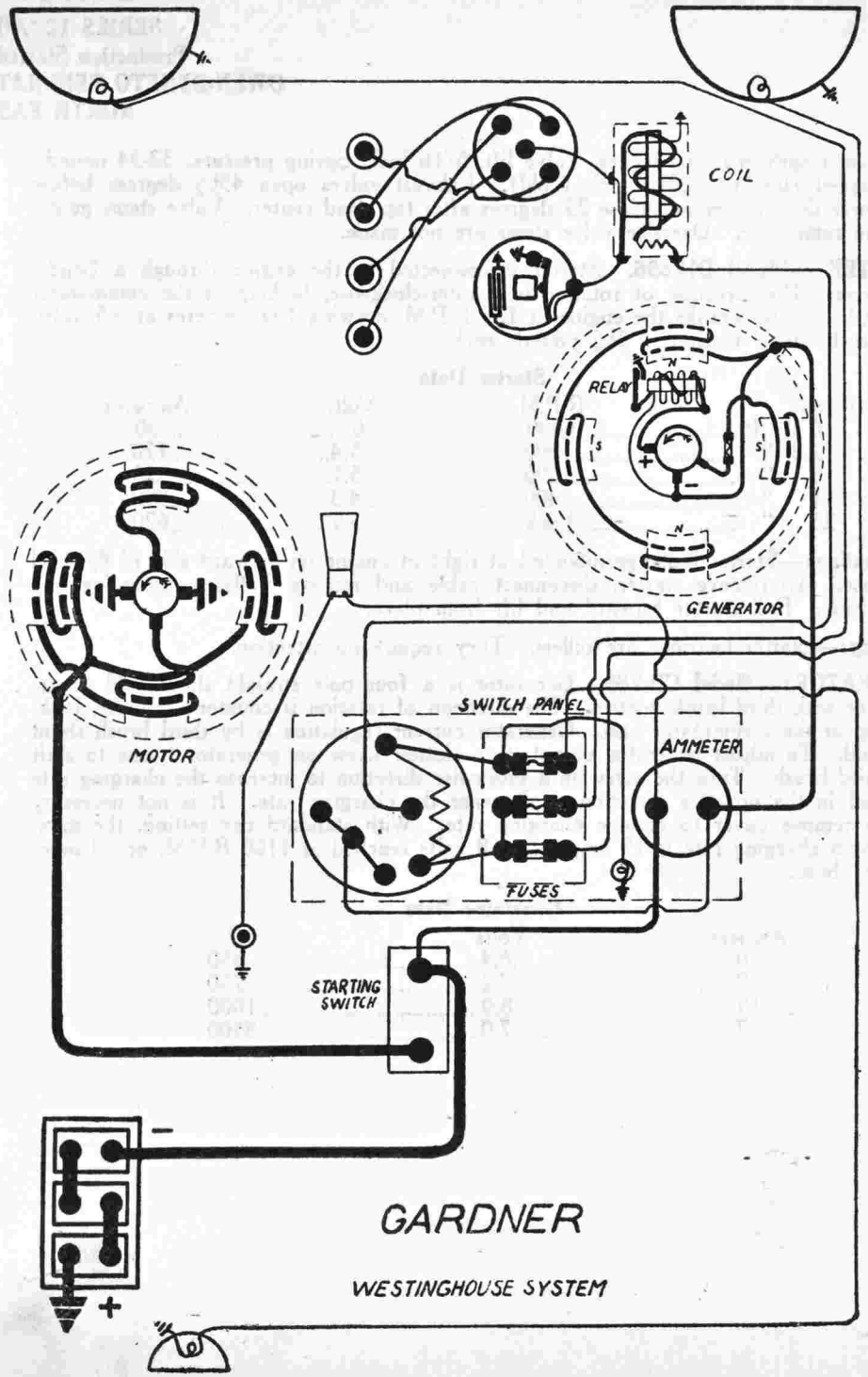
Shunt field winding takes 2.5 amperes at 6 to 6.3 volts. Move the third brush in a counter-clockwise direction to increase the charging rate, and in a clockwise direction to decrease the charging rate.

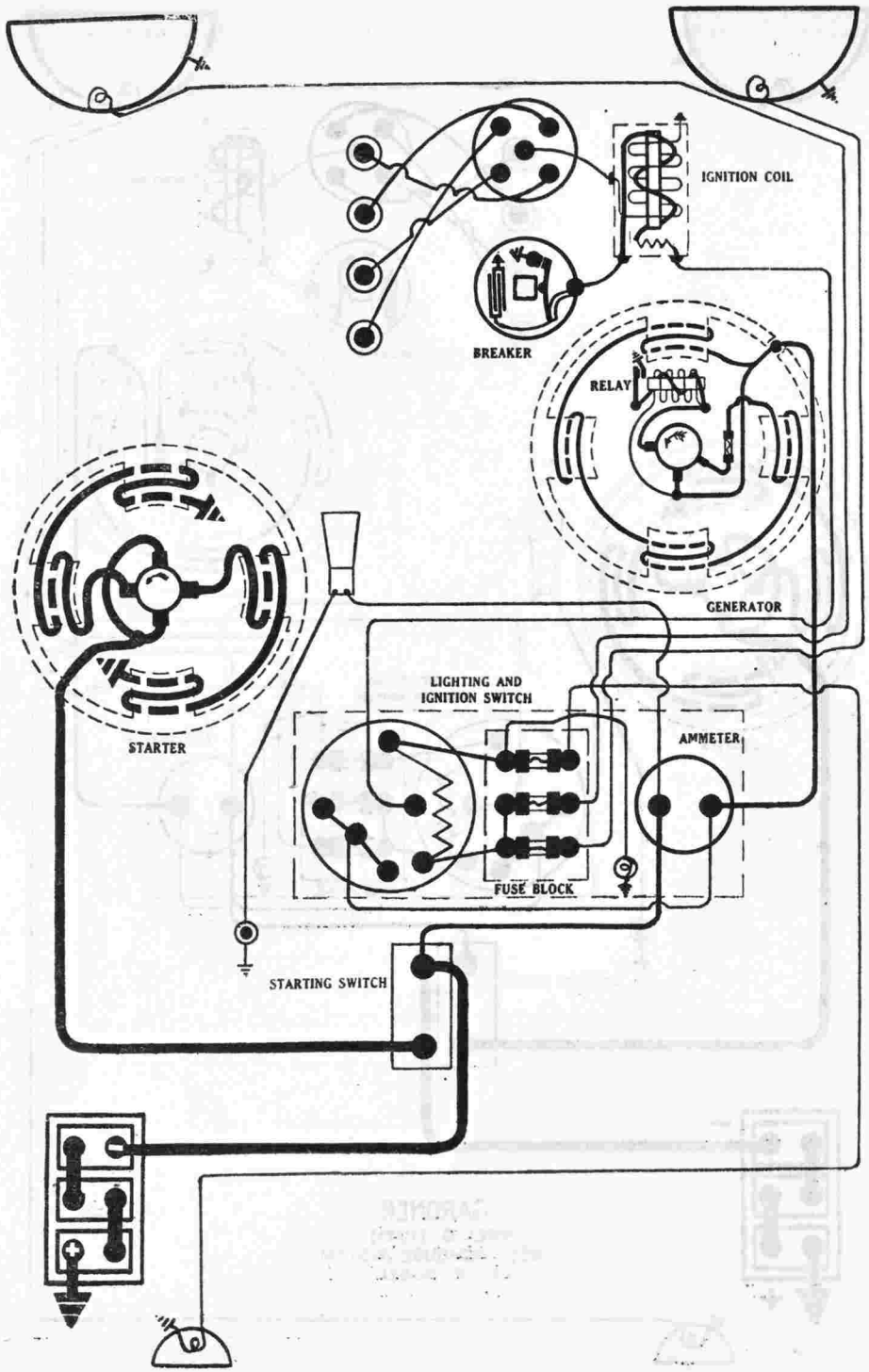
OILING.—Put 5 or 6 drops of light engine oil in the generator bearing oilers every two weks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in the generator frame. Relay closes at 7 miles per hour or 575-600 R.P.M. of the armature, and opens at 5 miles per hour or 525-575 R.P.M. of the armature. Adjust the spring tension on the relay armature so that the contacts open with a discharge current of 0-3 amperes. Adjust the air gap between the relay armature and coil core so that the contacts close when the voltage of th generator reaches 6.2 to 6.5 volts. Air gap between relay armature and coil core is .005 inch, contacts closed. Contacts separate .030 to .035 inch. Resistance of the shunt coil is 68 ohms. Clean relay contacts by drawing unglazed paper between them.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dash, dimmer and tail lamps are 6-8 volt. 2 cp.

FUSES.—Generator fuse is 5 ampere. Lighting circuit fuses are 20 ampere.





GARDNER

MODEL G (1920-21) R, T, S (1922)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM

WESTINGHOUSE IGNITION

BATTERY.—Willard, Type SJRN-3, 6 volt, 94 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type S.C. Coil Model No. 288,761. Distributor Model No. 290,356. Breaker contacts separate .012 to .016 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oilstone. The bumper on the contact spring is 1/8 inch off center from the line through the centers of the shaft and terminal screw, this offset being opposite to the direction of rotation of the cam. The above adjustment is made by bending the solid arm at the terminal block. A pull of 20 to 25 ounces, applied to the movable contact, is required to separate the contacts .020 inch. The spring pressure is adjusted by bending the solid arm at the point of contact with the contact spring. Resistance of the primary winding of the ignition coil is 1 ohm. Resistance of the secondary winding is 3700-4700 ohms.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler at the side of the breaker box every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Timing.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps are .025 inch.

STARTER.—Frame No. 33AB. Style 265,774-C. Rotation is counter-clockwise, looking at commutator end. Starter is connected to the engine through a Bendix drive. The brush tension is 2 to 3 pounds.

Starter Test Data.—No. 33AB

Torque	R.P.M.	Volts	Amperes
0.00 lb. ft.	3700-4100	5.5	70
1.75 lb. ft.	1600	5.5	150
12.00 lb. ft.	Lock	3.7	500

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every month.

GENERATOR:—Frame No. 35-AT. Style No. 331, 328. Rotation is counter-clockwise, looking at commutator end. Generator current regulation is by the third brush system. Maximum current output is 15-16 amperes at 7.5 volts, reached at 1450-1750 R.P.M. of the armature or 15-20 miles per hour.

Generator Data

Amperes	R.P.M.	Volts
0	575	6.5
8.5-10.5	1000	7-7.5
15.0-16.0	1450-1750	7-5

Shunt field winding takes 3.25 to 4 amperes at 6 to 6.3 volts. Move the third brush in a counter-clockwise direction to increase the charging rate, and in a clockwise direction to decrease the charging rate.

Oiling.—Put 5 or 6 drops of light engine oil in the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in the generator frame. Relay closes at 7 miles per hour or 575-600 R.P.M. of the armature, and opens at 5 miles per hour or 525-575 R.P.M. of the armature. Adjust the spring tension on the relay armature so that the contacts open with a discharge current of 0-3 amperes. Adjust the air gap between the relay armature and coil core so that the contacts close when the voltage of the generator reaches 6.2 to 6.5 volts. Air gap between relay armature and coil core is .005 inch, contacts closed. Contacts separate .030 to .035 inch. Resisance of the shunt coil is 68 ohms. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer, dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Generator fuse is 5 ampere. Lighting circuit fuses are 20 ampere.

GARDNER

MODEL R.T.S. SERIES 5 (1923)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM

WESTINGHOUSE IGNITION

BATTERY.—Willard, Type SJRN-3, ending on Car No.24,295-B, **SW-4** used, beginning on Car No. 24,296-B. The positive (+) terminal is grounded.

IGNITION.—Type SC. Coil Model No. 288,761. Distributor Model No. 290,356. Breaker contacts separate .012 to .016 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone. The bumper on the contact spring is 1/8 inch off center from the line through the centers of the shaft and terminal screw, this offset being opposite to the direction of rotation of the cam. The above adjustment is made by bending the solid arm to the terminal block. A pull of 20 to 25 ounces, applied to the movable contact is required to separate the contacts .020 inch. The spring pressure is adjusted by bending the solid arm at the point of contact with the contact arm. Resistance of the primary winding of the ignition coil is 1 ohm. The resistance of the ballast resistor is .4 ohm. Resistance of the secondary winding is 3700-4700 ohms.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler at the side of the breaker box every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Timing.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps are .025 inch.

STARTER.—Frame No. 33AB. Style 265,774-C. Rotation is counter-clockwise, looking at commutator end. Starter is connected to the engine through a Bendix drive.

Starter Test Data.—No. 33AB.

0.00 lb. ft.	3700-4100	5.5	70
1.75 lb. ft.	1600	5.5	150
12.00 lb. ft.	Lock	3.7	500

The brush tension is 2 to 3 lbs.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every month.

GENERATOR:—Frame No. 35-AT. Generator current regulation is by the third brush system. Maximum current output is 15-17 amperes, reached at 1500 R.P.M. of the armature or 16-20 miles per hour.

Generator Data

Amperes	Cold Test	R.P.M.	Amperes	Hot Test	R.P.M.
0		500			
8		750	10		1200
15-16		1600			

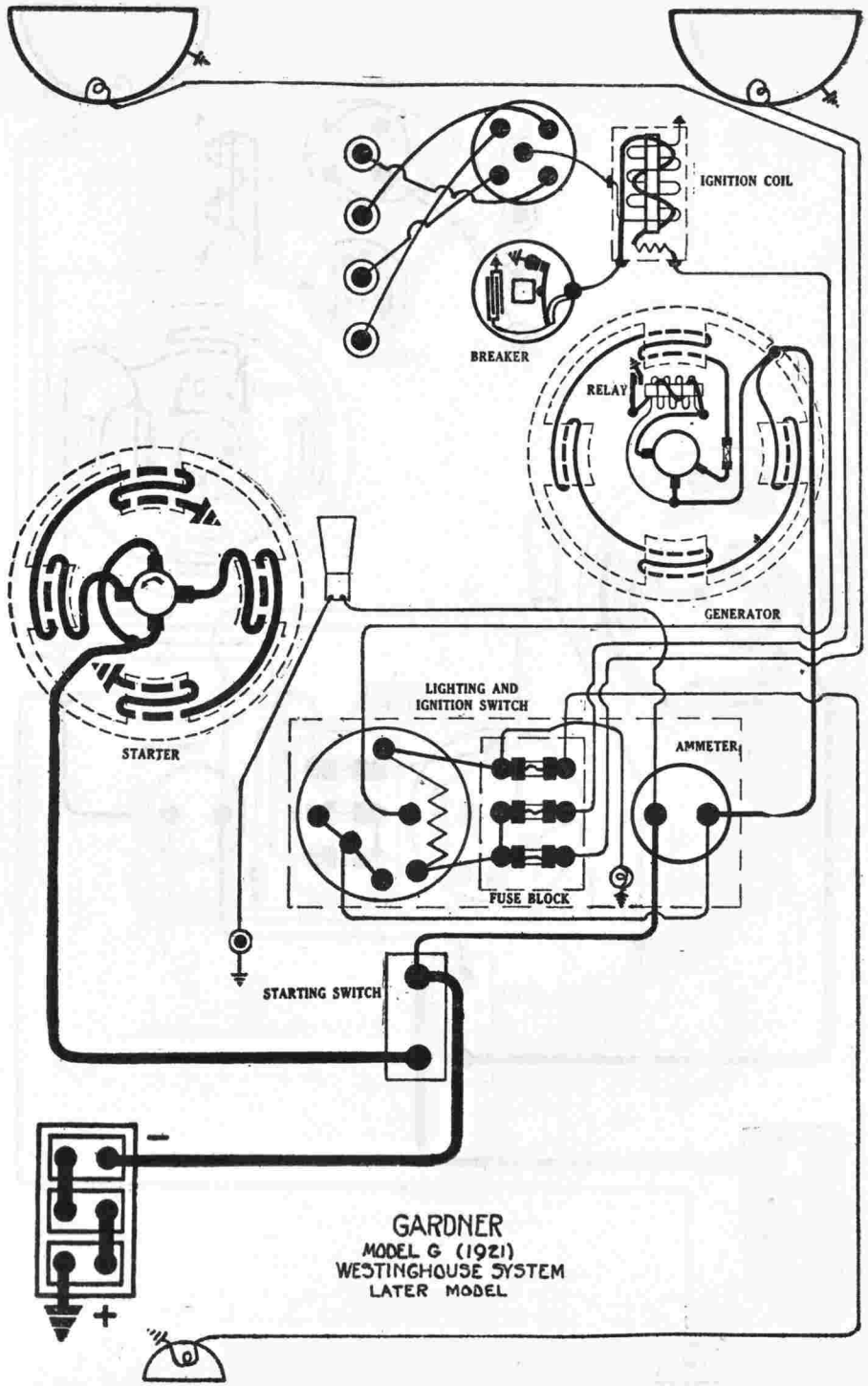
The cold test readings are obtained with a generator temperature under 95° F. The hot test readings are obtained after the generator has been operated one hour at 1800 R.P.M., charging a half-charged battery. Shunt field current is 2.8 to 3.25 amperes when 6 volts pressure is applied to its terminals. When the generator is operating freely as a motor, current is 3.5 to 5 amperes at 6 to 6.6 volts.

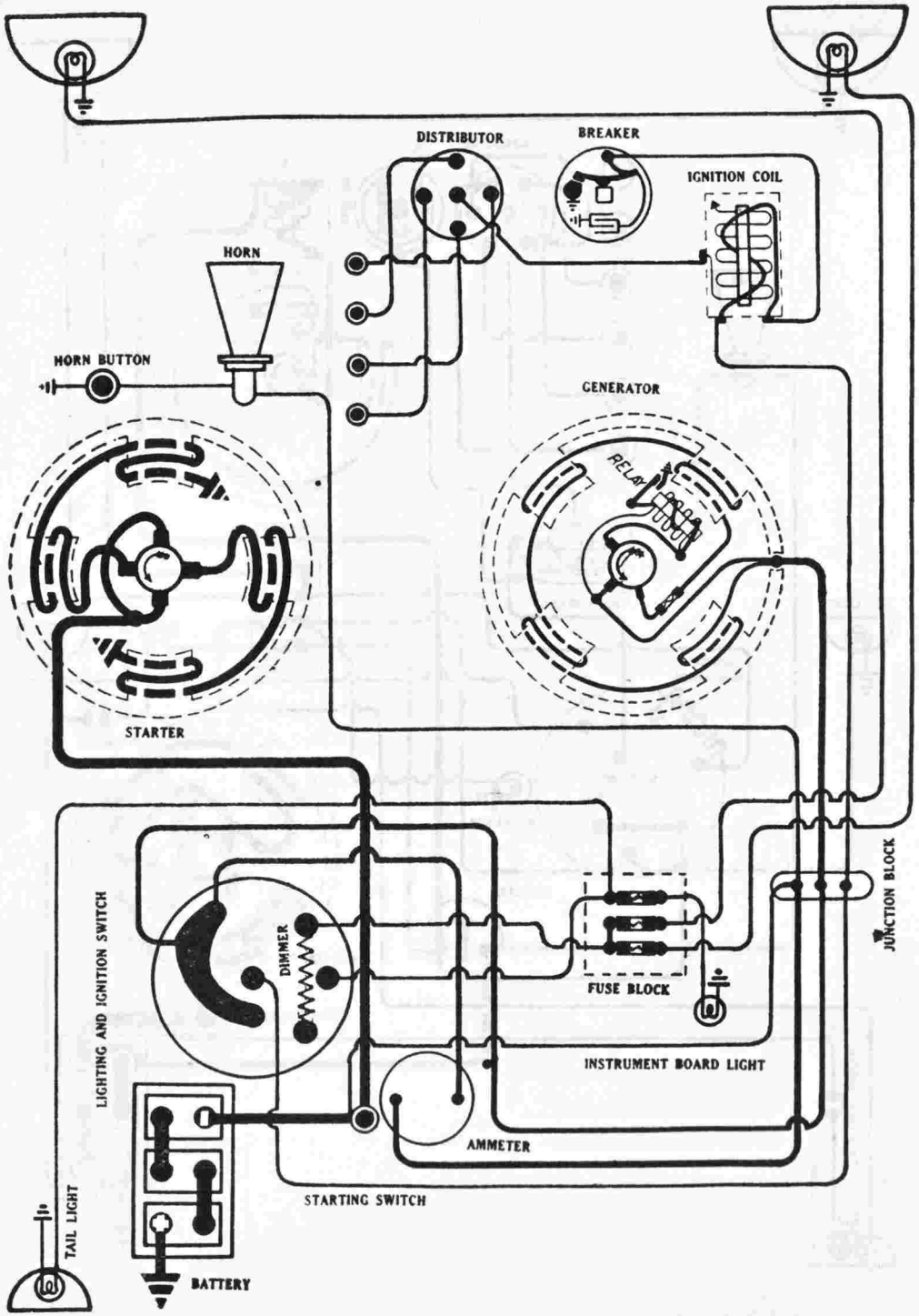
Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY:—Sytle 301210A. Relay closes at 500-550 R.P.M. of the armature or 7-9 miles per hour and opens at 450-500 R.P.M. of the armature or 5-7 miles per hour. Adjust the spring tension on the relay armature so that the contacts open with a discharge current of 0-3 amperes. Adjust the air gap between the relay armature and coil core so that the contacts close when the voltage of the generator reches 6.2 to 6.5 volts. Air gap between relay armature and coil core is .005 inch, contacts closed. Contacts separate .030 to .035 inch. Resistance of the shunt coil is 68 ohms. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS:—Head lamps are 6-8 volt, 21 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Generator fuse is 5 ampere. Lighting fuses are 20 ampere.





GARDNER

MODEL R,T,S, SERIES 5 (1923-24-25)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM

WESTINGHOUSE IGNITION

BATTERY.—Willard, Type SW-4, 6 volt, 94 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type S. C. Coil Model No. 288,761. Distributor Model No. 290,356. Breaker contacts separate .008 to .012 inch. They are made of tungsten. When the pitting of the contacts affects the ignition, remove and resurface with a medium oil-stone. The bumper of the contact spring is 1/8 inch off center from the line through the center of the shaft and terminal screw, this offset being opposite to the direction of rotation of the cam. The above adjustment is made by bending the solid arm at the terminal block. A pull of 20 to 25 ounces, applied to the movable contacts, is required to separate the contacts .020 inch. This spring pressure is adjusted by bending the solid arm at the point of contact with the contact spring. Resistance of the primary winding and ballast of the ignition coil is 1 ohm. Resistance of the secondary winding is 3700-4700 ohms.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler at the side of the breaker box every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Timing.—Breaker contacts begin to separate when the piston entering power stroke is 20° after top dead center, spark control lever and breaker assembly in the fully retarded position. Advance, 30° before top dead center.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps are .025 inch.

STARTER.—Frame Number 100. Style No. 297,903. Rotation of starter armature, looking at commutator end, is counter-clockwise. Starter is connected to engine through a Bendix drive. Starter cranks engine at 115 R.P.M., developing a torque of 2.2 lb. ft.

Starter Test Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4100-4700	5.5	35-45
12 lb. ft.	0	4.0	475

Brush tension should be 1¼ to 1½ pounds.

Oiling.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Frame No. 35-AT. Model 331,328. The direction of rotation, looking at commutator end, is counter-clockwise. Generator current regulation is by the third brush system. Maximum current output is 17 amperes, reached at 1500 R.P.M. of armature. Brush tension at 1¼ to 1½ pounds per brush.

Generator Test Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	500			
8	8.0	750	10	8.0	1200
15-16	8.0	1600			

To increase the charging rate, shift the third brush in the direction of armature rotation and to decrease charging rate shift the brush in the opposite direction.

Oiling.—Put 5 or 6 drops of light engine oil in the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Westinghouse Model 301,210-A. Relay is mounted on generator frame. Relay closes at 500 R.P.M. of the armature or at 0 to 2 amperes. Relay contacts separate .030 inch to .035 inch. Adjust air gap between relay armature and coil core to .005 inch, contacts closed.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Generator fuse is 5 ampere. Lighting circuit fuses are 20 ampere.

GARDNER

MODEL 6-A (1925)

REMY GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY:—Prest-O-Lite, Type 611-SHK. 6 volt, 92.5 ampere hour. The starting capacity is 110 amperes for 20 minutes. The lighting capacity is 5 amperes for 18.5 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model No. 284-P Distributor Model No. 626-P. Breaker contacts separate .019-.026 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone or with a fine, flat jeweler's file. Manual advance is 15°. Automatic advance is 20°.

Oiling:—Screw up the grease cup on the side of the distributor housing one or two turns every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Place a small bit of vaseline on the face of the breaker cam and oil the wick oiler under the rotor with light engine oil every 5000 miles.

Timing:—Breaker contacts begin to separate when the top dead center mark on the flywheel reaches a position of 10° or approximately one inch past the mark on the flywheel housing. The manual spark advance lever should be in the fully retarded position.

Firing Order:—The firing order if 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

STARTER:—Model No. 720-J. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The starter brush tension should be 20-28 ounces each.

Starter Data

Torpue	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
16 "	Lock	3.15	570

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR:—Model No. 941-B. The direction of rotation of the generator is counter-clockwise, looking at the commutator end. Current regulation is by the third brush system combined with a thermostat. The thermostat contacts open at approximately 160° inserting a resistance in the shunt field circuit and cutting down the output 50%. To adjust the generator output, loosen the screw on the generator end plate and shift the third brush mounting plate. Moving the third brush in the direction of generator rotation increases the charging rate and in the opposite direction decreases the charging rate. The maximum charging rate of 18-20 amperes is reached at 1450 R.P.M. or approximately 25 M.P.H.

Generator Data

Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7.3	750			
21	8.35-8.5	1450	11	7.5	1900

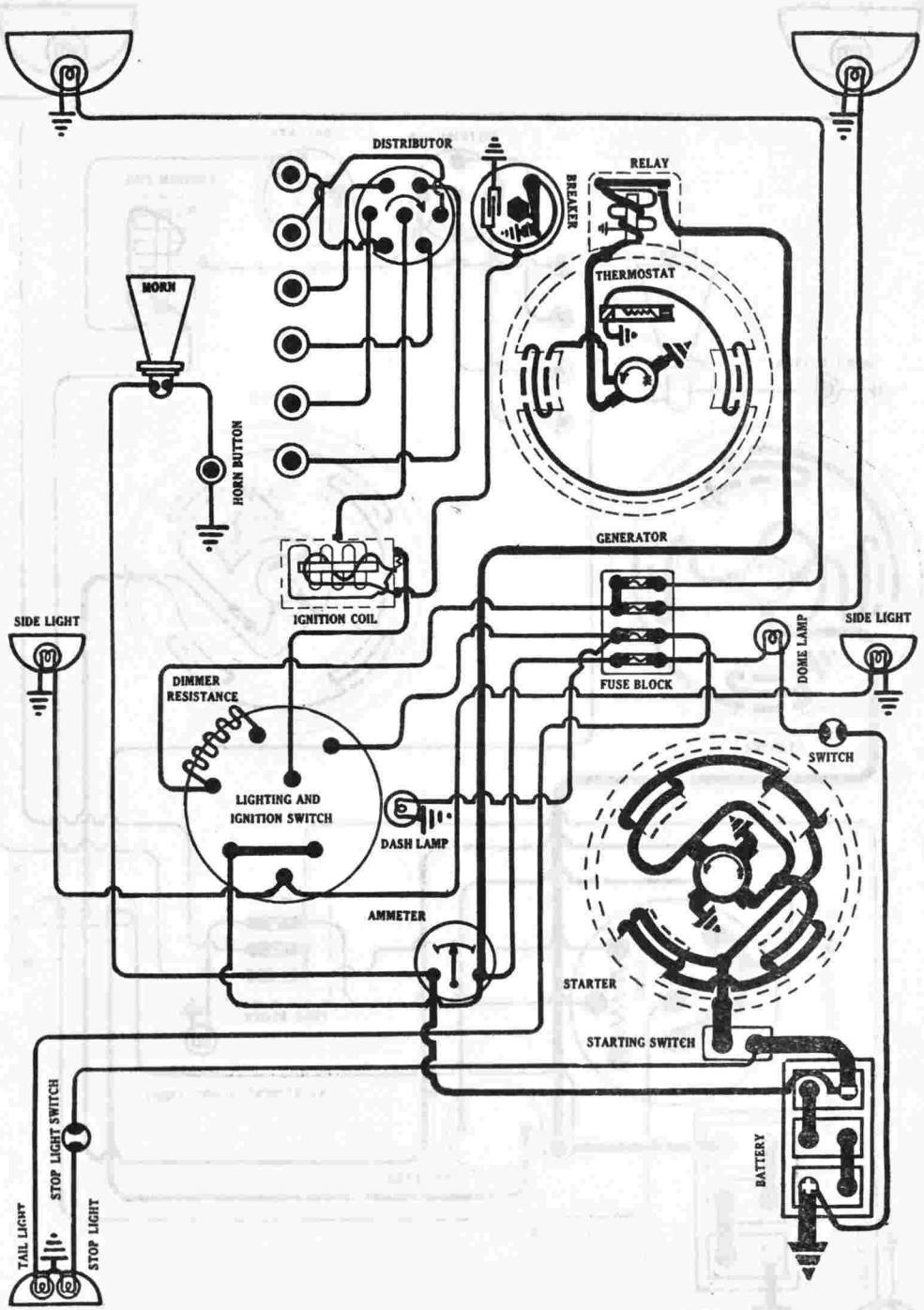
The brush tension should be 22-28 ounces each.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at the commutator end of the generator every month or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY:—Model No. 265-B. Relay contacts close at 675 R.P.M. of the generator armature with a generator voltage of 7.25 volts. Charging current at closing of contacts is 3 amperes. Contacts open with a discharge current of 0-2.5 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .014 inch, contacts closed.

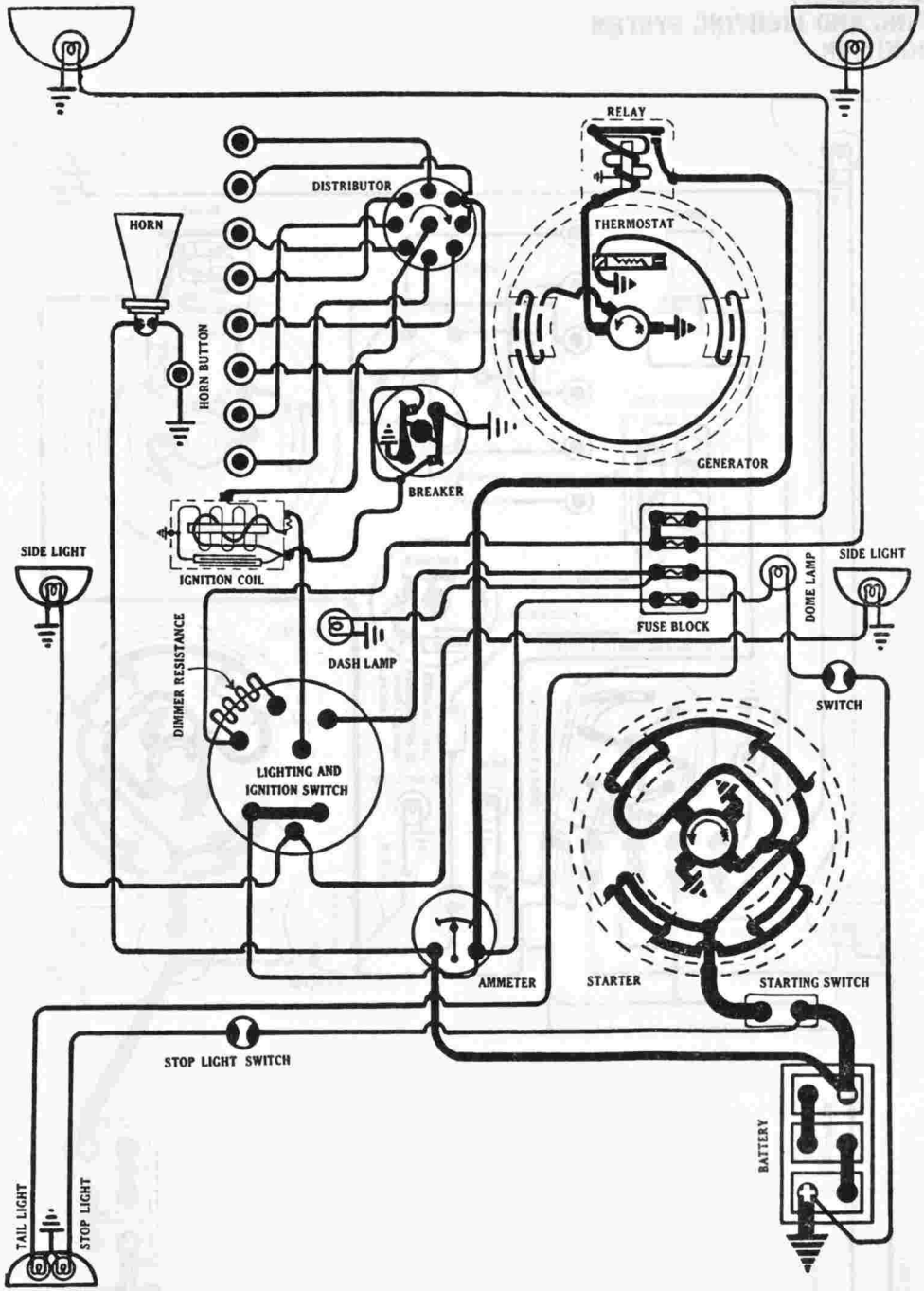
LIGHTING:—Combination Switch Model 475-D. Head lamps are 6-8 volt, 21 cp. S.C. Side, tail and dash lamps are each 6-8 volt, 3 cp. S.C. Stop lamp is 6-8 volt, 21 cp. S.C. Dome lamp is 6-8 volt, 4 cp. D.C.

FUSES:—Lighting fuses are 20 ampere.



GARDNER

MODEL 8-A (1925)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION



BATTERY:—Prest-O-Lite, Type 617-RHK. 6 volt, 136 ampere hour. The starting capacity is 152 amperes for 20 minutes. The lighting capacity is 5 amperes for 27 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model No. 284-L. Distributor Model No. 648-A. Breaker contacts separate .018-.024 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone or with a fine, flat jeweler's file. Two sets of contacts used. They must be synchronized so as to open at the same instant. Manual advance is 20°. Automatic advance is 15°.

Oiling:—Screw up the grease cup on the side of the distributor housing one or two turns every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Every 5000 miles place a small bit of vaseline on the face of the breaker cam and oil the wick oiler exposed when the rotor is removed with light engine oil.

Timing:—Breaker contacts begin to separate when the dead center mark for cylinders 1 and 8 on the flywheel is 10° or approximately one inch past the mark on the chain case cover. The ignition marking is on the front flywheel.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—The spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Model 720-J. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 20-28 ounces each.

Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR:—Model No. 917-V. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system combined with a thermostat. Thermostat contacts open at approximately 160° and reduce the generator output 50%. To adjust the charging rate loosen the screw on the generator end plate holding the third brush mounting plate and shift the third brush. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite directon decreases the charging rate. The maximum charging rate is 19 amperes reached at 1900 R.P.M. of the generator armature or approximately 25 M. P. H.

Generator Data.

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7.2	850			
19	8.4	1900	11	7.5	1900

The shunt field current is 5 amperes at 6 volts. The generator brush tension should be 22-28 ounces.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY:—Model 265-B. Relay contacts close at 675 R.P.M. of the armature with a generator voltage of 7.25 volts and open with a discharge current of 0-2.5 amperes. The charging current is approximately 3 amperes at closing of coil contacts. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LGHTING:—Combination Switch Model 475-D. Head and stop lamps are each 6-8 volt, 21 cp. SC. Dash, tail and side lamps are each 6-8 volt, 3 cp. SC. Dome lamp is 6-8 volt, 4 cp. D.C.

FUSES:—Lighting fuses are 20 ampere.

GARDNER

MODEL 6-B (1926-27)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY:—Prest-O-Lite, Type 611-SHK. 6 volt, 92.5 ampere hour. The starting capacity is 110 amperes for 20 minutes. The lighting capacity is 5 amperes for 18.5 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model 284-P. Distributor Model 636-H. Breaker contacts separate .020-.028 inch. They are made of tungsten. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 25°. Maximum automatic advance is 30°. The tension of the breaker arm spring is 17-21 ounces.

Mounting:—Distributor is mounted on top of the cylinder head. To remove distributor, disconnect primary lead and manual advance rod. Then remove distributor head with high tension cables intact. Remove the set screw in side of mounting and lift distributor from place.

Oiling:—Screw up the grease cup on the side of the distributor housing one or two turns every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Place a small bit of vaseline on the face of the breaker cam and oil the wick oiler under the rotor with light engine oil every 5000 miles.

Timing:—Breaker contacts begin to separate when the top dead center mark on the flywheel reaches a position 10° or approximately one inch past the mark on the flywheel housing. The manual spark advance lever should be in the fully retarded position. To check timing, crank engine until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Fully retard spark control lever and continue to crank engine until piston No. 1 reaches top dead center. At this point the flywheel mark "UDC-1-6" will be opposite the indicator on the flywheel housing. If breaker contacts are not beginning to separate, loosen distributor clamp screw and rotate distributor housing until contacts begin to separate. Tighten the clamp screw and make certain that the rotor is under the segment connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

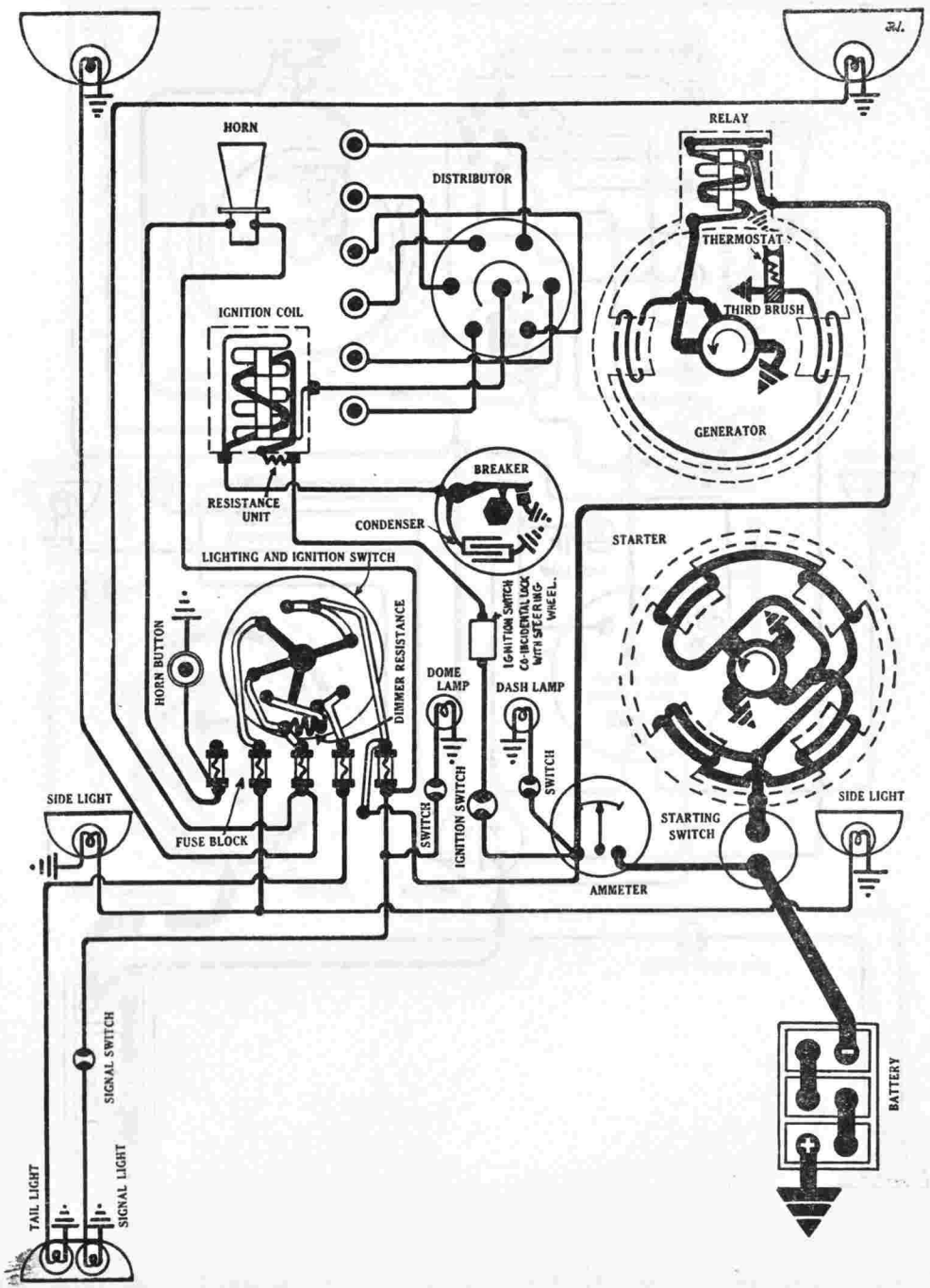
VALVE TIMING:—Inlet Valves. Head diameter is 1 5/8 inches stem diameter is .3425-.341 in; stem length is 5 19/32 inches (over head). Tappet clearance is .006 inch (hot). Valve lift is 5/16 inch. Spring pressure is 34-38 pounds (valves closed). Inlet valves open at top dead center and close 35 degrees after lower dead center.

Exhaust Valves:—Head diameter is 1 15/32 inches; stem diameter is .3425-.341 inch; stem diameter is 5 9/16 inches (over head). Tappet clearance is .008 inch (hot). Valve lift is 5/16 inch. Spring pressure is 34-38 pounds (valves closed). Exhaust valves open 42 degrees before lower dead center and close 5 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are made.

STARTER.—Model 720-Q. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 24 ounces.

Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 " "	Lock.	3.15	570



GARDNER

MODEL 6-8 (1926-27)
REMY GENERATING, STARTING AND LIGHTING SYSTEM.
REMY IGNITION

Mounting:—Starter is mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect starter cable and remove three flange mounting cap screws. Then slide starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR.—Model 941-D. The direction of rotation of the generator is counter-clockwise, looking at the commutator end. Current regulation is by the third brush system combined with a thermostat. The thermostat contacts open at approximately 160° inserting a resistance in the shunt field circuit and cutting down the output 50%. To adjust the generator output, loosen the screw on the generator end plate and shift the third brush mounting plate. Moving the third brush in the direction of generator rotation increases the charging rate and in the opposite direction decreases the charging rate. The maximum charging rate of 18-20 amperes is reached at 1450 R.P.M. or approximately 25 M.P.H.

Generator Data.

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7.3	750			
21	8.35-8.5	1450	11	7.5	1900

The brush tension should be 22-28 ounces each.

Mounting:—Generator is flange mounted at right of engine on rear of timing gear case. To remove generator, disconnect generator lead and remove three flange mounting cap screws. Then slide generator to rear and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at the commutator end of the generator every month or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY:— Model No. 265-B. Relay contacts close at 675 R.P.M. of the generator armature with a generator voltage of 7.25 volts. Charging current at closing of contacts is 3 amperes. Contacts open with a discharge current of 0-2.5 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .014 inch, contacts closed.

LIGHTING.—Combination Switch Model 420-H. Head lamps are 6-8 volts, 21 cp. S. C. Side, tail and dash lamps are each 6-8 volt, 3 cp.S.C. Stop lamp is 6-8 volt, 21 cp. S.C. Dome lamp is 6-8 volt, 4 cp.D.C.

FUSES:—Lighting fuses are 20 ampere.

GARDNER

MODEL 8-B (1926)

REMY GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY:—Prest-O-Lite, Type 617-RHK. 6 volt, 135 ampere hour. The starting capacity is 152 amperes for 20 minutes. The lighting capacity is 5 amperes for 27 hours, The positive (+) terminal is grounded.

IGNITION.—Coil Model 284-L. Distributor Model 648-B. Breaker contacts separate .020-.028 inch. They are made of tungsten. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 20°. Maximum automatic advance is 15°. Breaker arm spring tension is 17-21 ounces. The breaker uses two sets of contacts with an eight lobed cam. The contacts must be synchronized so that they open at the same instant.

Oiling:—Screw up the grease cup on the side of the distributor housing one or two turns every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Every 5000 miles place a small bit of vaseline on the face of the breaker cam and oil the wick oiler exposed when the rotor is removed with light engine oil.

Timing:—Breaker contacts begin to separate when the dead center mark for cylinders 1 and 8 on the flywheel is 10° or approximately one inch past the mark on the chain case cover. The ignition mark is on the front flywheel. To set timing, fully retard the manual advance lever. Then crank engine until piston No. 1 reaches top dead center on compression stroke. This is at the end of the upward stroke of the piston with both valves closed. Then turn the engine over 8° until the mark on the flywheel is opposite the mark on the chain case cover. Loosen the locknut in the center of the cam and shift cam until stationary set of contacts begin to separate. Tighten the locknut. Check contacts on movable plate to see that they open at the same instant. If they do not, loosen two screws holding mounting plate in position and rotate plate and contacts until they begin to separate. Then tighten the two screws. To make a close check on the contact opening, connect 6 volt lamps in the primary circuit and watch when they go out. When they do this the contacts are separating.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—The spark plug diameters are 7/8 inch. Gaps are .025 inch.

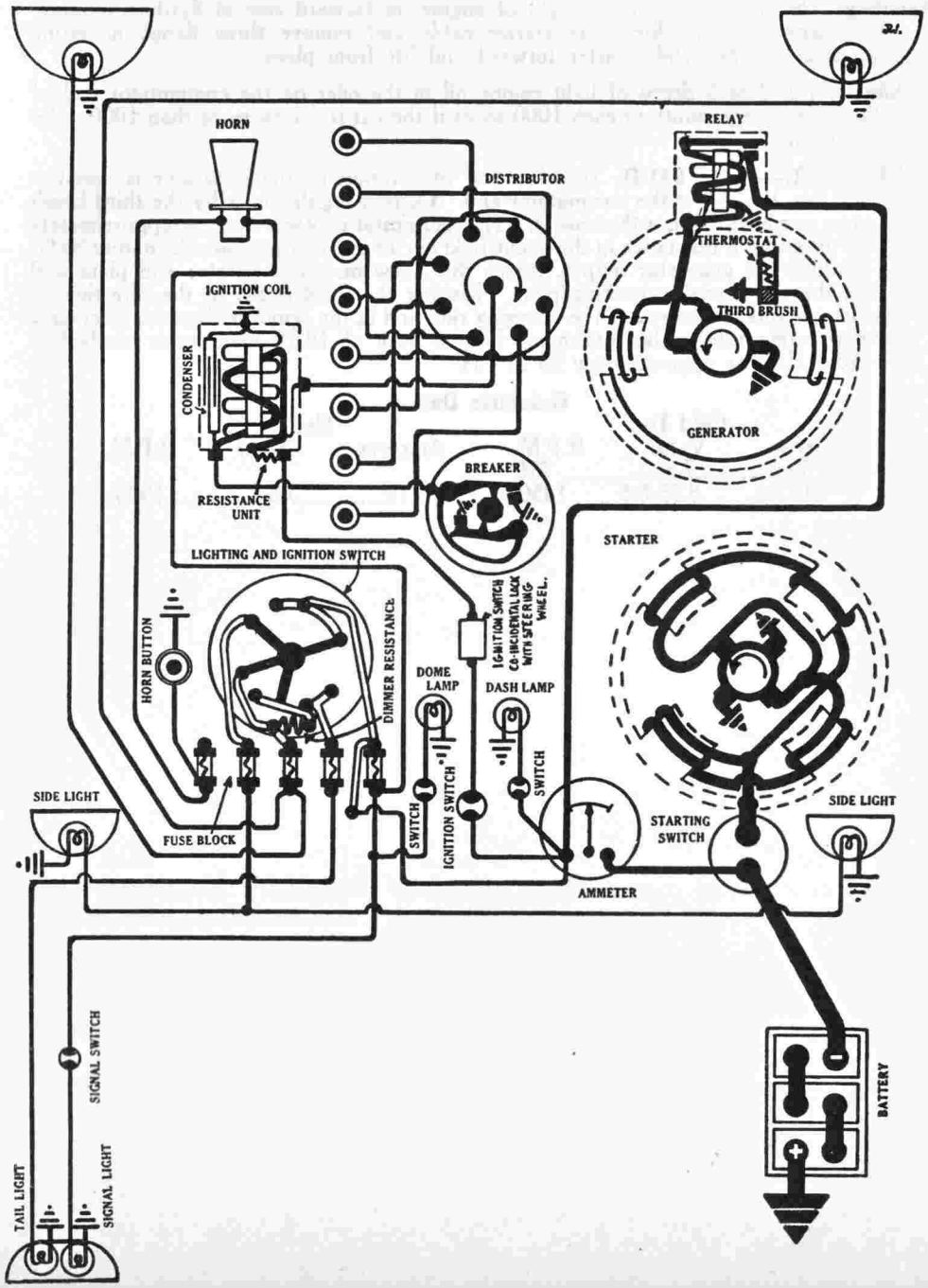
STARTER.—Model 720-Q. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension is 24 ounces each.

Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR.—Model 941-D. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system combined with a thermostat. Thermostat contacts open at approximately 160° and reduce the generator output 50%. To adjust the charging rate loosen the screw on the generator end plate holding the third brush mounting plate and shift the third brush. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. The maximum charging rate is 18-20 amperes reached at 1450 R.P.M. of the generator.



GARDNER

MODEL 8-B (1926)

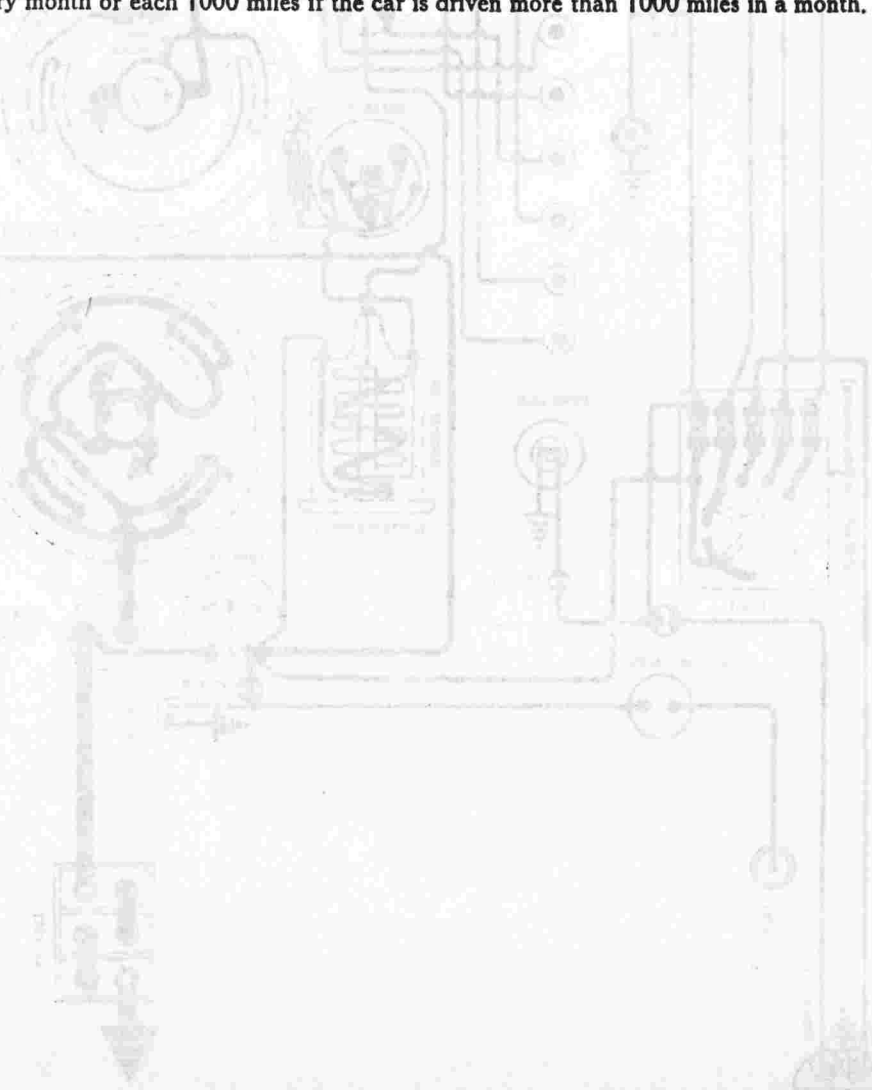
REMY GENERATING, STARTING AND LIGHTING SYSTEM.
REMY IGNITION.

Generator Data.

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7.3	750			
21	8.35-8.5	1450	11	7.5	1900

The shunt field current is 5 amperes at 6 volts. The generator brush tension should be 22-28 ounces.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.



RELAY:—Model 265-B. Relay contacts close at 675 R.P.M. of the armature with a generator voltage of 7.25 volts and open with a discharge current of 0-2.5 amperes. The charging current is approximately 3 amperes at closing of contacts. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING.—Combination Switch Model 420-H. Head and stop lamps are each 6-8 volt, 21 cp.S.C. Dash, tail and side lamps are each 6-8 volt, 3 cp.S.C. Dome lamp is 6-8 volt, 4 cp.D.C.

FUSES:—Lighting fuses are 20 ampere.

GARDNER

MODEL 80 (1927)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 613-RHK. 6 volt. Starting capacity is 115 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The positive (+) terminal is grounded. Battery is mounted on the frame at the right under the front floor board.

IGNITION:—Coil Model 550-A. Distributor Model 658-B. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine, flat contact file. Distributor is of the semi-automatic type. Manual advance is 15° (engine). Automatic advance begins at 500 R.P.M. and reaches the maximum of 17.5° (engine) at 2000 R.P.M. Double breaker contacts are used. They open at intervals of 45° corresponding to 90° of crankshaft rotation. The second set of contacts must be checked to see that they open at the proper instant (see timing). Ignition current is .6-2.5 amperes with engines running and 4.5 amperes with engine stopped. The tension of the breaker arm spring should be 17-21 ounces.

Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down one turn every two weeks or each 500 miles. Every 5000 miles remove the rotor and saturate the wick oiler exposed with light engine oil. Place a small bit of vaseline on the face of the breaker cam under the fiber bumper of the contact arm.

Timing:—Breaker contacts begin to separate when the dead center mark for cylinders 1 and 8 on the flywheel is 5° past top dead center. At this point piston No. 1 will be slightly past top dead center entering the power stroke. To set timing, fully retard manual spark control lever and crank engine until piston No. 1 on compression stroke reaches top dead center. This is the upstroke with both valves closed. At this point the dead center mark on the front flywheel will be opposite the mark on the chain case cover. Then crank the engine over 5°. Loosen the lock nut on the breaker cam and rotate the cam until stationary contacts begin to separate. Tighten the locknut. The other set of contacts open 45° after this point. They can be checked by special tool issued by distributor manufacturer.

Valve Timing:—INLET VALVES:—Head diameter, 1⅜ inches; stem diameter, 11/32 inch; stem length, 5⅞ inches; tappet clearance, .006 inch (hot); spring pressure, 50 pounds (closed); valve lift, 11/32 inch; intake opens at 5° past top dead center and closes 40° past lower dead center.

EXHAUST VALVES:—Head diameter, 1¼ inches; stem diameter, 11/32 inch; stem length, 5⅞ inches; tappet clearance, .008 inch (hot); spring pressure, 50 pounds (closed); valve lift, 11/32 inch; exhaust opens at 47° before lower dead center and closes on top dead center. The stem guides are removable. Oversize valve stems are made.

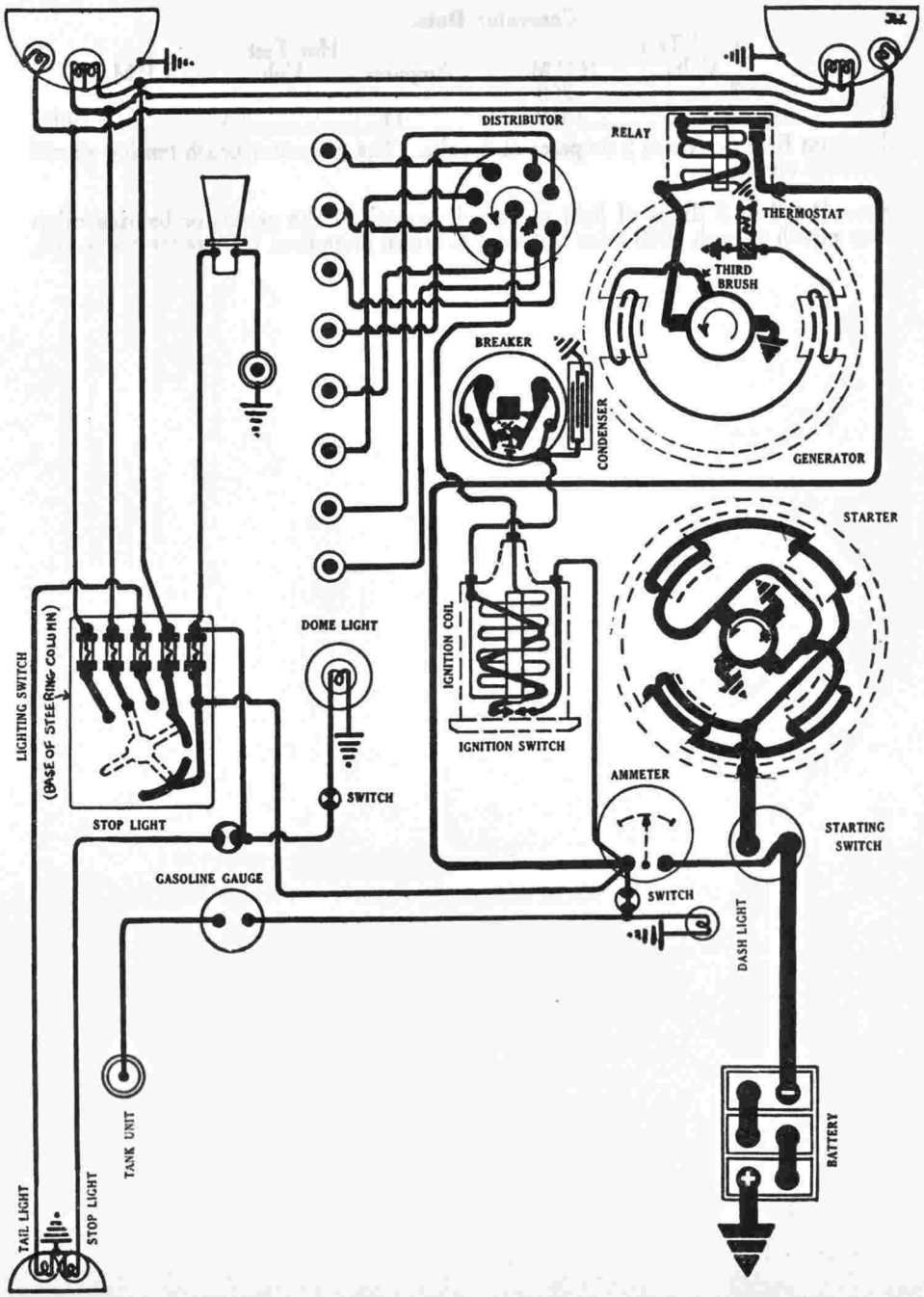
Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are .030 inch.

STARTER:—Model 716-A. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise looking at the commutator end. Starter brush tension should be 24-28 ounces. Starter switch is Model 406-D.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lbs. ft.	6000	5	65
15 "	Lock	3.15	570



GARDNER

MODEL 80 (1927)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the starter every 1000 miles.

GENERATOR:—Model 949-C. The direction of rotation of the generator is counter-clockwise looking at the commutator end. Current regulation is by the third brush system, combined with a thermostat. The thermostat contacts open at 150° F. To adjust the generator output, loosen the screw on generator end plate and shift the third brush mounting plate in a counter-clockwise direction to increase the charging rate and opposite to decrease the charging rate.

Generator Test

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.5	1450	9-12	7.5	2000

Shuntfield current is 4 amperes at 6 volts. Generator brush tension is 24-28 ounces.

Oiling:—Put 4 or 5 drops of light engine oil in the generator every 1000 miles.

RELAY:—Model No. 265-B. Relay is mounted on the end of the frame. Relay contacts close at 675 R.P.M. of the generator armature or 6-7 miles per hour with a generator voltage of 6.57 volts. Contacts open with a discharge current of 2.5 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .014 inch, contacts closed.

LIGHTING:—Remy Lighting Switch Model 420-Q. Head lamps are 6-8 volt 21-21 cp. double filament twin beam D.C. Auxiliary head lights are 6-8 volt 3 cp. S.C. Tail and dash lamps are each 6-8 volt 2 cp. S.C.

FUSES:—Lighting Fuses are 10 amperes.

GARDNER

MODEL 90 (1927)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 617-RHK. 6 volt, 135 ampere hour. The starting capacity is 152 amperes for 20 minutes. The lighting capacity is 5 amperes for 27 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model 550-A. Distributor Model 658-A. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine, flat contact file. Distributor is of the semi-automatic type. Manual advance is 15° (engine). Automatic advance begins at 500 R.P.M. and reaches the maximum of 17.5° (engine) at 2000 R.P.M. Double breaker contacts are used. They open at intervals of 45° corresponding to 90° of crankshaft rotation. The second set of contacts must be checked to see that they open at the proper instant (see timing). Ignition current is .6-2.5 amperes with engine running and 4.5 amperes with engine stopped. The tension of the breaker arm spring should be 17-21 ounces.

Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down one turn every two weeks or each 500 miles. Every 5000 miles remove the rotor and saturate the wick oiler exposed with light engine oil. Place a small bit of vaseline on the face of the breaker cam under the fiber bumper of the contact arm.

Timing:—Breaker contacts begin to separate when the dead center mark for cylinders 1 and 8 on the flywheel is 5° past top dead center. At this point piston No. 1 will be slightly past top dead center entering power stroke. To set timing, fully retard manual spark control lever and crank engine until piston No. 1 on compression stroke reaches top dead center. This is the upstroke with both valves closed. At this point the dead center mark on the front flywheel will be opposite the mark on the chain case cover. Then crank the engine over 5°. Loosen the lock nut on the breaker cam and rotate the cam until stationary contacts begin to separate. Tighten the locknut. The other set of contacts open 45° after this point. They can be checked by special tool issued by distributor manufacturer.

Valve Timing:—INLET VALVES:—Head diameter, 1 7/16 inches; stem diameter, 11/32 inch; stem length, 5½ inches; tappet clearance, .006 inch (hot); spring pressure, 36 pounds (closed); valve lift, 5/16 inch; intake opens at top dead center and closes 35° after lower dead center.
EXHAUST VALVES:—Head diameter, 1 5/16 inches; stem diameter, 11/32 inch; stem length, 5½ inches; tappet clearance, .008 inch (hot); spring pressure, 36 pounds (closed); valve lift, 5/16 inch; exhaust opens 42° before lower dead center and closes 5° after top dead center. The stem guides are removable. Oversize valve stems are made.

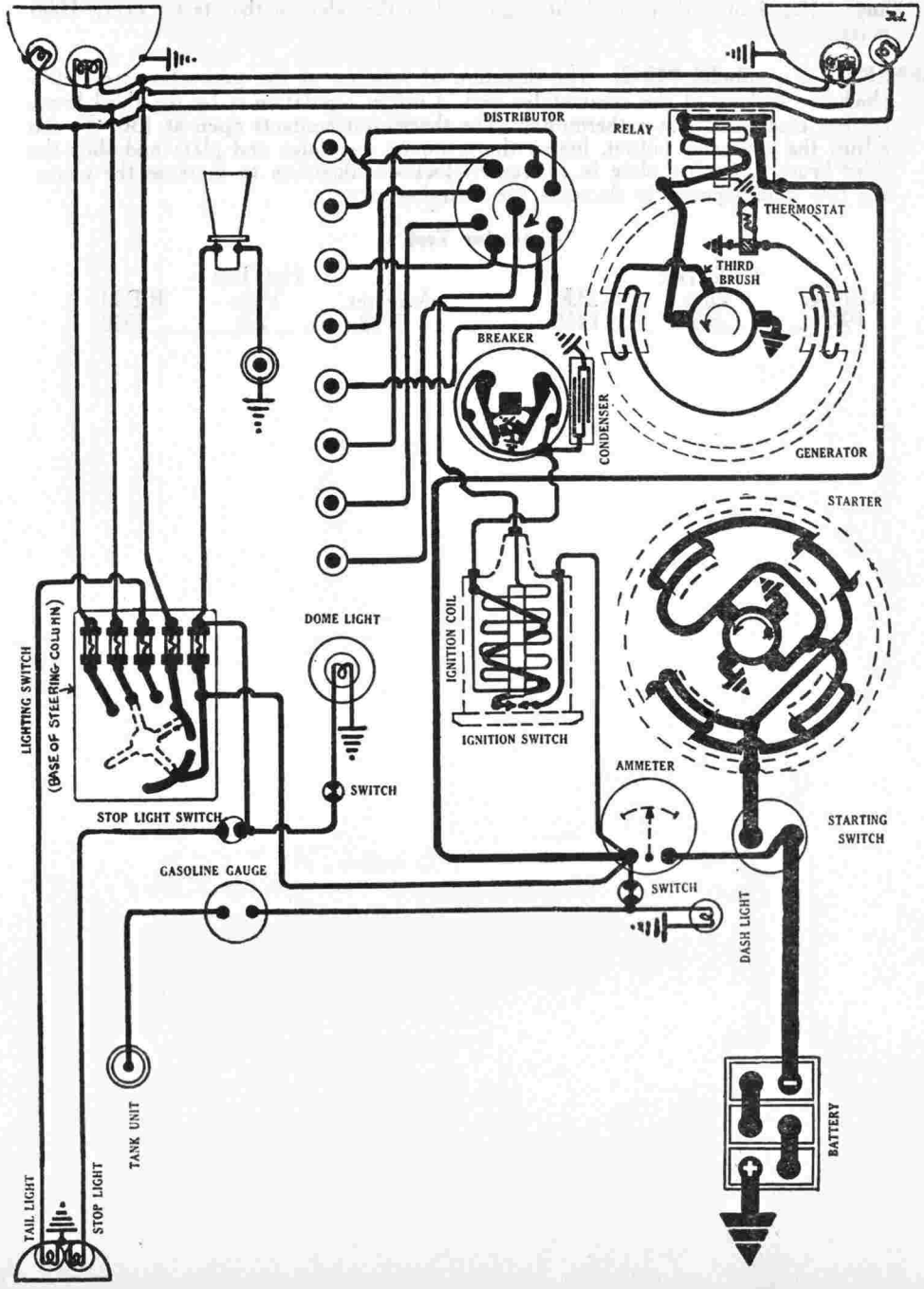
Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are .030 inch.

STARTER:—Model 720-Q. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise looking at the commutator end. Starter brush tension should be 24-28 ounces. Starter switch is Model 406-D.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lbs. ft	6000	5	65
15 "	Lock	3.15	570



GARDNER

MODEL 90 (1927)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the starter every 1000 miles.

GENERATOR:—Model 941-D. The direction of rotation of the generator is counter-clockwise looking at the commutator end. Current regulation is by the third brush system, combined with a thermostat. The thermostat contacts open at 150° F. To adjust the generator output, loosen the screw on generator end plate and shift the third brush mounting plate in a counter-clockwise direction to increase the charging rate and opposite direction to decrease the charging rate.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.5	1450	9-12	7.5	2000

Shuntfield current is 4 amperes at 6 volts. Generator brush spring tension is 24-28 ounces.

Oiling:—Put 4 or 5 drops of light engine oil in the generator oiler every 1000 miles.

RELAY:—Model No. 265-B. Relay is mounted on the end of the frame. Relay contacts close at 675 R.P.M. of the generator armature or 6-7 miles per hour with a generator voltage of 6.57 volts. Contacts open with a discharge current of 2.5 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .014 inch, contacts closed.

LIGHTING:—Remy Lighting Switch Model 420-Q. Head lamps are 6-8 volt 21-21 cp. double filament twin beam D.C. Auxiliary head lights are 6-8 volt 3 cp. S.C. Tail and dash lamps are each 6-8 volt 2 cp. S.C.

FUSES:—Lighting Fuses are 10 amperes.

GARDNER

MODEL 75 (1928) LYCOMING GT ENGINE
SERIAL NUMBERS 5AD62 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 615-JFK. 6 volts, 15 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 120 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted on frame under right front floor boards.

IGNITION:—Coil Model 550-A. Ignition current is .6-2.5 amperes at 6 volts with engine running and 4.5 amperes at 6 volts with engine stopped. Coil is mounted on the back of the instrument board with the switch extending through to the driving compartment.

Distributor Model 658-B. Breaker contacts separate .022 inch with breaker arm on lobe of cam. Set contact gap by loosening lock screw on stationary contact plate and turning eccentric adjusting screw until proper setting is secured. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Breaker uses two sets of contacts on a single four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval for the Gardner engine and breaker must be accurately set. See Timing. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 500 R.P.M. and reaches a maximum of 17.5 degrees (engine) at 2000 R.P.M.

Mounting:—Distributor is mounted in well on top of cylinder head. To remove distributor, disconnect manual advance rod and breaker lead. Remove distributor head with cables in place. Remove manual advance stop screw and lift distributor out.

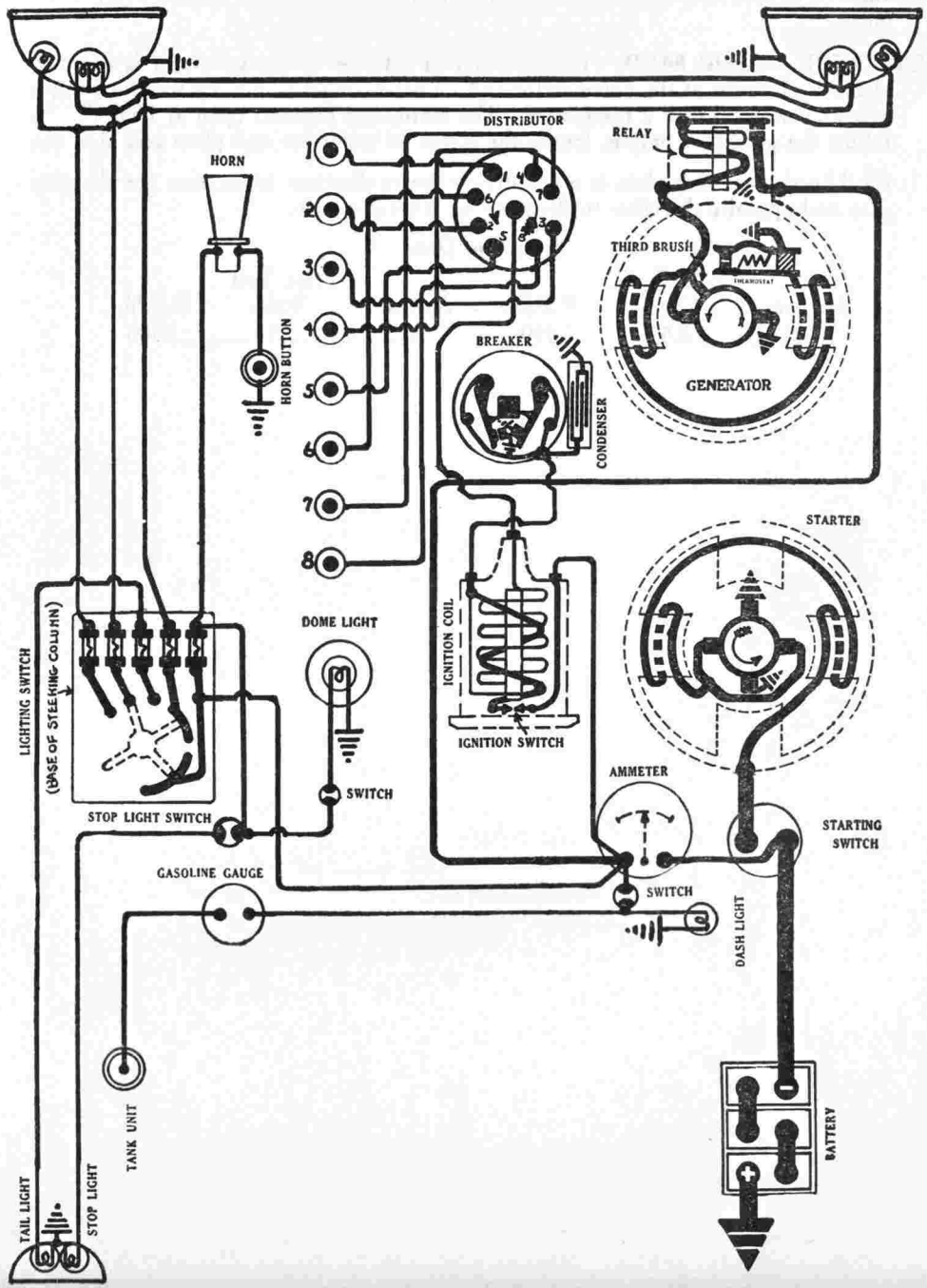
Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down one turn every two weeks or each 500 miles. Every 5000 miles remove the rotor and saturate the wick oiler in the center of the shaft with light engine oil. Place a small bit of vaseline on the face of the breaker cam under the fiber bumper of the contact arm.

Timing:—Synchronization of Contacts:—Use Delco-Remy Tool, Part No. 820738, and follow directions on Page S-30 of Reed Service Manual. Contacts can be synchronized without tool after distributor has been timed to engine by cranking engine over 90 degrees from firing position of piston No. 1 when piston No. 6 will reach firing position. The second set of contacts should separate at this point. If they do not, loosen lock screws and turn eccentric adjusting screw on breaker plate until contacts begin to open. Tighten the lock screws and check the contact gap with the breaker arm on the lobe of the cam. If it is not within the limits of .018-.024 inch reset at .022 and repeat synchronization operation.

Timing Distributor to Engine:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 6 degrees (on the flywheel) before top dead center with the spark lever fully advancd. To set timing, crank engine over until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Fully advance spark lever. Continue to crank engine until a point approximately 1.6 teeth on flywheel before top dead center mark is opposite the indicator on the flywheel case. Then loosen clamp screw on advance arm and rotate distributor until one set of contacts open. Tighten clamp screw and connect segment opposite rotor to spark plug in cylinder No. 1. Connect remaining plugs in order 6-2-5-8-3-7-4 counter-clockwise around the distributor head.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .030 inch.



GARDNER

MODEL 75 (1928) LYCOMING GT ENGINE
SERIAL NUMBERS 5AD62 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

VALVE TIMING:—INLET VALVES:—Head diameter, 1⅜ inches; stem diameter, 11/32 inch; stem length, 5⅞ inches. Tappet clearance, .006 inch (hot). Spring pressure, 50 pounds closed. Valve lift, 11/32 inch. Intake opens at top dead center and closes 45 degrees past lower dead center.

EXHAUST VALVES:—Head diameter, 1¼ inches; stem diameter, 11/32 inch; stem length, 5⅞ inches. Tappet clearance, .008 inch (hot). Spring pressure, 50 pounds (closed). Valve lift, 11/32 inch. Exhaust opens at 50 degrees before lower dead center and closes at 10 degrees after top dead center. The stem guides are removable. Oversize valve stems are made.

STARTER:—Model 716-A. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 24-28 ounces. Starter switch is Model 406-D.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	5	70
15 "	Lock	3.7	450

Mounting:—Starter is flange mounted at left of engine on the forward side of the flywheel housing. To remove starter, disconnect cable and starting pedal rod. Then remove 3 cap screws on flange. Lift starter forward and out.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the starter every 1000 miles. The drive end bearing is oilless.

GENERATOR:—Model 949-C. The direction of rotation of the generator is counter-clockwise, looking at the commutator end. Current regulation is by the third brush system, combined with a thermostat. The thermostat contacts open at 150 degrees F. To adjust the generator output, loosen the screw on the generator end plate and shift the third brush mounting plate in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.5	1450	9-12	7.5	2000

Generator motoring draws 5.5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Generator brush spring tension is 24-28 ounces.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, loosen mounting bracket screws; push generator and water pump towards crank case, pry off belt. Remove water connections to pump, take out generator mounting screws, lift out generator and pump assembly. Radiator must be drained before the pump can be removed.

Oiling:—Put 4 or 5 drops of light engine oil in the generator oiler every 1000 miles.

RELAY:—Model No. 265-B. Relay is mounted on the generator. Relay contacts close at 675 R.P.M. of the generator armature or 6-7 miles per hour with a generator voltage of 6.57 volts. Contacts open with a discharge current of 2.5 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch with contacts closed.

LIGHTING:—Delco-Remy Lighting Switch Model 420-Q. Switch is mounted on the lower end of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using 21 cp. filament instead of dimming) Mazda No. 1110. Parking lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Side lights are 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Tail lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda. No 87. Dome light is 6-8 volt, 3 cp. D.C. Mazda No. 64.

FUSES:—There are five 10 ampere fuses mounted on the lighting switch.

GARDNER

MODEL 85 (1928) LYCOMING GS ENGINE
SERIAL NUMBERS GRL057 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 615-JFK, 6 volt, 15 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 120 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted on frame under right front floor boards.

IGNITION:—Coil Model 550-A. Ignition current is .6-2.5 amperes at 6 volts with engine running and 4.5 amperes at 6 volts with engine stopped. Coil is mounted on the back of the instrument board with the switch extending through to the driving compartment.

Distributor Model 658-B. Breaker contacts separate .022 inch with breaker arm on lobe of cam. Set contact gap by loosening lock screw on stationary contact plate and turning eccentric adjusting screw until proper setting is secured. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Breaker uses two sets of contacts on a single four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval for the Gardner engine and breaker must be accurately set. See Timing. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 500 R.P.M. and reaches a maximum of 17.5 degrees (engine) at 2000 R.P.M.

Mounting:—Distributor is mounted in well on top of cylinder head. To remove distributor, disconnect manual advance rod and breaker lead. Remove distributor head with cables in place. Remove manual advance stop screw and lift distributor out.

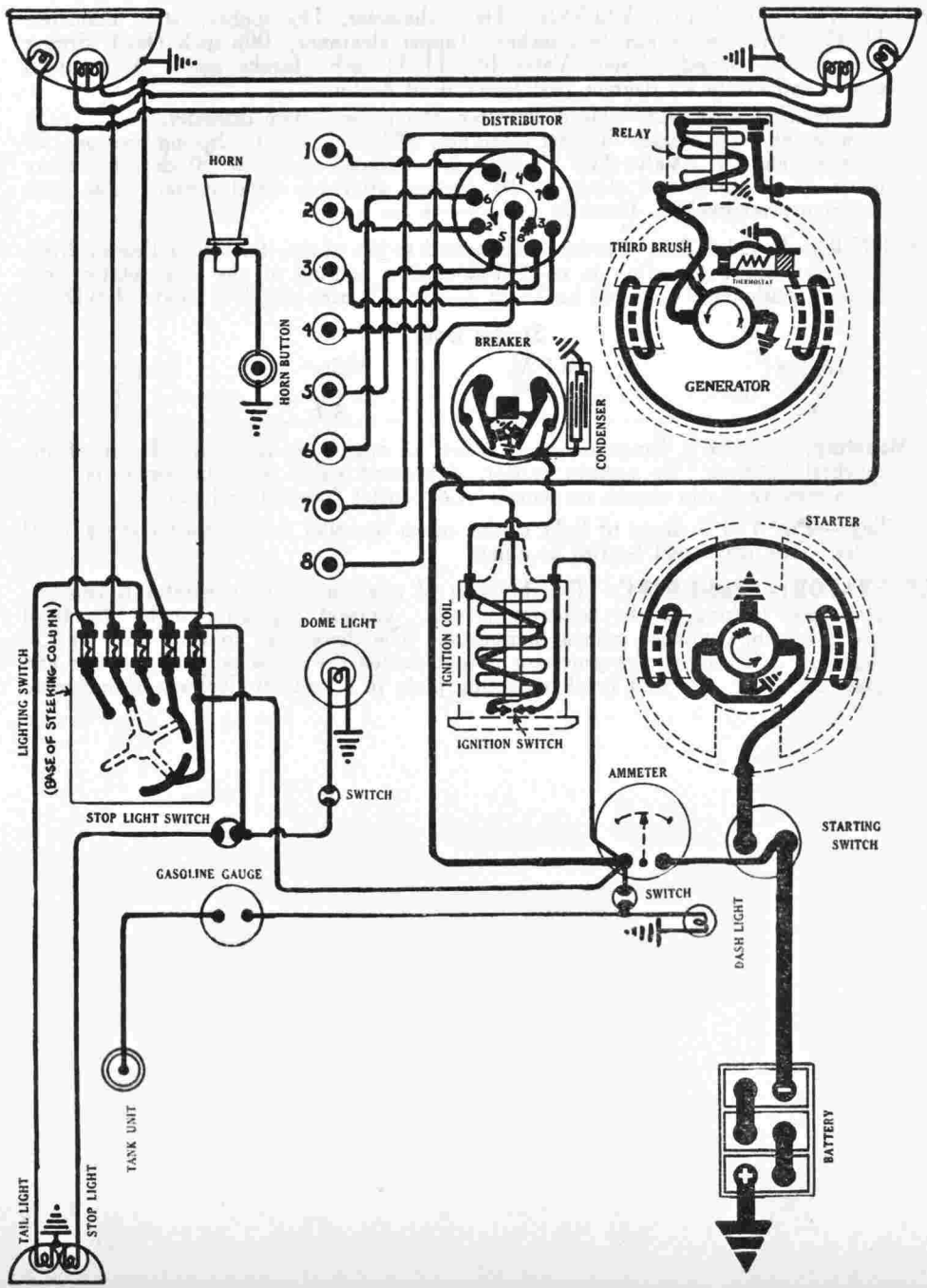
Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down one turn every two weeks or each 500 miles. Every 5000 miles remove the rotor and saturate the wick oiler in the center of the shaft with light engine oil. Place a small bit of vaseline on the face of the breaker cam under the fiber bumper of the contact arm.

Timing:—Synchronization of Contacts:—Use Delco-Remy Tool, Part No. 820738, and follow directions on Page S-2 of Reed Service Manual. Contacts can be synchronized without tool after distributor has been timed to engine by cranking engine over 90 degrees from firing position of piston No. 1 when piston No. 6 will reach firing position. The second set of contacts should separate at this point. If they do not, loosen lock screws and turn eccentric adjusting screw on breaker plate until contacts begin to open. Tighten the lock screws and check the contact gap with the breaker arm on the lobe of the cam. If it is not within the limits of .018-.024 inch reset at .022 inch and repeat synchronization operation.

Timing Distributor to Engine:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 6 degrees (on the flywheel) before top dead center with the spark lever fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Fully advance spark lever. Continue to crank engine until a point approximately 1.6 teeth on flywheel before top dead center mark is opposite the indicator on the flywheel case. Then loosen clamp screw on advance arm and rotate distributor until one set of contacts open. Tighten clamp screw and connect segment opposite rotor to spark plug in cylinder No. 1. Connect remaining plugs in order 6-2-5-8-3-7-4 counter-clockwise around the distributor head.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 7/8 18 S.A.E. Standard. Gaps are .030 inch.



GARDNER

MODEL 85 (1928) LYCOMING GS ENGINE
SERIAL NUMBERS GRL057 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

VALVE TIMING:—INLET VALVES:—Head diameter, 1⅜ inches; stem diameter, 11/32 inch; stem length, 5⅞ inches. Tappet clearance, .006 inch (hot). Spring pressure, 50 pounds closed. Valve lift, 11/32 inch. Intake opens at top dead center and closes 45 degrees past lower dead center.

EXHAUST VALVES:—Head diameter, 1¼ inches; stem diameter, 11/32 inch; stem length, 5⅞ inches. Tappet clearance, .008 inch (hot). Spring pressure, 50 pounds (closed). Valve lift, 11/32 inch. Exhaust opens at 50 degrees before lower dead center and closes at 10 degrees after top dead center. The stem guides are removable. Oversize valve stems are made.

STARTER:—Model 716-A. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 24-28 ounces. Starter switch is Model 406-D.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	5	70
15 "	Lock	3.7	450

Mounting:—Stater is flange mounted at left of engine on the forward side of the flywheel housing. To remove starter, disconnect cable and starting pedal rod. Then remove 3 cap screws on flange. Lift starter forward and out.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the starter every 1000 miles. The drive end bearing is oilless.

GENERATOR:—Model 949-C. The direction of rotation of the generator is counter-clockwise, looking at the commutator end. Current regulation is by the third brush system, combined with a thermostat. The thermostat contacts open at 150 degrees F. To adjust the generator output, loosen the screw on the generator end plate and shift the third brush mountig plate in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.5	1450	9-12	7.5	2000

Generator motoring draws 5.5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Generator brush spring tension is 24-28 ounces.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, loosen mounting bracket screws; push generator and water pump towards crank case, pry off belt. Remove water connections to pump, take out generator mounting screws, lift out generator and pump assembly. Radiator must be drained before the pump can be removed.

Oiling:—Put 4 or 5 drops of light engine oil in the generator oiler every 1000 miles.

RELAY:—Model No. 265-B. Relay is mounted on the generator. Relay contacts close voltage of 6.57 volts. Contacts open with a discharge current of 2.5 amperes. voltage of 6.57 vots. Contacts open with a discharge current of 2.5 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch with contacts closed.

LIGHTING:—Deco-Remy Lighting Switch Model 420-Q. Switch is mounted on the lower end of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using 21 cp. filament instead of dimming) Mazda No. 1110. Parking lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Side lights are 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Tail lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dome light is 6-8 volt, 3 cp. D.C. Mazda No. 64.

FUSES:—There are five 10 ampere fuses mounted on the lighting switch.

GARDNER

MODEL 95 (1928) LYCOMING MD ENGINE
SERIAL NUMBER GRL-027 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 617-RHK, 6 volt, 135 ampere hour. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 152 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 27 hours. Battery is mounted on frame under right front floor boards.

IGNITION:—Coil Model 550-A. Ignition current is .6-2.5 amperes at 6 volts with engine running and 4.5 amperes at 6 volts with engine stopped. Coil is mounted on the back of the instrument board with the switch extending through to the driving compartment.

Distributor Model 658-K. Breaker contacts separate .022 inch with breaker arm on lobe of cam. Set contact gap by loosening lock screw on stationary contact plate and turning eccentric adjusting screw until proper setting is secured. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Breaker uses two sets of contacts on a single four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval for the Gardner engine and breaker must be accurately set. See Timing. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 500 R.P.M. and reaches a maximum of 17.5 degrees (engine) at 2000 R.P.M.

Mounting:—Distributor is mounted in well on top of cylinder head. To remove distributor, disconnect manual advance rod and breaker lead. Remove distributor head with cables in place. Remove manual advance stop screw and lift distributor out.

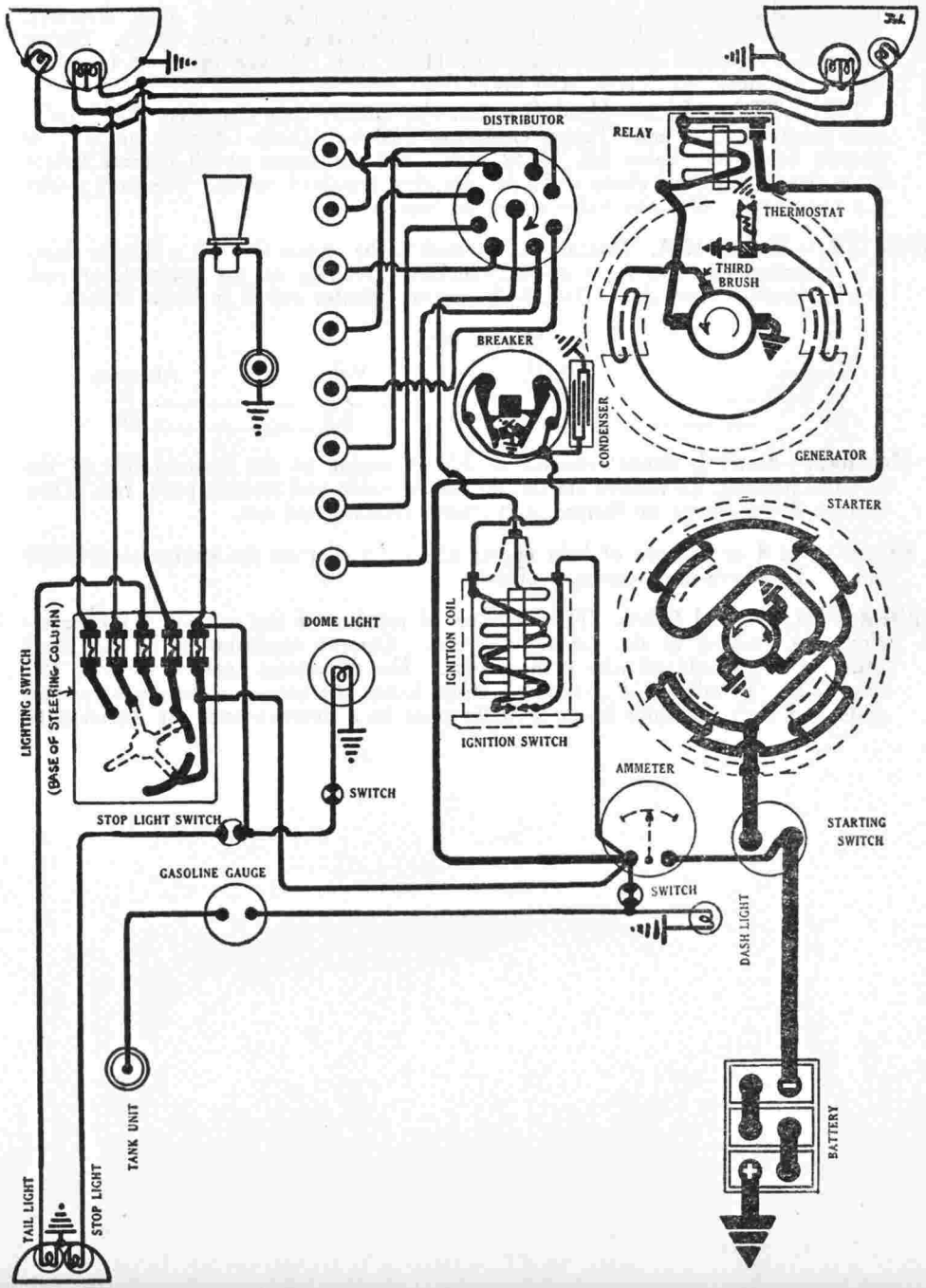
Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down one turn every two weeks or each 500 miles. Every 5000 miles remove the rotor and saturate the wick oiler in the center of the shaft with light engine oil. Place a small bit of vaseline on the face of the breaker cam under the fiber bumper of the contact arm.

Timing:—Synchronization of Contacts:—Use Delco-Remy Tool, Part No. 820738, and follow directions on Page S-2 of Reed Service Manual. Contacts can be synchronized without tool after distributor has been timed to engine by cranking engine over 90 degrees from firing position of piston No. 1 when piston No. 6 will reach firing position. The second set of contacts should separate at this point. If they do not, loosen lock screws and turn eccentric adjusting screw on breaker plate until contacts begin to open. Tighten the lock screws and check the contact gap with the breaker arm on the lobe of the cam. If it is not within the limits of .018-.024 inch reset at .022 inch and repeat synchronizing.

Timing Distributor to Engine:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 6 degrees (on the flywheel) before top dead center with the spark lever fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Fully advance spark lever. Continue to crank engine until a point approximately 2 teeth on the flywheel before the top dead center mark is opposite the indicator on the flywheel case. Then loosen clamp screw in advance arm and rotate distributor until one set of contacts open. Tighten clamp screw and connect segment opposite rotor to spark plug in cylinder No. 1. Connect remaining plugs in order 6-2-5-8-3-7-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .030 inch.



GARDNER

MODEL 95 (1928) LYCOMING MD ENGINE
SERIAL NUMBERS GRL-027 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

VALVE TIMING:—INLET VALVES:—Head diameter, 1 7/16 inches; stem diameter, 11/32 inch; stem length, 5½ inches. Tappet clearance, .006 inch (hot). Spring pressure, 36 pounds (closed). Valve lift, 5/16 inch. Intake opens at top dead center and closes 45 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 5/16 inches; stem diameter, 11/32 inch; stem length, 5½ inches. Tappet clearance, .008 inch (hot). Spring pressure, 36 pounds (closed). Valve lift, 5/16 inch. Exhaust opens 50 degrees before lower dead center and closes 10 degrees after top dead center. The stem guides are removable. Oversize valve stems are made.

STARTER:—Model 720-Q. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 24-28 ounces. Starter switch is Model 406-D.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5.0	65
15 "	Lock	3.15	570

Mounting:—Starter is flange mounted at left of engine on the forward side of the flywheel housing. To remove starter, disconnect cable and starting pedal rod. Then remove 3 cap screws on flange. Lift starter forward and out.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the starter every 1000 miles.

GENERATOR:—Model 941-D. The direction of rotation of the generator is counter-clockwise, looking at the commutator end. Current regulation is by the third brush system, combined with a thermostat. The thermostat contacts open at 150 degrees F. To adjust the generator output, loosen the screw on generator end plate and shift the third brush mounting plate in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate.

Generator Data

	Cold Test			Hot Test	
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.5	1450	9-12	7.5	2000

Generator motoring draws 5.5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Generator brush spring tension is 24-28 ounces.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, take off hose connections at water pump, loosen plate on front of chain case and swing out of the way. Loosen generator flange nuts, push generator towards motor, lift off chain from sprocket; keep chain from push generator towards motor, lift off chain from sprocket; keep chain from dropping down in chain case by fastening up with wire. Take out flange mounting nuts and lift generator and pump assembly from place.

Oiling:—Put 4 or 5 drops of light engine oil in the generator oiler every 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 675 R.P.M. of the generator armature or 6-7 miles per hour with a generator voltage of 6.57 volts. Contacts open with a discharge current of 2.5 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch with contacts closed.

LIGHTING:—Delco-Remy Lighting Switch Model 420-Q. Switch is mounted on the lower end of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using 21 cp. filament instead of dimming) Mazda No. 1110. Parking and tail lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Side lights are 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop and backing lights are 6-8 volt, 15 cp. S.C. Mazda No. 87. Corner lamps are 6-8 volt, 3 cp. D.C. Mazda No. 64.

FUSES:—There are five 10 ampere fuses mounted on the lighting switch.

GERONIMO

MODEL 6-A, 45 (1918-19-20-21)

DYNETO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Willard, 6 volt, 88 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth, or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING—Put 4 or 5 drops of light engine oil in the ignition unit oilers every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model D-361, D-176 or D-190. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes	Volts
0.0 lb. ft.	5600	25	6.4
2.5 lb. ft.	1400	150	5.8
5.0 lb. ft.	850	250	5.3
10.0 lb. ft.	250	420	4.6
14.0 lb. ft.	Lock	530	4.0

OILING.—Put several drops of light engine oil in the starter oilers every month.

GENERATOR.—Model C-354, C-176 or C-190. Generator current regulation is by the third brush system. Maximum current output of 14 amperes is reached at 16-18 miles per hour or 1500 R.P.M. of armature.

Generator Data

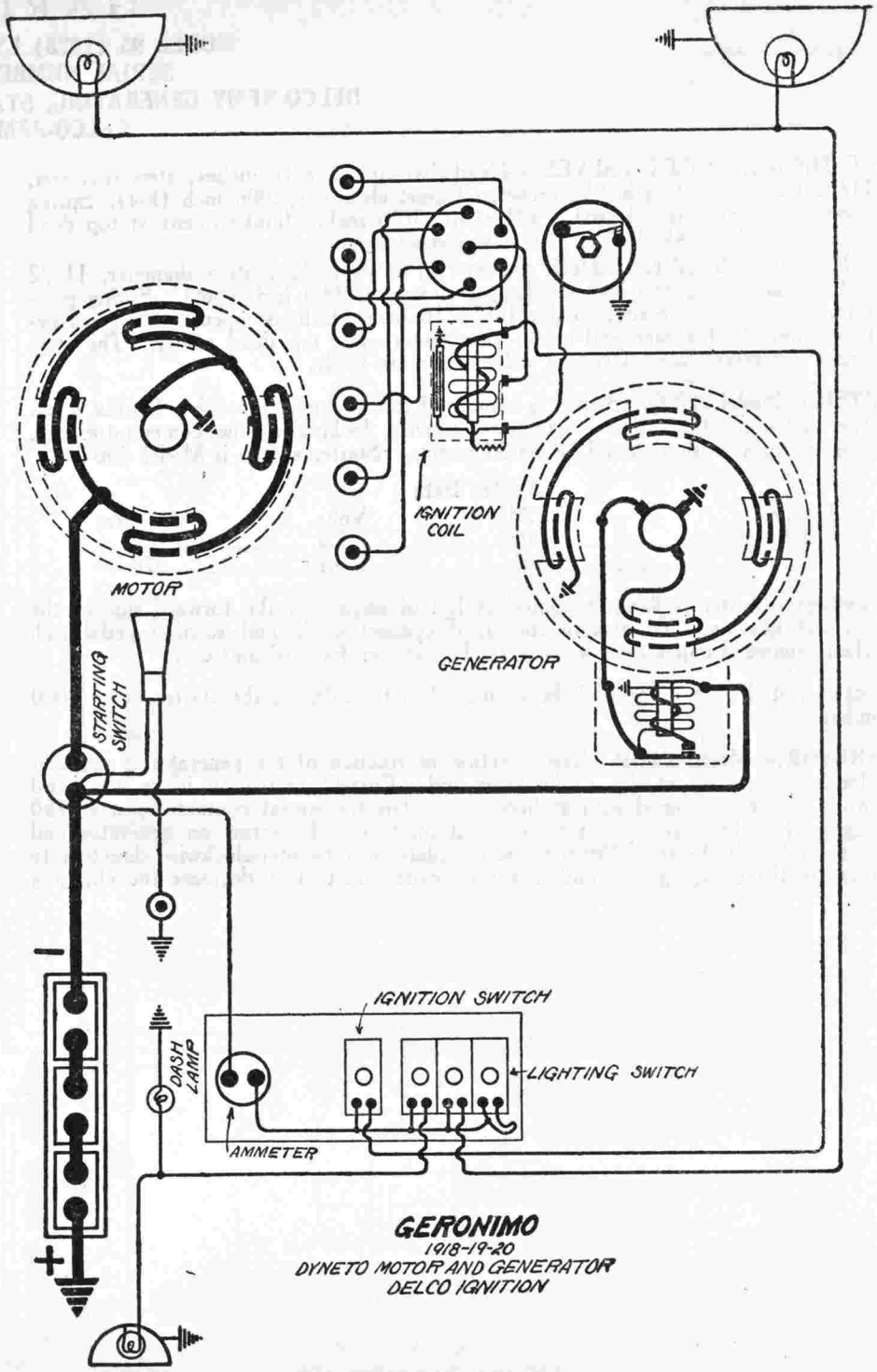
Amperes	M.P.H.	Volts
0	7- 9	6.4
5	9-10	6.6
10	12-14	6.8
12-14	16-18	7.8
8	40-45	6.7

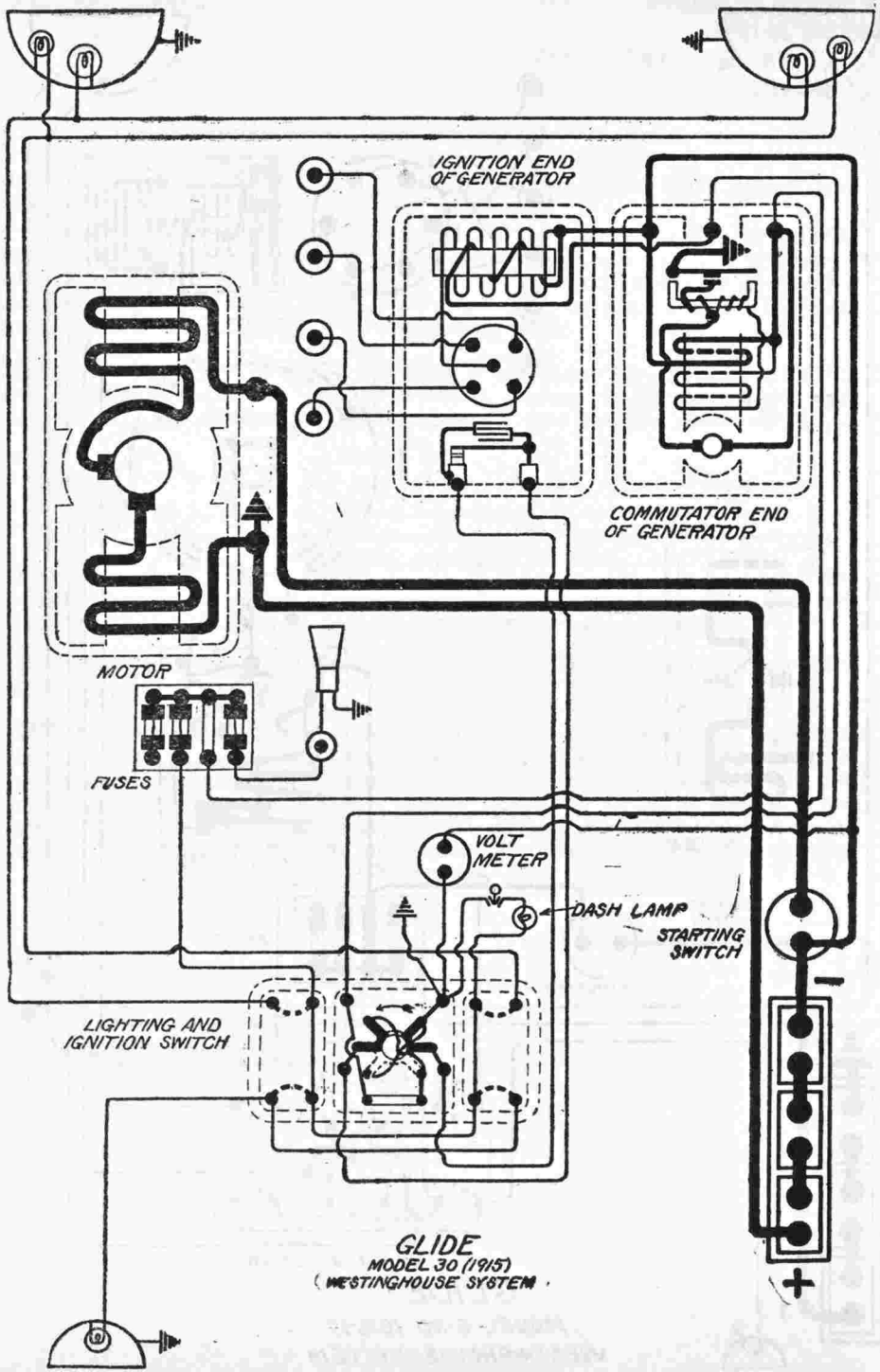
Charging rate may be varied by adjusting the third brush setting. Shunt field current is 3.5 amperes at 6.5 volts.

OILING.—Put 4 or 5 drops of light engine oil in the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 450-500 R.P.M. of armature, and opens at 6-8 miles per hour or 400-450 R.P.M. of armature. Relay contacts separate 3/32 inch. Air gap between relay armature and coil core is 1/8 inch. Clean relay contacts by drawing unglazed paper beween them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dash and tail lamps are 6-8 volt, 2 cp.





Glide

Model 30 (1915)
Westinghouse Starting and Lighting System
Westinghouse Ignition

(This Page Applies to Cars Having Serial Numbers 7389 to 7698 Inclusive.)

Battery.—Battery is 6 volt, 85 ampere-hour. The positive (+) terminal is grounded at the starting motor.

Ignition—The generator and ignition system is combined into one unit. The breaker is operated direct from the armature shaft. The centrifugal weights perform the double duty of automatically advancing and retarding the spark in relation to the engine speed, and of closing the timer contacts at the proper time. As these weights are revolved, they bear against the fiber bumper on the contact arm, pushing it down and causing the contact points to be brought together. As the weights are moved further, their bearing surface passes off the fiber bumper, which allows the spring to force contact arm upwards, causing the contacts to be quickly separated. The weights automatically advance the spark as speed increases. The weights are so shaped that they permit the contacts to be closed a greater part of the revolution, as the spark advances, resulting in a uniform spark at all speeds.

Timing.—To time generator to engine, first turn engine until the piston of No. 1 cylinder is on top dead center, both valves closed, then remove distributor plate and turn generator armature back until the mark on the distributor brush holder lines up with the mark on the end bracket. Connect to engine in this position and connect spark plugs to the distributor according to the firing order.

Spark Plug Gaps.—Spark plug gaps should be about .025 inch.

Starter.—Starter is connected to engine through a Bendix drive.

STARTER DATA, FRAME NO. 300

Torque	R.P.M.	Amperes
0 lb. ft.	5000	30-40
1 lb. ft.	2600	100
2 lb. ft.	1600	150
3 lb. ft.	1100	190
4 lb. ft.	800	230
5 lb. ft.	500	260
6 lb. ft.	300	290
10.5 lb. ft.	Lock	390

Oiling.—Put several drops of light engine oil in each of the starter oilers every month.

Generator.—Generator charging current regulation is by reverse series field. Current taken by the lights does not flow through this field so has but little effect on the charging rate.

GENERATOR DATA, MODEL NO. 230

Speed R. P. M.	Total Output Amperes	Charging Rate Lamps Out. Amperes
400	2	1.0- 1.5
500	5-6	2.5- 3.0
750	10	6.0- 6.5
1000	13	8.5- 9.0
1500	16-17	10.5-11.0
2000	18	11.0-12.0
3000	19	12.0

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 15 cp. Dimmer lamps are 6-8 volts, 4 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.

Fuses.—Small fuses are 5 ampere. Large fuses are 15 ampere.

Glide

Model Six-40 (1916-17)
Westinghouse Starting and Lighting System
Westinghouse Ignition
Cars 9000 to 10255

Battery.—Battery is 6 volt, 85 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate .006 inch to .008 inch. Should they become burned or pitted, resurface them with a fine, jeweler's file. The springs should exert just enough pressure on the distributor brushes to force them ¼ inch past the top of the holder when the distributor cap is removed, but should retain them firmly so that they do not tend to fall out. Brushes must move freely in their holders. Be sure that both brushes are in place when replacing the rotor. (There is a brush on both the top and bottom side of the rotor).

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position. Contacts are beginning to separate when the end of the distributor rotor is directly opposite the V notch on the rim of the case.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be about .023 inch.

Ballast Resistor.—There is a ballast resistor in the ignition switch. A fuse must not be permanently substituted for this resistor. In case it is necessary to operate the car with the ballast resistor defective, a 5 ampere fuse may be used temporarily, but the ballast must be replaced as soon as possible, as continued operation without it will result in serious burning of the timer contacts.

Oiling.—Put 2 or 3 drops of light machine oil in the oiler at the side of breaker assembly every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

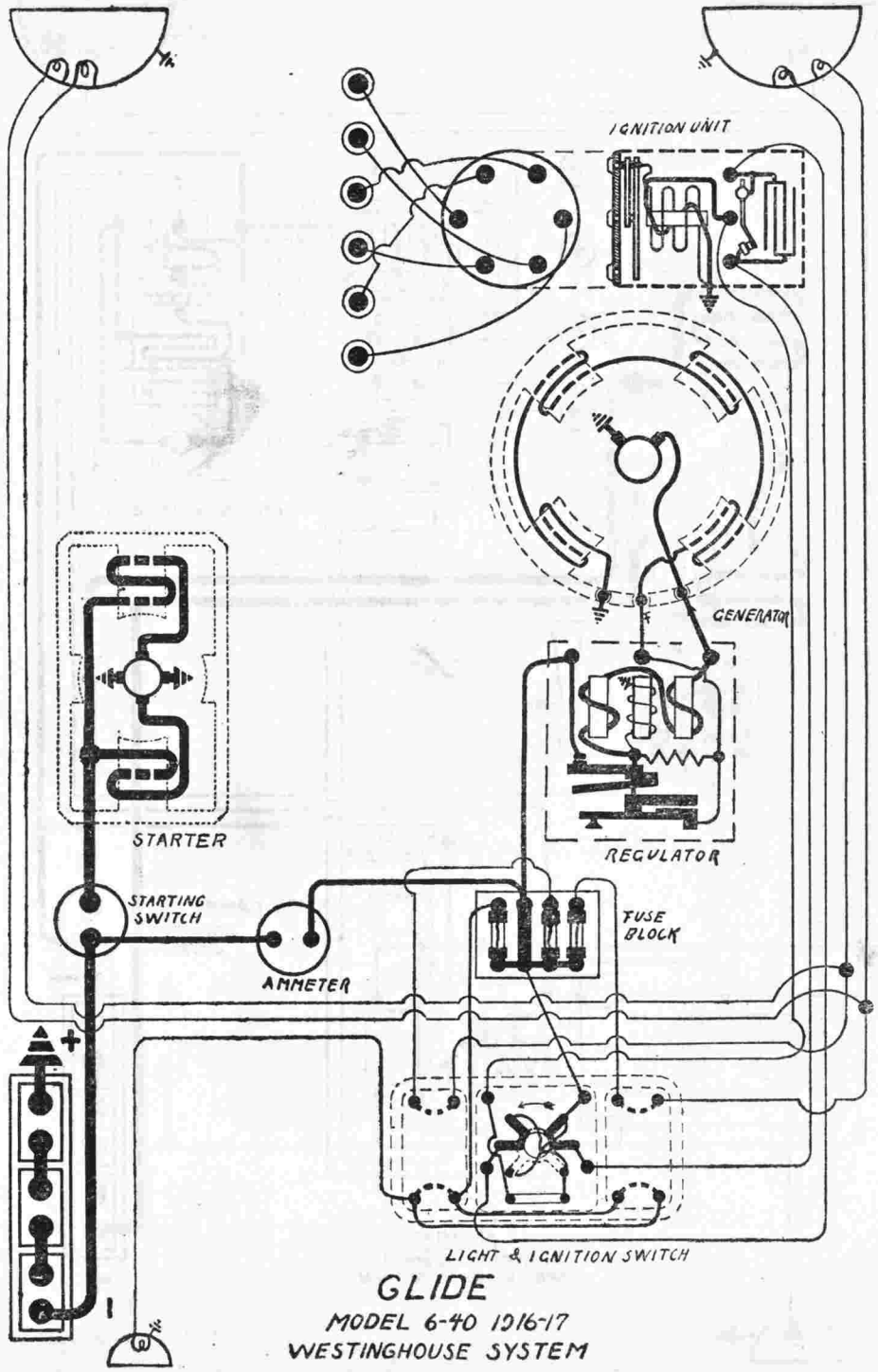
Starter.—Starter is connected to the engine through a Bendix drive. It should run at 1500 R. P. M., when delivering 2 pound-feet torque. It should deliver 10.5 pound-feet lock torque, taking about 400 amperes. Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited motor windings or commutator bars will cause high current and low speed during the cranking operation.

Oiling.—Refill the wicked oil well under the starter bearings with light machine oil every three months.

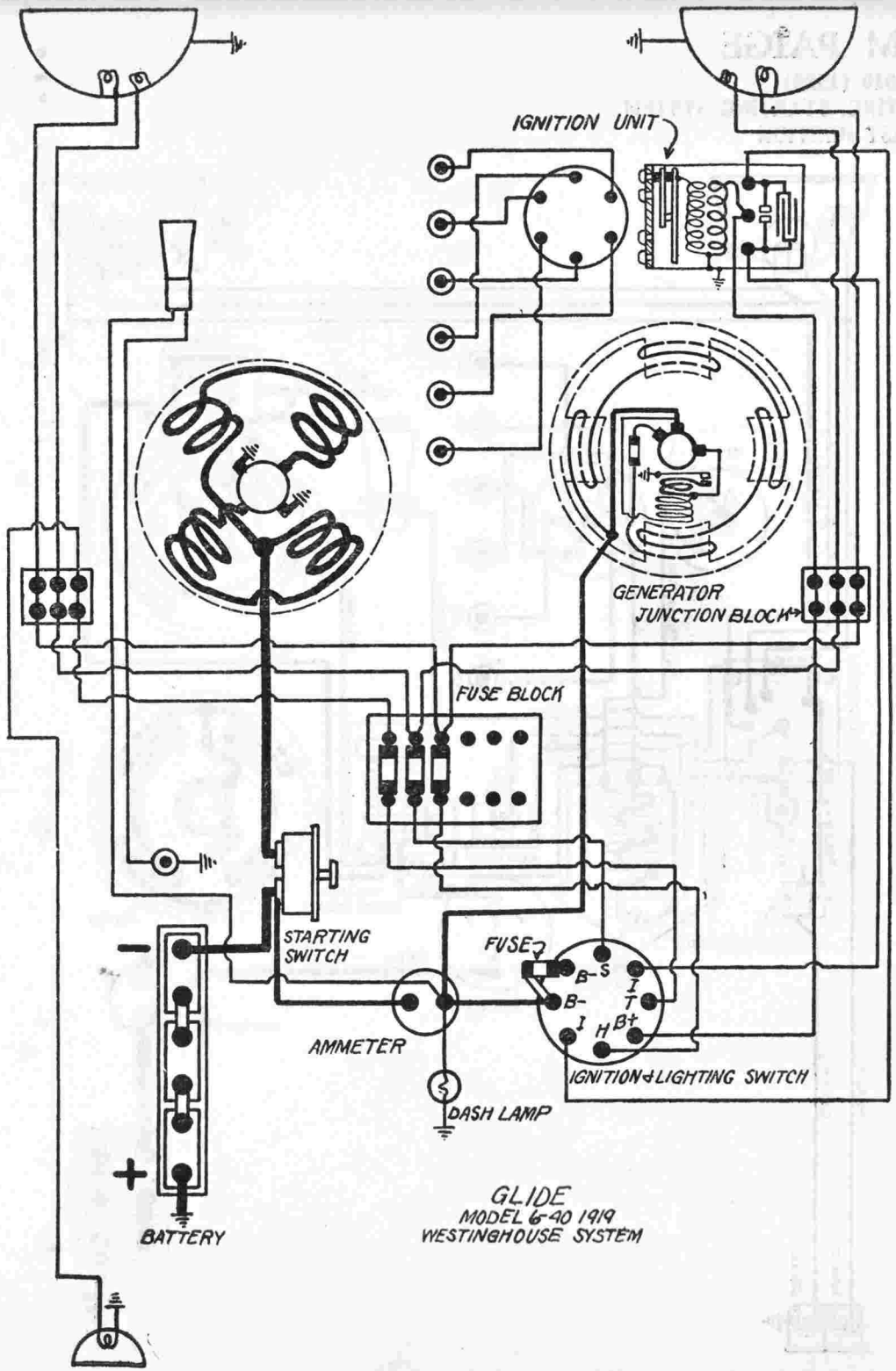
Generator.—Generator voltage regulation is by a vibrating regulator. Relay is combined with the regulator. The charging current should be 1 to 1.5 amperes at closing and the discharge current .5 to 1.25 amperes at opening of relay contacts. The air gap between relay armature (moving member) and coil core should be .027 inch to .030 inch. Contacts should separate .013 inch to .017 inch. Adjust by bending brass prongs. Clean relay and regulator contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface them with a piece of well worn No. 00 sand paper, drawing a piece of unglazed paper between them, to remove all grit, and adjust, before again putting into service. Generator should deliver 14 amperes at 7.5 volts.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 17 cp. Dimmer lamps are 6-8 volts, 5 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp. Trouble lamp is 6-8 volts, 2 cp.



GLIDE
MODEL 6-40 1916-17
WESTINGHOUSE SYSTEM



Westinghouse Generating, Starting and Lighting System
Westinghouse Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts separate .006 inch to .008 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper. Adjust the distributor brush springs so that the brushes extend ¼ inch from their holders when the distributor cap is removed, retaining them, however, so that they do not fall out. Brushes must move freely in their holders. See that the brushes on the top and bottom of the rotor are in place when installing rotor.

Oiling.—Put 2 or 3 drops of light machine oil in the oiler at side of ignition unit every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

Timing.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .023 inch.

Starter.—Frame No. 710. Starter is connected to engine through a Bendix drive. Torque is 2.5 pound-feet at 1200 R. P. M. Lock torque is 14 pound-feet, current 450 amperes.

Oiling.—Refill starter oil wells with light engine oil every month.

Generator.—Frame No. 760. Generator current regulation is by third brush system. Current output is varied by adjustment of third brush setting. Set the third brush so that at 1100-1500 R. P. M. the maximum current output is 15 to 17 amperes, at 7½ volts. The cold test readings are obtained with the normal setting of third brush, and a generator temperature under 35° C. (95° F.). The hot test readings are obtained after the generator has been operated one hour at 1800 R. P. M., charging a half-charged battery or its equivalent.

GENERATOR DATA

Cold Test

R. P. M.	Generator Output—Amperes	Generator Voltage
500	0	6.5
750	8	6.5
1250	15-17	7.5
2500	7-11	6.5-7.5

Hot Test

R. P. M.	Generator Output—Amperes	Generator Voltage
1250	12-14	7.5
2500	7-11	6.5-7.5

Field current is 2.8 to 3.25 amperes, 6 volts. Field resistance is 1.9 to 2.25 ohms at 25° C. (77° F.).

Field Test, Generator Operating—Cold Test

R. P. M.	Generator Output Amperes	Generator Voltage	Field Current
1250	15-17	7.5	1.5 -2.4

Hot Test

R. P. M.	Generator Output Amperes	Generator Voltage	Field Current
1250	12-15	7.5	1.5 -2.2

Operating freely as a motor, current flow is 3.5 to 5 amperes, 6 to 6.6 volts.

Oiling.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—Relay closes at 6-8 miles per hour or 500-550 R. P. M. of armature, and opens at 6-8 miles per hour, or 450-500 R. P. M. of armature. Charging current is 1 to 2 amperes at closing and the discharge current 0 to 2 amperes at opening of relay. Air gap between relay armature (moving member) and coil core is .031 inch, contacts separated. Contacts separate .013 inch to .018 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash lamp and tail lamp are 6-8 volt, 2 cp. On 1918 cars, head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt 5 cp.

GRAHAM PAIGE

MODEL 610 (1928)

NORTH EAST GENERATING, STARTING SYSTEM

NORTH EAST IGNITION

BATTERY:—Willard Type WR-13, 6 volt, 13 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted under the front floor boards on the right frame member.

IGNITION:—Coil Type 20285. Coil is mounted on the dash integral with the ignition switch and lock which extends through to the driving compartment. Ignition current is 2 amperes at 7 volts with engine running and 5.5 amperes with engine stopped.

Distributor Type 10827. Breaker contacts separate .020 inch with breaker arm on lobe of cam. Set contact gap by loosening lock nut on stationary contact stud and turning stud until proper gap is secured. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-18 ounces. Distributor is full automatic. Automatic advance begins at 750 R.P.M. of engine. Maximum automatic advance is 15 degrees reached at 2400 R.P.M. A spark control button is provided to secure additional retard.

Mounting:—Distributor is mounted on cylinder head and can be removed from the left side. To remove distributor, disconnect primary lead and remove head with cables intact. Then remove set screw in side of shaft mounting and lift distributor from place.

Oiling:—Put 3 or 4 drops of light engine oil in the oiler on the side of the distributor every 1000 miles.

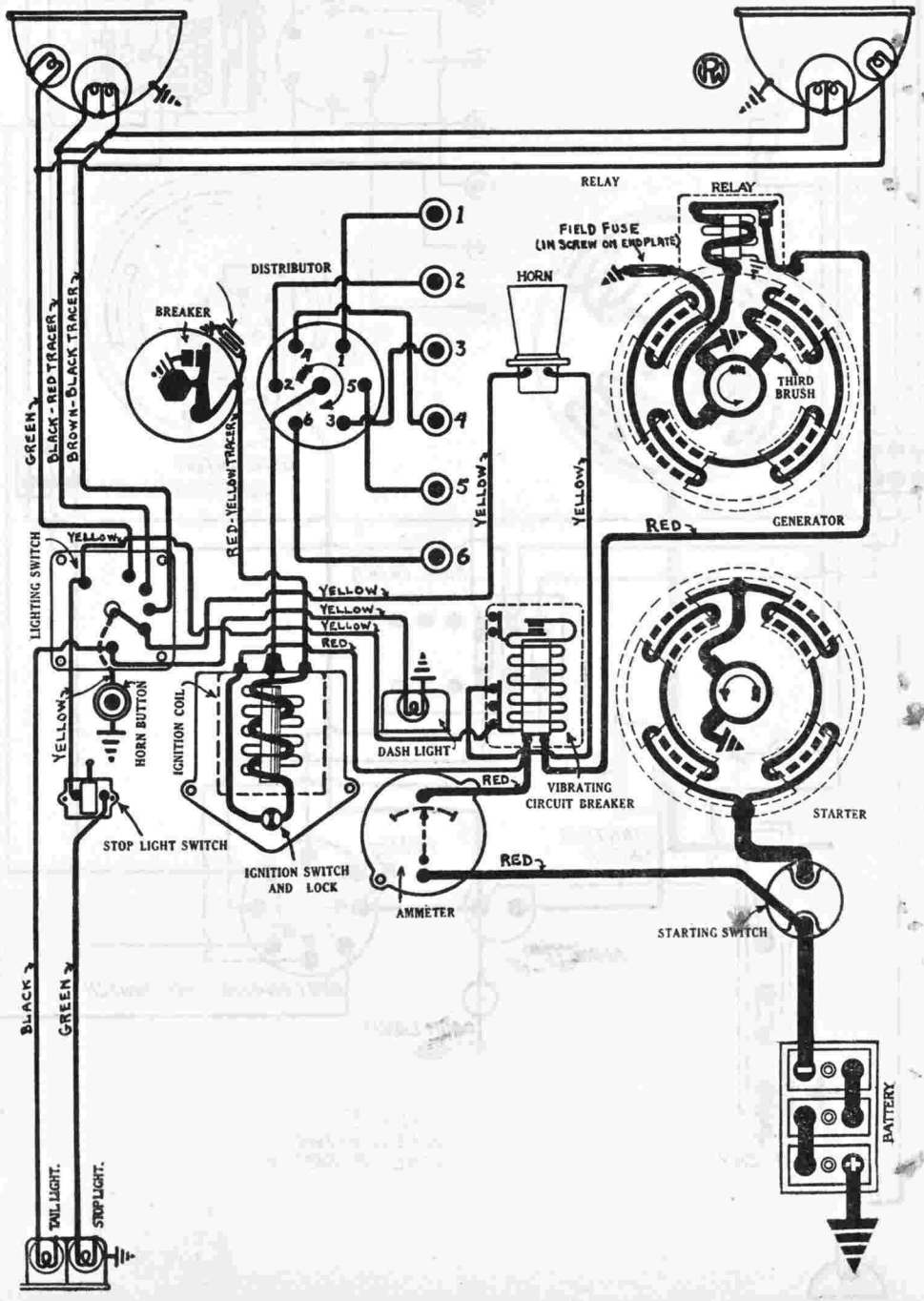
Timing:—Breaker contacts begin to separate when piston No. 1 entering power stroke reaches a position 7° or 47/64 inch on the flywheel before top dead center when the flywheel mark 'Spark Full Advance' is opposite the pointer on the flywheel case with the spark control button in the fully advanced position. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Then place spark button in advanced position. Continue to crank engine until flywheel mark 'Spark Full Advance' is visible through the peephole in the front of the flywheel housing on the right side directly opposite the indicator on the housing. Then loosen advance arm clamp screw and rotate distributor in a counter-clockwise direction until the contacts begin to separate. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining plugs in order 5-3-6-2-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Gaps are .025 inch.

VALVE TIMING:—Inlet valves open at top dead center and close 40 degrees after lower dead center with piston 13/32 inch up on compression stroke or 4 15/64 inches on the flywheel past lower dead center. Exhaust valves open 40 degrees before lower dead center with piston 13/32 inch from bottom of power stroke or 4 15/64 inches on the flywheel before lower dead center and close 10 degrees after top dead center with the piston 3/64 inch down on intake stroke or 1 1/16 inches on the flywheel after top dead center. Tappet clearance should be .008 inch on inlet valves and .010 inch for exhaust valves. Flywheel distances are correct with 12 1/8-inch flywheel.

STARTER:—Type 6470. Starter is connected to the engine through an inboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter switch is Type 15380. Starter brush spring tension should be 37 ounces (2 pounds 5 ounces each).



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GRAHAM PAIGE

MODEL 610 (1928)
NORTH EAST GENERATING, STARTING SYSTEM
NORTH EAST IGNITION

Starter Data

Torque	R.P.M.	Volts	Amperes
4.3 lb. ft.	1000	4.6	280
6.5 "	600	4.1	370
8.5 "	300	3.75	445
10.5 "	Lock	3.2	545

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing by standard S.A.E. No. 1 flange. To remove starter, disconnect cable and remove 3 flange mounting cap screws. Then pull starter forward and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Type 6472. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, shift third brush by turning knurled screw on generator end plate. Turn the screw in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. With standard car setting the maximum charging rate is 13 amperes (hot) at 8 volts reached at 1300 R.P.M. or 25 miles per hour. All three brushes are mounted on a movable plate. Adjusting the charging rate shifts all three brushes around the commutator.

Generator Data (Cold)

Amperes	Volts	R.P.M.
3	8	700
13.5	8	1000
16	8	1200
17.25	8	1400
16.25	8	1800
15.5	8	2000

Motoring generator draws 4.5 amperes at 6.2 volts. Shunt field current is 4 amperes at 8 volts with generator running at 1300 R.P.M. (cold). Brush spring tension is 18 ounces. A 6 ampere field fuse is mounted in the commutator end plate.

Mounting:—Generator is cradle mounted at rear of engine on right side and is driven by extension of water pump shaft. To remove generator, disconnect lead and hose coupling. Then loosen clamp and lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at each end of the generator every 1000 miles.

RELAY:—Type 20220. Relay is mounted on the generator. Relay closes when the voltage of the generator reaches 7.25 volts and opens with a discharge current of 1-2 amperes. Charging current at closing of contacts is 2 amperes. Relay contacts separate .016 inch. Air gap is .028 inch with contacts closed.

LIGHTING:—Lighting switch is mounted at lower end of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Auxiliary head lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop light is 6-8 volt, 21 cp. S.C. Mazda No. 1129. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Generator field fuse is 6 amperes capacity.

CIRCUIT BREAKER:—Delco-Remy Model 410-A. A vibrating circuit breaker is mounted on the dash. Circuit breaker begins to operate when the current reaches 25-30 amperes. While vibrating it limits the current to 15 amperes.

GRAHAM PAIGE

MODEL 614 (1928)

NORTH EAST GENERATING, STARTING SYSTEM

NORTH EAST IGNITION

BATTERY:—Willard. Type CWR-15. 6 volt, 15 plates. The battery capacity is 100 ampere hours. The positive (+) terminal is grounded. The starting capacity (20 minute rate) is 114 amperes for 20 minutes. The lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted under front floor boards on right frame member.

IGNITION:—Coil. Type 20232. Coil is mounted on the toeboard. Ignition current is 2 amperes at 7 volts with engine running and 5.5 amperes at 6.5 volts with engine stopped.

Distributor Model TU. Type 10863. Breaker contacts separate .020 inch. Set contact gap by loosening locknut on stationary contact stud and turning up stud until proper gap is secured with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-18 ounces. Breaker has two sets of contacts opening at the same instant. They must be synchronized (see Timing). Distributor is full automatic with an auxiliary spark control button to provide retard. Automatic advance begins at 750 R.P.M. of engine. Maximum automatic advance is 15 degrees reached at 2400 R.P.M.

Mounting:—Distributor is mounted on cylinder head and can be removed from the left side. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Then remove set screw in side of distributor shaft housing and lift distributor from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor shaft every 500 miles.

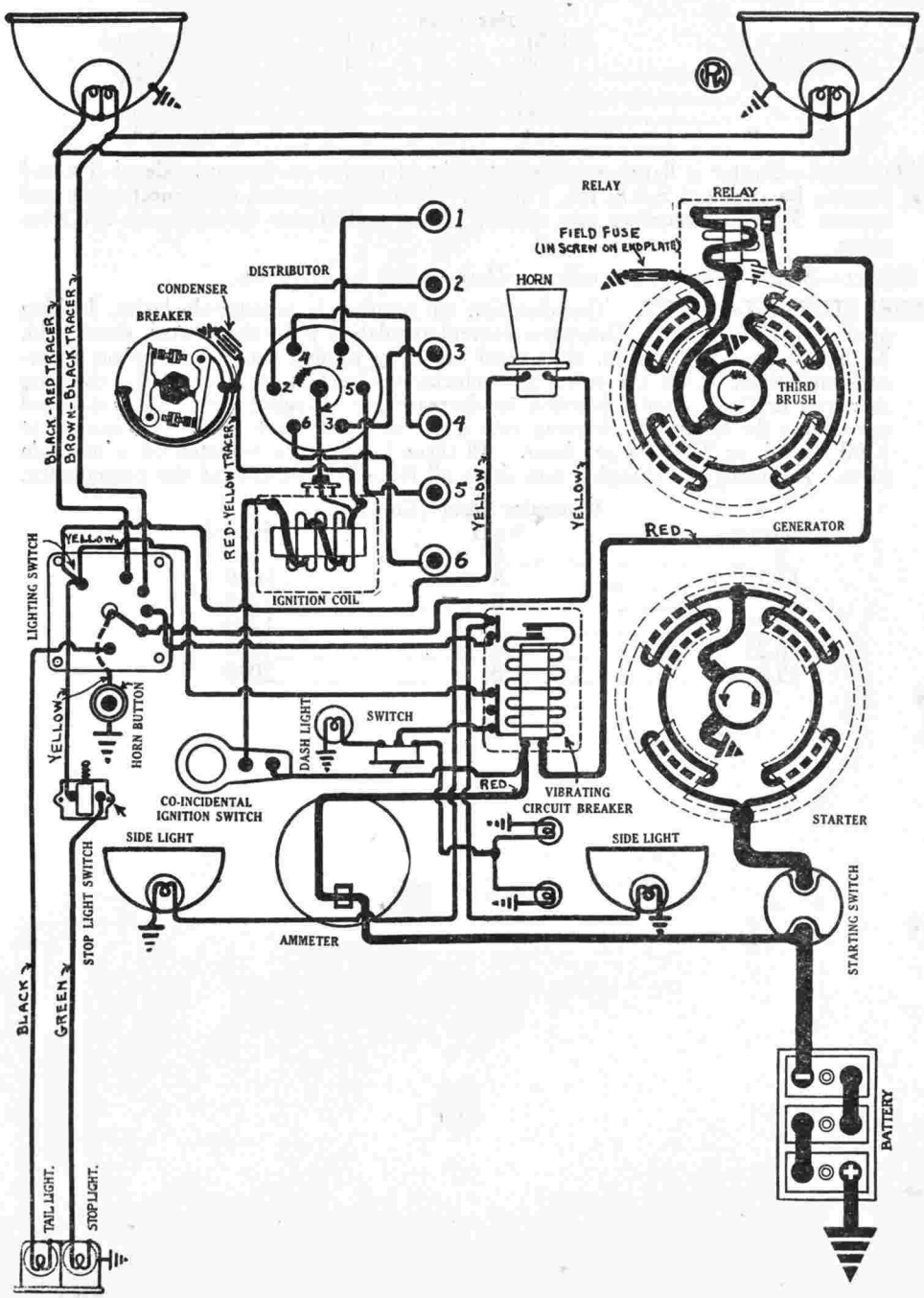
Timing:—Synchronization of Contacts. Connect a six volt lamp across each of the breaker contacts. Watch lights as contacts open. Both lamps should light at the same instant.

Timing Distributor to Engine. Breaker contacts separate when piston No. 1 entering power stroke reaches a position when the flywheel mark "Spark Full Advance" is opposite the indicator on the flywheel housing. This is 7 degrees before top dead center which is 47/64 inch on a 12⅛ inch diameter flywheel. To set timing, crank engine until piston No. 1 enters compression stroke. Place spark control button in fully advanced position and see that distributor is turned counter-clockwise to the full limit of the advance arm slot. Then continue to crank engine until flywheel mark is opposite the indicator in the peephole on the forward side of the flywheel housing on the left side of the engine. Loosen advance arm clamp bolt and rotate distributor until contacts begin to open. Tighten the clamp bolt and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect remaining plugs in order 5-3-6-2-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Gaps are .025 inch.

VALVE TIMING:—Inlet Valves. Head diameter 1 9/16 inches; stem diameter 11/32 inch; stem length 5½ inches. Valve lift is .318 inch. Tappet clearance is .006 inch. Inlet valves open at top dead center and close at 40 degrees after lower dead center with the piston .4125 inch up on compression stroke or 4 15/64 inches on the flywheel past lower dead center. Flywheel distances are correct on a 12⅛ inch diameter flywheel.



GRAHAM PAIGE

MODEL 614 (1928)

NORTH EAST GENERATING, STARTING SYSTEM
NORTH EAST IGNITION

Exhaust Valves. Head diameter 1 15/32 inches; stem diameter 11/32 inch; stem length 5½ inches. Valve lift is .327 inch. Tappet clearance is .010 inch. Exhaust valves open at 40 degrees before lower dead center with the piston .4125 inch from bottom of power stroke or 4 15/64 inches on the flywheel before lower dead center and close 10 degrees after top dead center with the piston .0422 inch down on intake stroke or 1 1/16 inches on the flywheel after top dead center.

STARTER:—Model SBK. Type 6460. Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 2 pounds 5 ounces (37 ounces). Starter switch is Type 15380.

Starter Data

Torque	R.P.M.	Volts	Amperes
6 lb. ft.	800	4.75	270
7.5 "	600	4.5	330
9.5 "	400	4.2	380
11 "	200	3.7	450
13.5 "	Lock	3.4	530

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing by standard S.A.E. No. 1 flange. To remove starter, disconnect cable and remove 3 flange mounting bolts. Then pull starter forward and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model LB. Type 6446. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, shift third brush by turning knurled screw on commutator end plate. The three brushes are mounted on a plate and the rack moves all three when the adjustment is made. Turn screw in a clockwise direction shifting the brush plate in a counter-clockwise direction to increase the charging rate, and in the opposite direction to decrease charging rate. With standard car setting, maximum charging rate is 12-16 amperes.

Generator Data
(cold)

Amperes	Volts	R.P.M.
4	8	700
12	8	900
17.5	8	1200
17.5	8	1300
16.5	8	1600
14.25	8	2000

Motoring generator draws 5 amperes at 6.2 volts. Shunt field current is 6 amperes at 8 volts with generator running at 1300 R.P.M. Brush spring tension is 1 pound 2 ounces (18 ounces). A six ampere field fuse is mounted in the commutator end plate.

Mounting:—Generator is cradle mounted at right of engine and is driven by extension of water pump shaft. To remove generator, disconnect lead and drive coupling and loosen mounting strap. Then lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every 500 miles.

RELAY:—Type 20220. Relay is mounted on the generator. Relay contacts close when the generator voltage reaches 7.25 volts and open with a discharge current of 1-2 amperes. Charging current at closing of contacts is 1.5-2 amperes. Relay contacts separate .016 inch. Air gap is .028 inch with contacts closed.

LIGHTING:—Briggs and Stratton Switch. Lighting switch is mounted at the base of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact). Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Dash light is 6-8 volt, 3 cp. S.C. Mazda No. 63. Tail and stop light is 6-8 volt, 21-2 cp. D.C. Mazda No. 1158.

CIRCUIT BREAKER:—Delco-Remy. Model 410-A. A vibrating circuit breaker is mounted on the dash. Circuit breaker begins to operate with a current flow of 25-30 amperes and continues to vibrate limiting the current to 15 amperes until the short circuit is removed.

GRAHAM PAIGE

MODELS 619 AND 629 (1928)
NORTH EAST GENERATING, STARTING SYSTEM
NORTH EAST IGNITION

BATTERY:—Willard, Type CWR-17, 6 volt, 17 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 130 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 23 hours. Battery is mounted under front floor boards on right frame member.

IGNITION:—Coil Type 20232. Coil is mounted on the toeboard. Ignition current is 2 amperes at 7 volts with engine running and 5.5 amperes with engine stopped.

Distributor Type 10833. Breaker contacts separate .020 inch. Set contact gap by loosening locknut on stationary contact stud and turning up stud until proper gap is secured with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-18 ounces. Breaker has two sets of contacts opening at the same instant. They must be synchronized (see Timing). Distributor is full automatic with an auxiliary spark control button to provide retard. Automatic advance begins at 750 R.P.M. of engine. Maximum automatic advance is 15 degrees reached at 2400 R.P.M.

Mounting:—Distributor is mounted on cylinder head and can be removed from the left side. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Then remove set screw in side of distributor shaft housing and lift distributor from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor shaft every 1000 miles.

Timing:—Synchronization of Contacts:—Connect a six volt lamp across each of the breaker contacts. Watch lights as contacts open. Both lamps should light at the same instant.

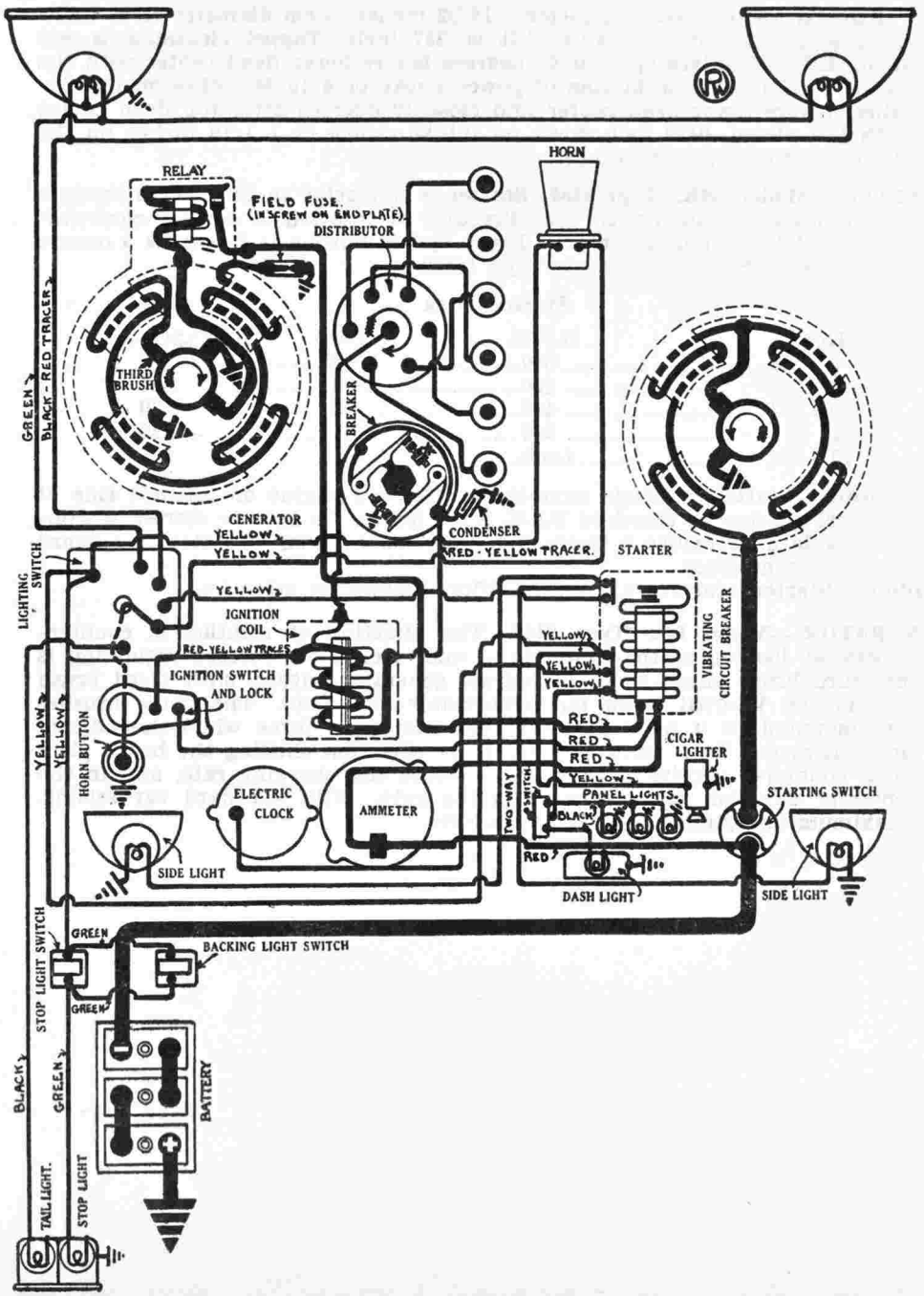
Timing Distributor to Engine:—Breaker contacts separate when piston No. 1 entering power stroke reaches a position when the flywheel mark 'Spark Full Advance' is opposite the indicator on the flywheel housing. To set timing, crank engine until piston No. 1 enters compression stroke. Place spark control button in fully advanced position and see that distributor is turned counter-clockwise to the full limit of the advance arm slot. Then continue to crank engine until flywheel mark 'Spark Full Advance' is opposite the indicator in the peephole on the forward side of the flywheel housing on the right side of the engine. Loosen advance arm clamp bolt and rotate distributor until contacts begin to open. Tighten the clamp bolt and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect remaining plugs in order 5-3-6-2-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Gaps are .028-.030 inch.

VALVE TIMING:—Inlet valves open at top dead center and close 45 degrees after lower dead center with the piston 37/64 inch up on compression stroke or 6 15/64 inches on the flywheel past lower dead center. Exhaust valves open 50 degrees before lower dead center with the piston 23/32 inch from bottom of power stroke or 6 59/64 inches on the flywheel before lower dead center and close 10 degrees after top dead center with the piston 3/64 inch down on intake stroke or 1 25/64 inches on the flywheel past top dead center. Flywheel distances are correct with standard 15⅞-inch flywheel. Valve lift is 11/32 inch. Tappet clearance is .010 inch.

STARTER:—Type 6462. Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 2 pounds 5 ounces (37 ounces). Starter switch is Type 15380.



GRAHAM PAIGE

NORTH EAST GENERATING, STARTING SYSTEM
NORTH EAST IGNITION

Starter Data

Torque	R.P.M.	Volts	Amperes
5 lb. ft.	1000	5.0	230
8.25 "	600	4.5	320
11.75 "	300	4.0	425
13 "	200	3.8	470
16 "	Lock	3.1	550

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing by standard S.A.E. No. 1 flange. To remove starter, disconnect cable and remove 3 flange mounting bolts. Then pull starter forward and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Type 6447. The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, shift third brush by turning knurled screw on commutator end plate. Turn screw in a counter-clockwise direction shifting third brush in a clockwise direction to increase charging rate and in the opposite direction to decrease charging rate. With standard car setting, maximum charging rate is 17.5 amperes (hot) reached at 1300 R.P.M. or 25 miles per hour.

Generator Data (Cold)

Amperes	Volts	R.P.M.
4	8	700
12	8	900
17.5	8	1200
17.5	8	1300
16.5	8	1600
14.25	8	2000

Motoring generator draws 5 amperes at 6.2 volts. Shunt field current is 6 amperes at 8 volts with generator running at 1300 R.P.M. Brush spring tension is 1 pound 2 ounces (18 ounces). A six ampere field fuse is mounted in the commutator end plate.

Mounting:—Generator is cradle mounted at left of engine and is driven by extension of water pump shaft. To remove generator, disconnect lead and drive coupling and loosen mounting strap. Then lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every 500 miles.

RELAY:—Type 20220. Relay is mounted on the generator. Relay contacts close when the generator voltage reaches 7.25 volts and open with a discharge current of 1-2 amperes. Charging current at closing of contacts is 1.5-2 amperes. Relay contacts separate .016 inch. Air gap is .028 inch with contacts closed.

LIGHTING:—Lighting switch is mounted at lower end of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Side lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop light is 6-8 volt, 21 cp. S.C. Mazda No. 1129. Dash, panel and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Generator field fuse is 6 amperes capacity.

CIRCUIT BREAKER:—Delco-Remy Model 410-A. A vibrating circuit breaker is mounted on the dash. Circuit breaker begins to operate with a current flow of 25-30 amperes and continues to vibrate limiting the current to 15 amperes until the short circuit is removed.

GRAHAM PAIGE

MODEL 835 (1928)

NORTH EAST GENERATING, STARTING SYSTEM
NORTH EAST IGNITION

BATTERY:—Willard. Type CWR-17. 6 volt, 17 plates. The positive (+) terminal is grounded. Battery capacity is 114 ampere hours. Starting capacity (20 minute rate) is 130 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 23 hours. Battery is mounted under front floor board on left frame member.

IGNITION:—Coil. Type 20232. Coil is mounted on the toe board. Ignition current is 2 amperes at 7 volts with engine running and 5.5 amperes at 6.5 volts with engine stopped.

Distributor Model B-8. Type 10834. Breaker contacts separate .020 inch. Set contact gap by loosening locknut on stationary contact stud and turning up stud until proper gap is secured with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-18 ounces. Breaker has two sets of contacts opening at the same instant. They must be synchronized (see Timing). Distributor is full automatic with an auxiliary spark control button to provide retard. Automatic advance begins at 450 R.P.M. of engine. Maximum automatic advance is 18 degrees reached at 2200 R.P.M.

Mounting:—Distributor is mounted on cylinder head and can be removed from the right side. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Then remove set screw in side of distributor shaft housing and lift distributor from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor shaft every 500 miles.

Timing:—Synchronization of Contacts. Connect a six volt lamp across each of the breaker contacts. Watch lights as contacts open. Both lamps should light at the same instant.

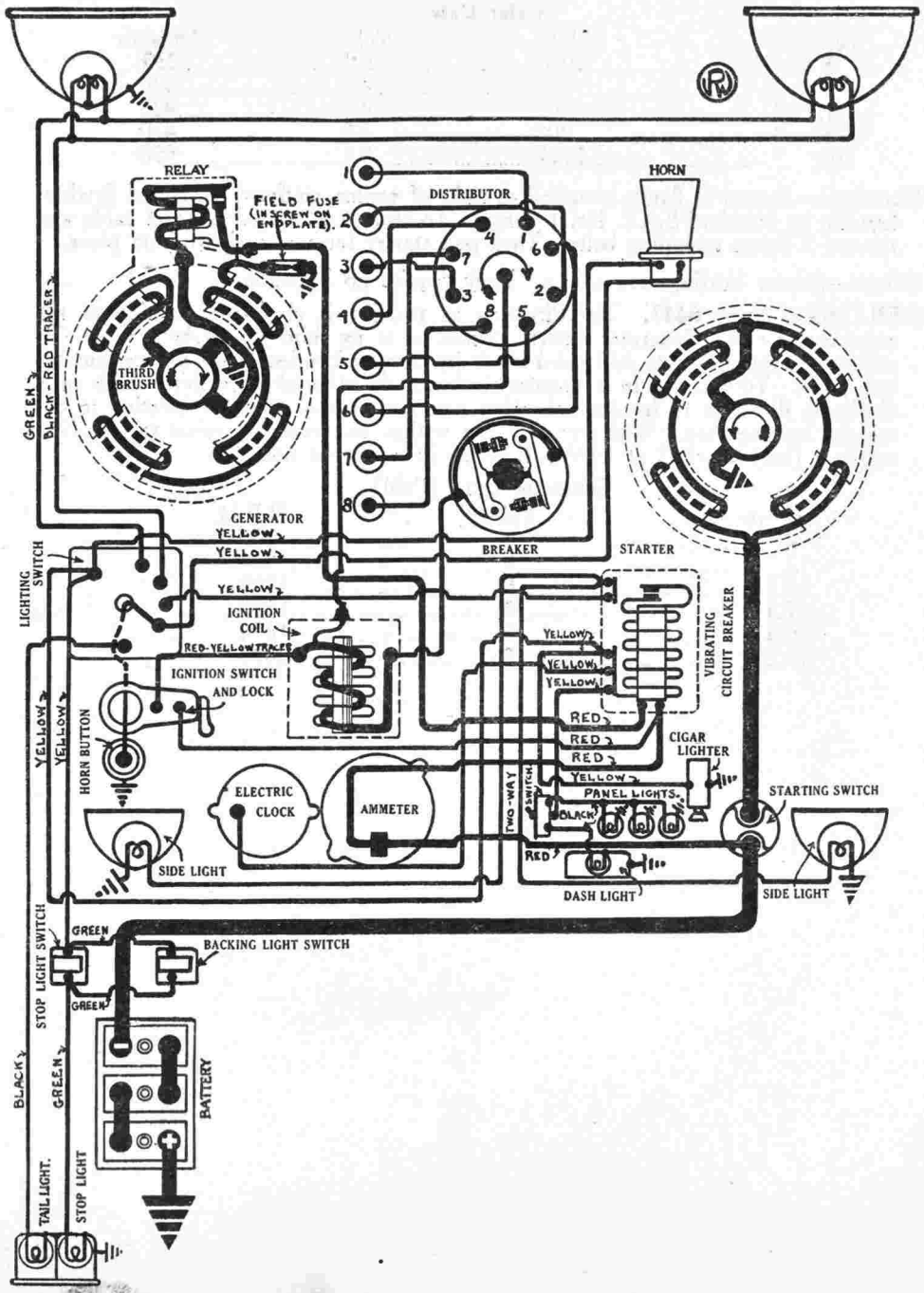
Timing Distributor to Engine. Breaker contacts separate when piston No. 1 entering power stroke reaches a position when the flywheel mark "Spark Advanced" is opposite the indicator on the flywheel housing or 7/16 inch before top dead center on a 12½ inch diameter flywheel. To set timing, crank engine until piston No. 1 enters compression stroke. Place spark control button in fully advanced position and see that distributor is turned counter-clockwise to the full limit of the advance arm slot. Then continue to crank engine until flywheel mark is opposite the indicator in the peephole on the forward side of the flywheel housing on the left side of the engine. Loosen advance arm clamp bolt and rotate distributor until contacts begin to open. Tighten the clamp bolt and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect remaining plugs in order 6-2-5-8-3-7-4, clockwise around the distributor head.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Gaps are .025 inch.

VALVE TIMING:—Inlet Valves. Head diameter 1⅝ inches; stem diameter ⅜ inch; stem length 5 7/16 inches. Valve lift .370 inch. Tappet clearance .008 inch. Inlet valves open at 2 degrees past top dead center when the piston is .0017 inch down on the intake stroke or 7/32 inch on the flywheel after top dead center and close 47 degrees after lower dead center when the piston is 9/16 inch up on the compression stroke or 5⅛ inches after lower dead center on the flywheel.

Exhaust Valves. Head diameter 1 9/16 inches; stem diameter ⅜ inch; stem length 5 7/16 inches. Valve lift .370 inch. Tappet clearance .008 inch. Exhaust valves open 43 degrees before lower dead center when the piston



GRAHAM PAIGE

MODEL 835 (1928)

NORTH EAST GENERATING, STARTING SYSTEM
NORTH EAST IGNITION

is 15/32 inch from bottom of power stroke or 4 11/16 inches on the flywheel before lower dead center and close 2 degrees after top dead center when the piston is .0017 inch down on the intake stroke or 7/32 inch on the flywheel after top dead center. Flywheel distances are correct on a 12½ inch diameter flywheel.

STARTER:—Model SBH. Type 6462. Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 37 ounces. Starter switch is type 15380.

Starter Data

Torque	R.P.M.	Volts	Amperes
5 lb. ft.	1000	5.0	230
8.25 "	600	4.5	320
11.75 "	300	4.0	425
13 "	200	3.8	470
16 "	Lock	3.1	550

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove three flange mounting bolts. Then pull starter forward and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model LB. Type 6447. The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, shift third brush by turning knurled screw on commutator end plate. Turn screw in a counter-clockwise direction shifting third brush in a clockwise direction to increase charging rate and in the opposite direction to decrease the charging rate. With standard car setting, maximum charging rate is 17.5 amperes (hot) reached at 1300 R.P.M. or 25 M.P.H.

Generator Data
(cold)

Amperes	Volts	R.P.M.
4	8	700
12	8	900
17.5	8	1200
17.5	8	1300
16.5	8	1600
14.25	8	2000

Motoring generator draws 5 amperes at 6.2 volts. Shunt field current is 6 amperes at 8 volts with generator running at 1300 R.P.M. Brush spring tension is 1 pound 2 ounces (18 ounces). A six ampere field fuse is mounted in the commutator end plate.

Mounting:—Generator is cradle mounted at left of engine and is driven by extension of water pump shaft. To remove generator, disconnect lead and drive coupling and loosen mounting strap. Then lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every 500 miles.

RELAY:—Type 20220. Relay is mounted on the generator. Relay contacts close when the generator voltage reaches 7.25 volts and open with a discharge current of 1-2 amperes. Charging current at closing of contacts is 1.5-2 amperes. Relay contacts separate .016 inch. Air gap is .028 inch with contacts closed.

LIGHTING:—Briggs and Stratton Switch. Lighting switch is mounted at base of steering column. Head lights are 6-8 volt, 21-21 cp (double filament-double contact). Dash and tail lights are 6-8 volt, 3 cp. S.C. Side lights are 6-8 volt, 3 cp. S.C. Stop light 6-8 volt, 21 cp. S.C.

CIRCUIT BREAKER:—Delco-Remy Model 410-A. A vibrating circuit breaker is mounted on the dash. Circuit breaker begins to operate with a current flow of 25-30 amperes and continues to vibrate limiting the current to 15 amperes until the short circuit is removed.

GRANT

MODELS M, T, U (1915-16-17)
ALLIS-CHALMERS STARTING AND LIGHTING SYSTEM
ATWATER-KENT IGNITION

Battery.—Battery is 6 volt, 80 ampere-hour. The two wire system is used.

Ignition.—Breaker contacts should open .010 inch to .012 inch. To lessen the gap, remove the screw and take off one or more of the thin washers under the head, as required. If tungsten contacts become badly corroded they may be resurfaced by drawing across a piece of fine emery cloth laid on a flat surface as on the bed of a drill press. The polarity switch reverses the current across the breaker contacts every time it is turned on. This tends to keep the contacts true.

Timing.—Spark should occur when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position on the four cylinder car and when the mark "1 and 6 DC" on the flywheel is at the indicator, spark control lever and breaker assembly in the fully retarded position on the six cylinder cars.

Firing Order.—The firing order of the "Four" is 1, 3, 4, 2. The firing order of the "Six" is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be .025 inch to .030 inch.

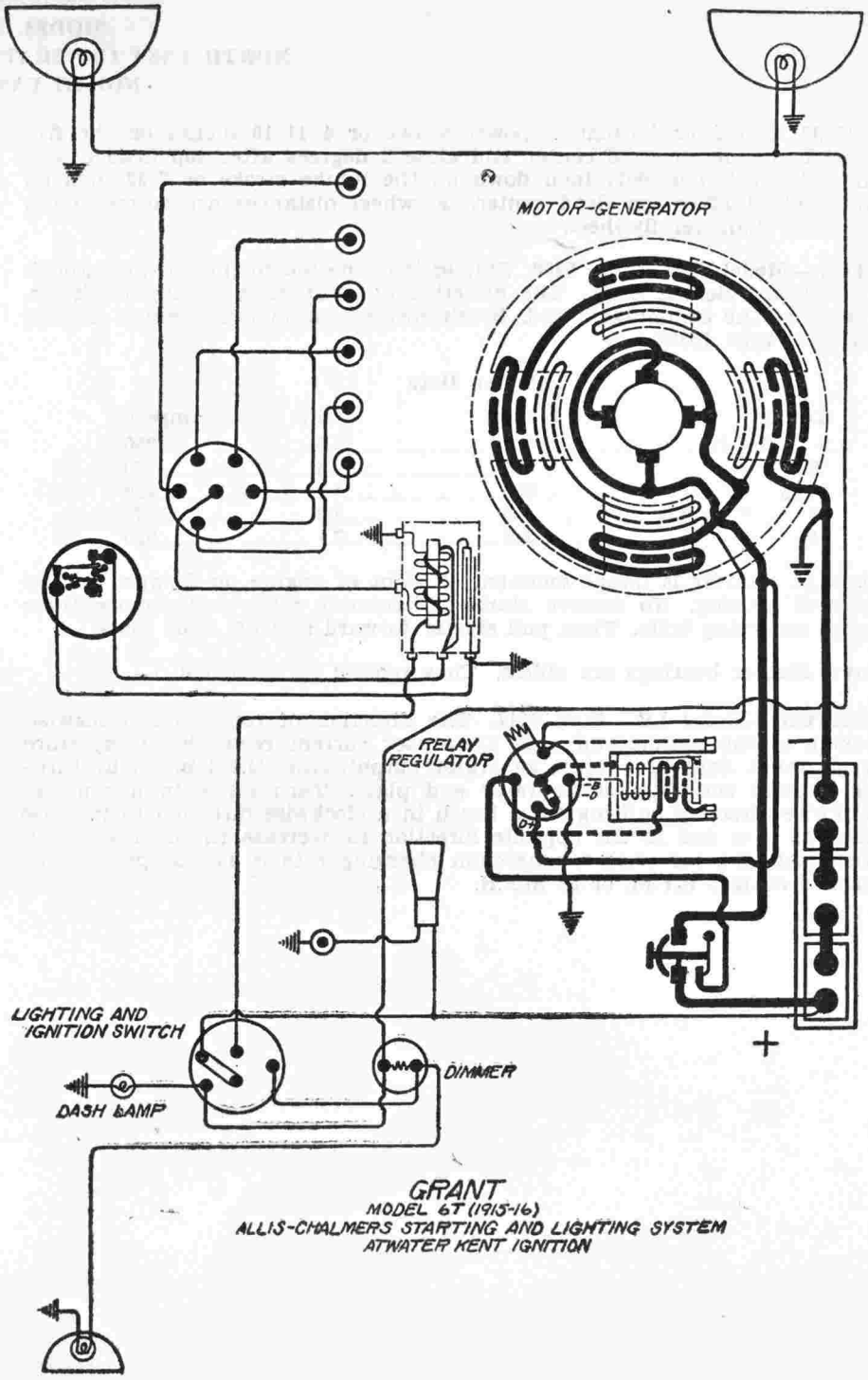
Oiling.—Put one drop of light machine oil on the latch and latch lifter bearings and put three or four drops in the main bearings every month. At the same time put a small amount of vaseline on the latch, latch lifter and other moving parts. Care must be taken that no vaseline or oil reaches the tungsten contacts as it will cause them to burn and corrode. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

Motor-Generator.—The motor and generator are combined in one frame, forming what is known as the single unit system. Generator current regulation is by reverse series field and vibrating regulator. The relay should close at about 600 R. P. M., of the engine or 10 to 12 miles per hour.

Trouble Shooting.—Should the motor operate properly yet the generator fail to keep the battery charged, the lights may be too large or used excessively, starter used excessively, there is an unintentional ground or a short circuit in the wiring, shunt field is open, relay is not closing, relay contacts are dirty or corroded or the main fuse is burned out or is not making good contact with the clip. Examine particularly the small wire connected to the positive terminal of the battery, the two small wires connected to the motor-generator and the small wire connected to the starting switch. To test the shunt field stop engine, remove large fuse and connect the terminal marked "Field" to either end of the small fuse. The ammeter will show a discharge of 3 or 4 amperes if the shunt field is O. K. If the shunt field tests O. K., replace the large fuse, start engine and speed it up to 600-650 R. P. M., then connect the two terminals on the instrument panel marked "Field and Dyn. +"; if this produces no charge, leave them connected together, and also connect the lower clip of the small fuse to the large fuse. These two connections cut the regulator out of the circuit entirely, so this test must not be made with engine running over 650 R. P. M., or under 600 R. P. M. If it is running faster there will be a very large charging current and if running slower there will be a very large discharge current which may damage the ammeter, wiring or other apparatus. If the meter did not indicate charge on any of the other tests but now indicates charge, the regulator is at fault.

Lamps.—Head lamps are 6-8 volts, 14 cp. on the 1915 cars. They take about 2 amperes each. On the 1916 cars the head lamps are 6-8 volts, 17 cp. Dash and tail lamps are both 6-8 volts, 2 cp., and take about .42 ampere each.

Fuses.—The large fuse is 45 ampere. The small fuse is 20 ampere.

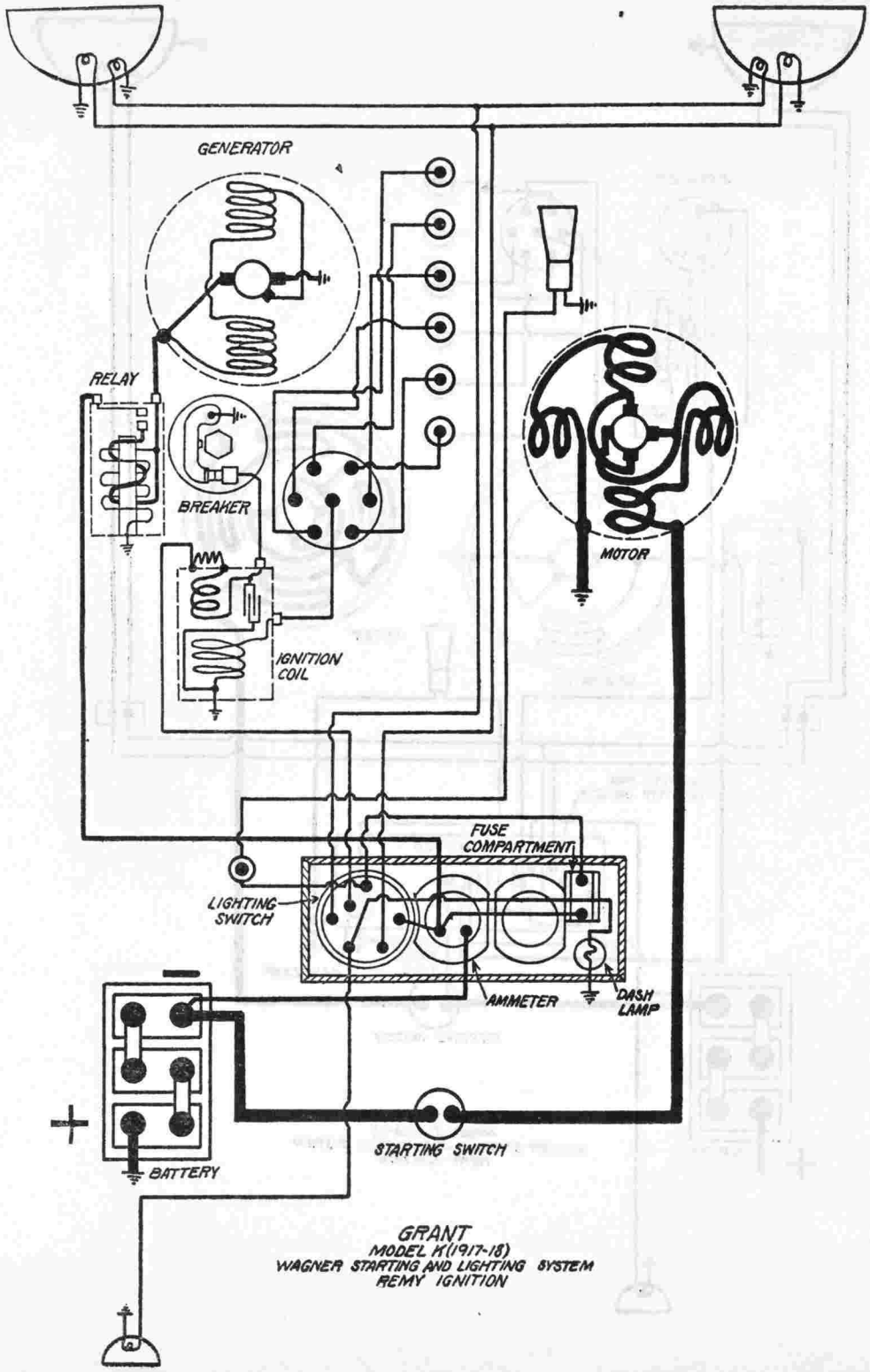


GRANT
MODEL 6T (1915-16)
ALLIS-CHALMERS STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

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Grant

Model K (1917-18) (Serial Nos. 15000 to 27000)
Wagner Generating, Starting and Lighting System
Remy Ignition



Battery.—Willard. Type SJW-3, 6 volt, 90 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Model Nos. 352-A and 284-B. Breaker contacts separate .020 to .025 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper.

Oiling.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when flywheel marking "1 and 6 TC" i ¾ inch past the indicator, spark control rod pulled out ⅜ inch. (First see that breaker assembly is fully retarded when control button is pushed all the way in.)

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—Spark plug gaps are .025 inch.

Starter.—Model EM-166, Type 36-T. Starter is connected to the engine through a Bendix drive.

Oiling.—Put several drops of light engine oil in each of starter bearing oilers every month.

Generator.—Model EM-165, Type 41-Y. Generator current regulation is by third brush system. Rotation is counter clockwise, viewed from commutator end. Maximum output of 15 amperes is reached at 20 miles per hour.

Amperes	Generator Data	R. P. M.
4		800
9		1000
12		1200
14.5		1500
15		1650
14		2000
11		2500

Oiling.—Put 4 or 5 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—Relay closes at 8-10 miles per hour and opens at 6-8 miles per hour. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 16 cp. Dimmer lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

Fuses.—Fuses are 20 ampere.

GRANT

MODEL G (1918-19-20)
WAGNER GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Willard, Type S-J-W-3. 6 volt, 90 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil No. 284-B. Distributor No. 352-A. Breaker contacts separate .020 to .025 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when flywheel marking "No. 1-6-T.C." is ¾ inch beyond the indicator, spark control button pulled out one-half of its stroke (⅜ inch). First see that the breaker assembly is in the fully retarded position when the control button is pushed all the way in.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model EM.-199, Type 35-T. Starter is connected to the engine through a Bendix drive.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter bearing oilers every month.

GENERATOR.—Model E.M.-189, Type 45-W. Generator current regulation is by third brush system. Rotation is counter-clockwise, viewed from commutator end. Maximum current output of 17 amperes is reached at 20 miles per hour.

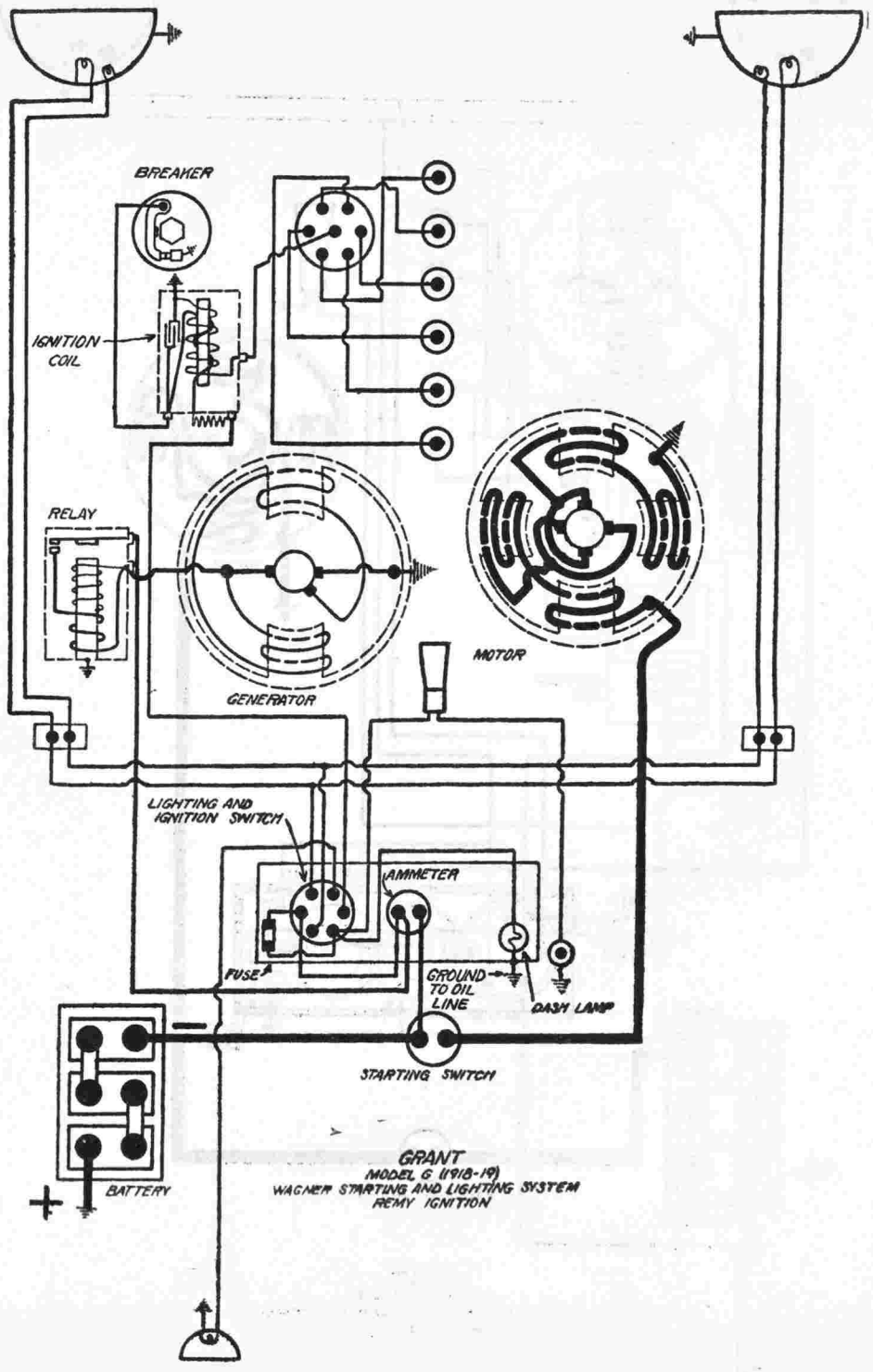
Amperes	Generator Data.	R.P.M.
7.0		700
13.0		1000
16.0		1300
17.0		1500
14.0		2000
10.5		2500

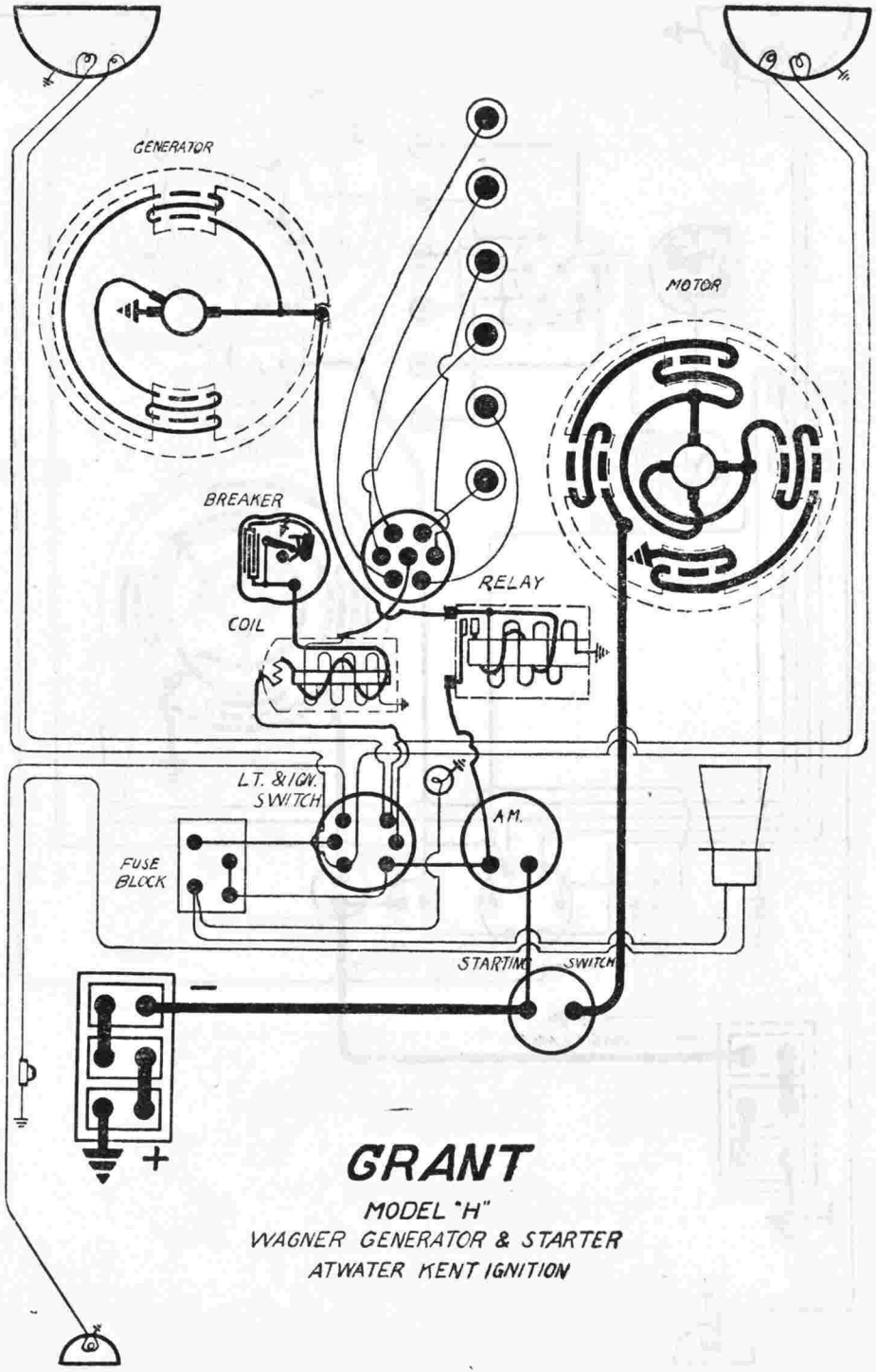
OILING.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour and opens at 6-8 miles per hour. Clean relay contacts by drawing unglazed paper between them. If badly burned or pited, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 16 cp. Dimmer lamps are 6-8 volt, 4 cp. Tail and dash lamps are each 6-8 volt, 2 cp.

FUSES.—Fuses are 20 ampere.





GRANT

MODEL "H"

WAGNER GENERATOR & STARTER

ATWATER KENT IGNITION

GRANT

MODEL H (1920) (SERIAL NOS. UNDER 2030)

WAGNER GENERATING, STARTING AND LIGHTING SYSTEM

ATWATER KENT IGNITION

BATTERY.—Prest-O-Lite, 6 volt, 105 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type CC. Breaker contacts separate .006 inch. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel.

OILING.—Put 4 or 5 drops of light engine oil in the breaker unit oiler every two weeks. Put a small amount of vaseline on the cam, applying with a toothpick. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .028 inch.

STARTER.—E.M.-298, 36-T. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 115 R.P.M., current 160 amperes. Running freely, starter armature revolves at 8000 R.P.M., current 60-90 amperes. Lock torque is 11.5 pound-feet, current 475 amperes.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—E.M.-303, 45-W. Generator current regulation is by third brush system. Maximum current output is 16 amperes, reached at 1500 R.P.M. of the armature or 20-24 miles per hour.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 585-730 R.P.M. of the armature, and opens at 6-8 miles per hour or 437-585 R.P.M. of the armature. Charging current is 2 amperes at closing and the discharge current 0-4 amperes at the opening of relay contacts. Relay contacts separate .035 to .065 inch. Air gap between relay armature (moving member) and coil core is .025 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Fuse is 15 ampere.

GRANT

MODEL H, HX, HY, HZ (1920-21)
BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY.—**Prest-O-Lite, Type 613-RHN,** 6 volt, 115 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type CC. Breaker contacts separate .006 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Remove the distributor cap every two weeks, and put 4 or 5 drops of light engine oil in the oil hole exposed. Put a small amount of vaseline on the cam, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Type FD-140, M-1308 or M-1381. Starter is connected to the engine through a Bendix drive. Lock torque is 11.6 pound-feet, current being 550 amperes at 4 volts. Pressure of brushes on the commutator is 30 ounces.

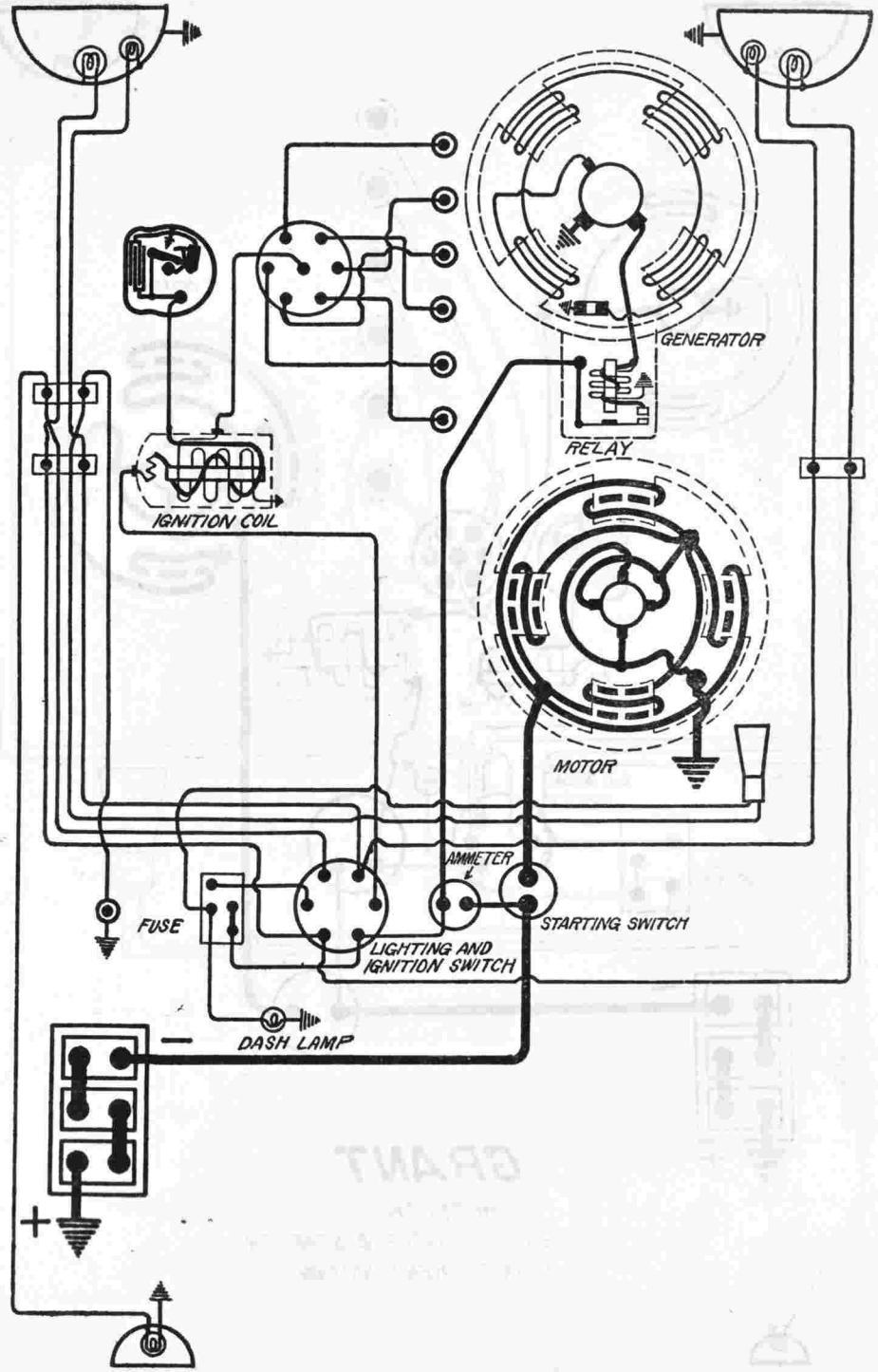
OILING.—Put 5 or 6 drops of light engine oil in each of the starter bearing oilers every month.

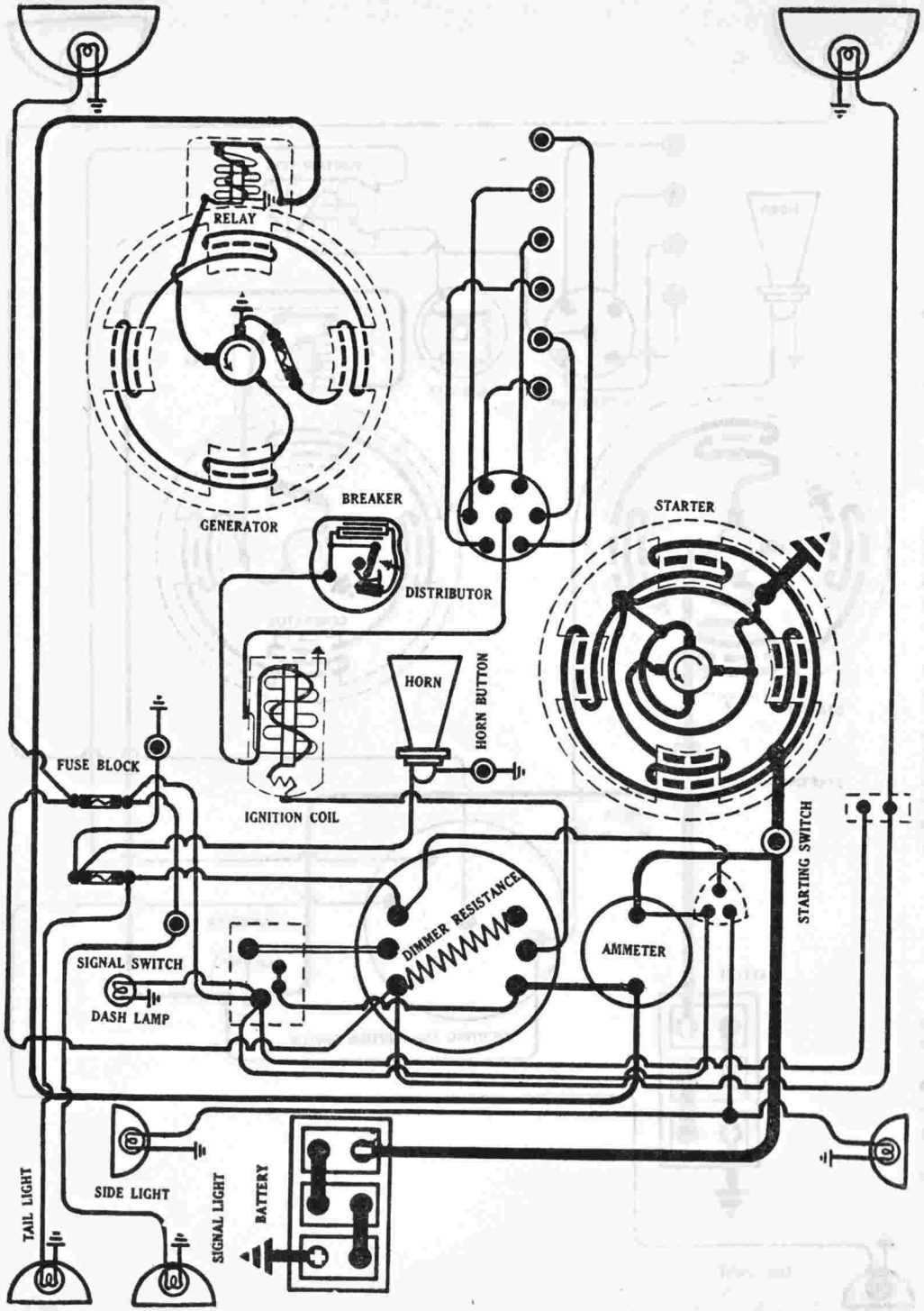
GENERATOR.—Type P-230, M-1345. Generator current regulation is by third brush system. Maximum current output is 14 amperes, reached at 1500 R.P.M. of the armature or 15-20 miles per hour. Charging rate reduces to 12 amperes at 30-40 miles per hour. Charging rate is varied by inserting a special toothed wrench in the adjusting hole in the commutator end plate and moving the third brush assembly through a ratchet engagement. Turn the adjusting wrench in a clockwise direction to increase the charging rate, and in the opposite direction to decrease the charging rate.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 600 R.P.M. of the armature, and opens at 6-8 miles per hour or 550 R.P.M. of the armature. Relay contacts separate .015 inch. Air gap between relay armature and coil core is .025 inch, contacts closed. Adjust spring tension on relay so that contacts close when the voltage of the generator, measured across the main brushes, reaches 6.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.





GRANT

SERIES 65000 (1922)

BIJUR GENERATING, STARTING AND LIGHTING SYSTEM

ATWATER-KENT IGNITION

BATTERY.—Prest-O-Lite, Type 613-RHN, 6 volts, 105 ampere-hours. The starting capacity is 120 amperes for 20 minutes. The lighting capacity is 5 amperes for 20 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model N3. Distributor Model 46-CC. Breaker contacts separate .015 inch, fully separated. The contact points are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oil-stone.

Oiling.—Remove distributor cap every two weeks and put 4 or 5 drops of light engine oil into exposed oil hole. Put a small amount of vaseline on the cam, applying wtih a tooth-pick. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plugs.—The spark plug diameters are 7/8 inch. Spark plug gaps are .025 inch.

STARTER.—Type FD-140, M-1380. The starter is connected to the engine by a Bijur drive. Motor running freely at 5000 R.P.M. takes a current of 35-45 amperes, 5.8 volts. Cranking the engine at 150 R.P.M., requires a current of 250 amperes, 5 volts. Lock torque is 11.6 pounds-feet, current being 550 amperes, 4 volts. Pressure of brushes on the commutator is 30 ounces.

Oiling.—Put 5 or 6 drops of light engine oil into each of the starter bearing oilers every month.

GENERATOR.—Type P-230, M-1345. Generator current regulation is by the third brush system. Maximum current output is 14 amperes, reached at 1200 R.P.M. of the armature or 23 M.P.H. Charging rate reduces to 12 amperes at 30-40 M.P.H. Charging rate is varied by inserting a special toothed wrench in the adjusting hole in the commutator end plate and moving the third brush assembly through a ratchet engagement. Turn the adjusting wrench in a clockwise direction to increase the charging rate, and in the opposite direction to decrease the charging rate.

Generator Test Data

Hot Test		Cold Test	
Amperes	R.P.M.	Amperes	R.P.M.
12	1200	14	1200

Oiling.—Put 4 or 5 drops of light engine oil in commutator end oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles. Drive end of generator is oiled by the splash of the engine.

RELAY.—Relay closes at 450 R.P.M. of armature, or 9 M.P.H., or 7-7.5 volts, and opens at 200-300 R.P.M., or4-6 M.P.H, or 0-1 ampere discharge. The contact gap is .015 inch. The air gap between relay armature and coil core is .015 to .020 inch, contacts fully closed.

LAMPS.—Head lights are 6-8 volts, 21 cp. Tail, side and dash lamps are 6-8 volts, 2 cp. Signal lamp is 6-8 volts, 21 cp. Dimmer resistance is used. All lamps have single contact base.

FUSES.—Lighting fuses are 15 amperes, 1¼ inch long. Generator fuse is 15 amperes 5/8 inch long.

GRAY

MODEL N (1922-23) O (1924-25)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WESTINGHOUSE IGNITION

BATTERY.—U. S. L., Type CDX-311-X, 6 volt, 84 ampere hour, The starting capacity is 96 amperes for 20 minutes The lighting capacity is 5 amperes for 17 hours. The positive (+) terminal is grounded.

IGNITION.—Type SC. Breaker contacts separate .012-.016 inch, fully separated. The are made of tungsten. If the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone.

Oiling.—See generator oiling.

Timing:—Breaker contacts begin to separate when piston No. 1 is 7/32 inch before top dead center entering power stroke with the spark control lever and breaker assembly in the fully advanced position.

Resistance of primary coil is 1 ohm. The distance from the distributor arm to carburetor bowl should not be less than 1/4 of an inch.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plugs: — The spark plug diameters are 7/8 inch. The gaps are .030 inch.

STARTER.—Frame No. 33-AB. The starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator current of 35-45 amperes, 5.5 volts. Cranking the engine at 100-150 R.P.M., takes end of the motor. Motor running free at 4100-4700 R.P.M. of armature takes a current of 150-200 amperes, 5-5.5 volts. The lock torque is 12 pound-feet, the current being 474 amperes, 4 volts.

Oiling.—Place 4 or 5 drops of light engine oil into each of the starter oilers once a month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles.

GENERATOR.—Frame No. 34-ATI. The direction of rotation is counter-clockwise, looking at commutator end. The generator motoring freely takes 3-4 amperes at 6-6.3 volts. The shunt field current is 2.5-3.2 amperes, 6-6.3 volts. The third brush system is used for current regulation. To increase the generator output, loosen the screws on the rear end of generator bracket, and move the third brush in the direction of armature rotation (counter-clockwise). Move against the direction of rotation or in clockwise direction to decrease the charging rate.

Generator Test Data

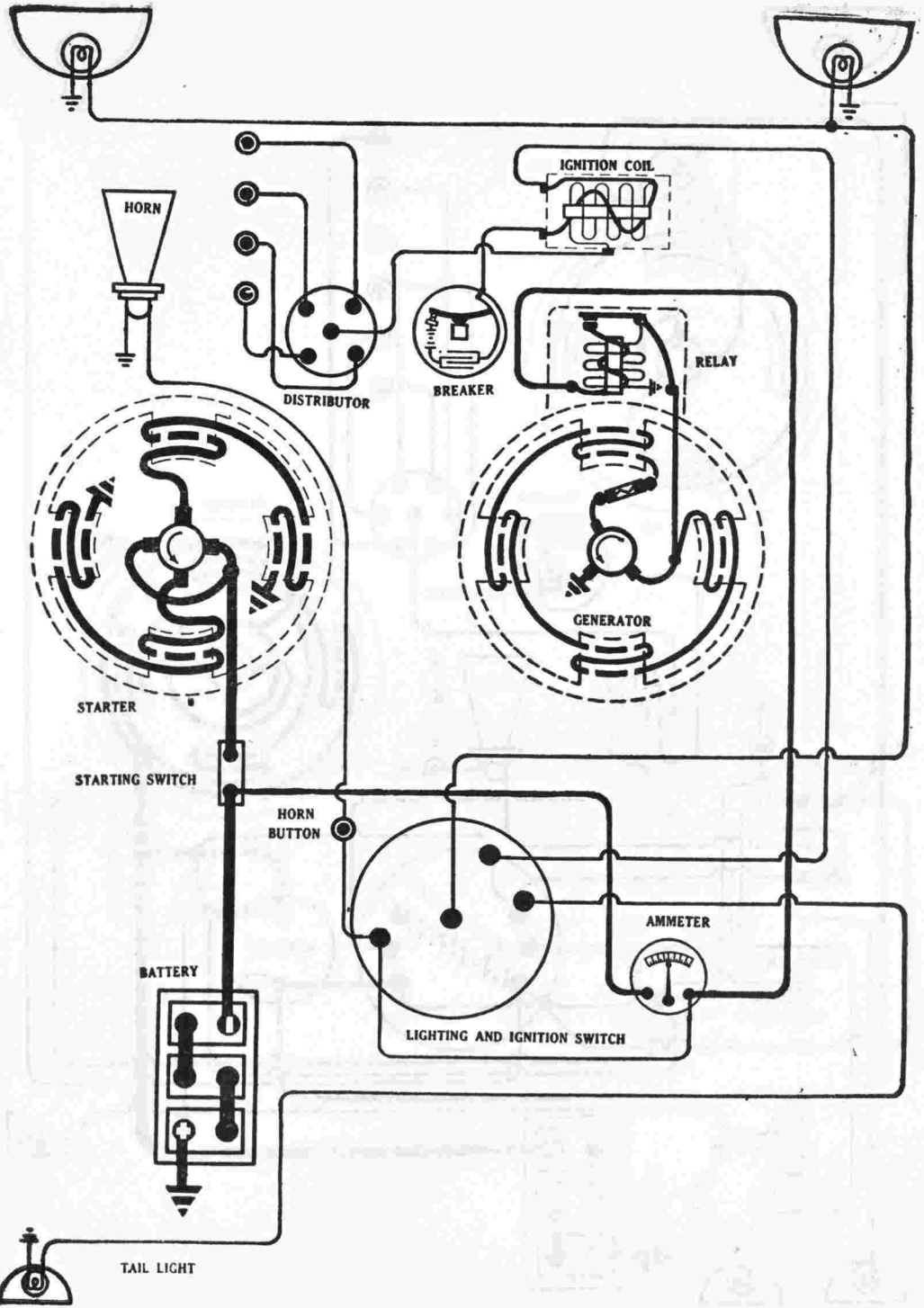
Hot Test			Cold Test		
Amperes	R.P.M.	Volts	Amperes	R.P.M.	Volts
0	650	6.5	0	600	6.5
8-11	1500	7.5	12-14	1400-1600	7.5
7- 9	2500	7 -7.5	9-11	2500	7.0-7.5

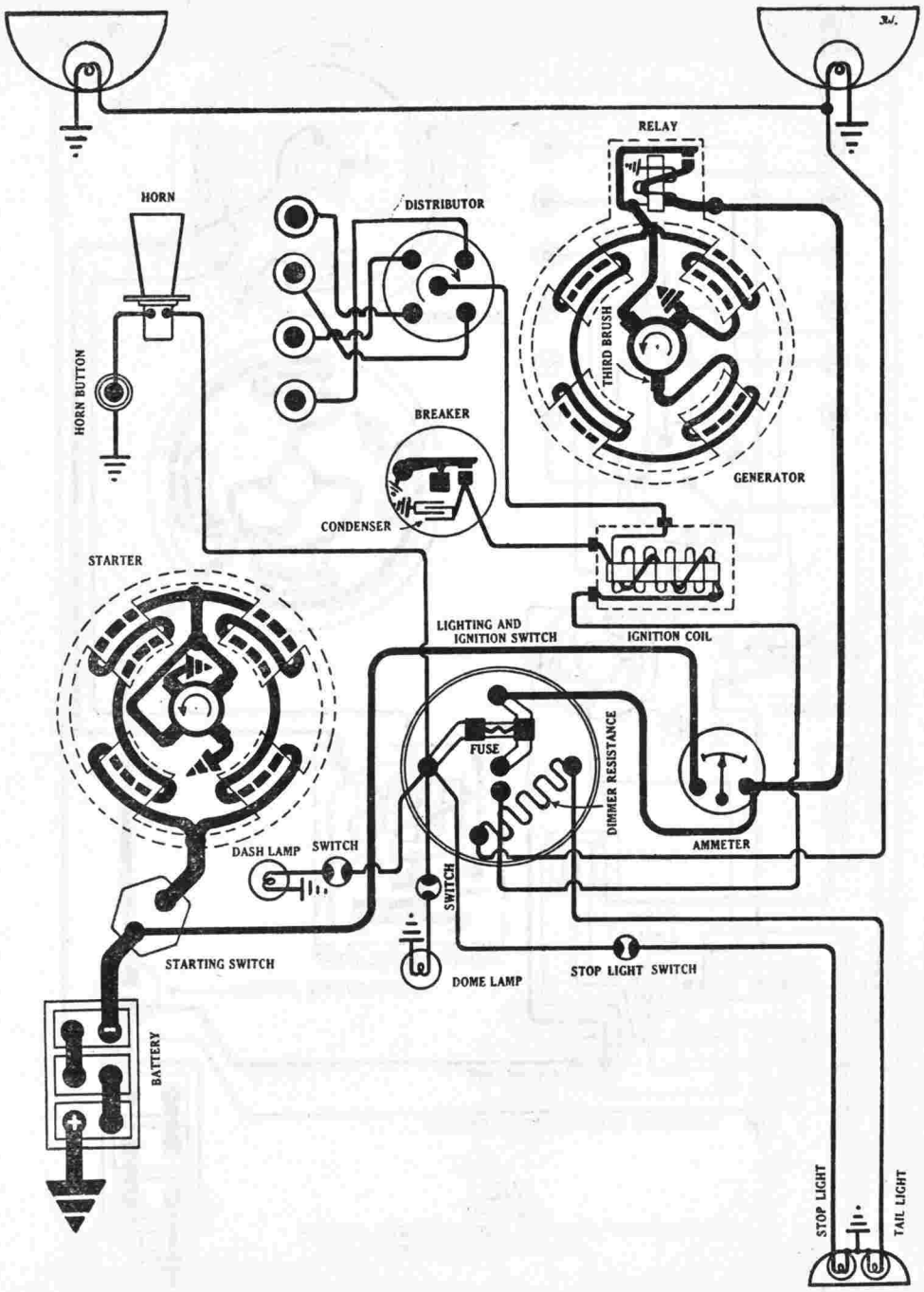
Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every two weeks or each 500 miles. The bearing on the drive end of the generator is oiled by the splash from the gears.

RELAY.—Relay closes at 500-550 R.P.M. of armature, or 7 to 9 miles per hour, or 6-5 volts, and opens at 450-500 R.P.M. of armature, or 5 to 7 miles per hour, or 0-2 amperes discharge. Relay contacts separate .030 inch. The air gap between the relay armature and coil core is .012-.015 inch. The shunt coil resistance is 68 ohms.

LIGHTING.—Head lamps are each 6-8 volt, 21 cp. Dash, dome, tail and stop lamps are each 6-8 volt, 2 cp. All lamps have the single contact base.

FUSES.—The generator fuse is 5 amperes. Lighting fuse is 20 amperes.





GRAY

MODEL S (1925-26)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

BATTERY—U. S. L., Type 3-CVX-5X. 6 volt. Starting capacity is 96 amperes for 20 minutes. Lighting capacity is 5 amperes for 16.8 hours. The positive (+) terminal is grounded.

IGNITION—Coil Model IG-4063. Distributor Model IG-4112-A. Breaker contacts separate .020-.024 inch. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Distributor is of the manual type. Manual advance is 50°. Ignition current is 1-3 amperes engine running and 3.4-5 amperes with engine stopped.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every week or each 250 miles if the car is driven more than 250 miles in a week. Put a small bit of vaseline on the face of the breaker cam under the bumper on the breaker arm every month.

Timing.—Breaker contacts begin to separate when piston No. 1 entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1-3-4-2.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER.—Model MO-4102. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 1¼-1½ pounds each. Starter cranks the engine at 175 R.P.M. taking 125 amperes at 5 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	Free	5	45	(Without Bendix)
0 "	Free	5	50	(With Bendix)
2 "	1700	5.1	180	
5 "	700	4.4	315	
7 "	230	4	395	
10 "	Lock	3.6	490	

Oiling.—Put 5 to 10 drops of light engine oil in the oiler on the drive end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month. The commutator end bearing requires no attention.

GENERATOR.—Model GW-4101. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the charging rate, remove the commutator cover band and shift the third brush mounting bracket by tapping the mounting stud with a screwdriver. Shift the third brush in the direction of armature rotation to increase the charging rate and in the opposite direction to decrease the charging rate. Maximum charging rate is 15 amperes at 8 volts.

Generator Data

Cold Test				Hot Test			
Amperes	Volts	R.P.M.	M.P.H.	Amperes	Volts	R.P.M.	M.P.H.
0	..	610	8	2	..	750	10
5	..	750	10	5	..	940	12
10	..	1000	13.5	10	..	1400	18
14	8	1450	19				

Running freely as a motor generator draws 5 amperes at 6 volts. Shunt field current is 2.5 amperes at 6.2 volts. Generator brush tension should be 1¼-1½ pounds each.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. The drive end bearing is oiled by splash from the gears.

RELAY.—Model CB-4007. Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of .5-2.5 amperes. Contacts separate .025-.035 inch. Air gap between armature and coil core is .010-.030 inch, contacts closed.

LIGHTING.—Head and stop lamps are each 6-8 volts, 21 cp. S. C. Dash and tail lamps are each 6-8 volts, 2 cp. S. C.

FUSES.—Generator field fuse is 5 amperes. Lighting fuse on switch is 20 amperes.

H. A. L.

1916-17-18

Westinghouse Starting and Lighting System. Remy or Delco Ignition

Battery.—Battery is 6 volt, 130 ampere-hour.

Ignition.—Remy ignition breaker is used on the 1916-17 cars. Delco ignition is used on the 1918 cars. On cars using Remy ignition breaker contacts should separate .020 inch to .025 inch. On cars using Delco ignition, contacts should separate .018 inch to .020 inch. Should they become badly burned or pitted, affecting the ignition, resurface them with a fine, flat jeweler's file or a piece of worn No. 00 sand paper.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1R, 2L, 4R, 4L, 2R, 1L, 6R, 5L, 3R, 3L, 5R, 6L.

Spark Plug Gaps.—Spark plug gaps should be .020 inch to .025 inch.

Oiling.—On cars using Remy ignition, refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles. On cars using Delco ignition, remove the cover on top of unit and put 4 or 5 drops of light engine or machine oil in each of the oil holes and the top bearing every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles. The lower bearings must be thoroughly cleaned out and repacked with soft grease every three months.

Starter.—Starter is connected to the engine through a Bendix drive. It should run at 1050 R. P. M., when delivering 3.5 pound-feet torque. It should develop 17.5 pound-feet lock torque, taking about 500 amperes.

Oiling.—Put 4 or 5 drops of light engine oil in each of the starter oilers every month.

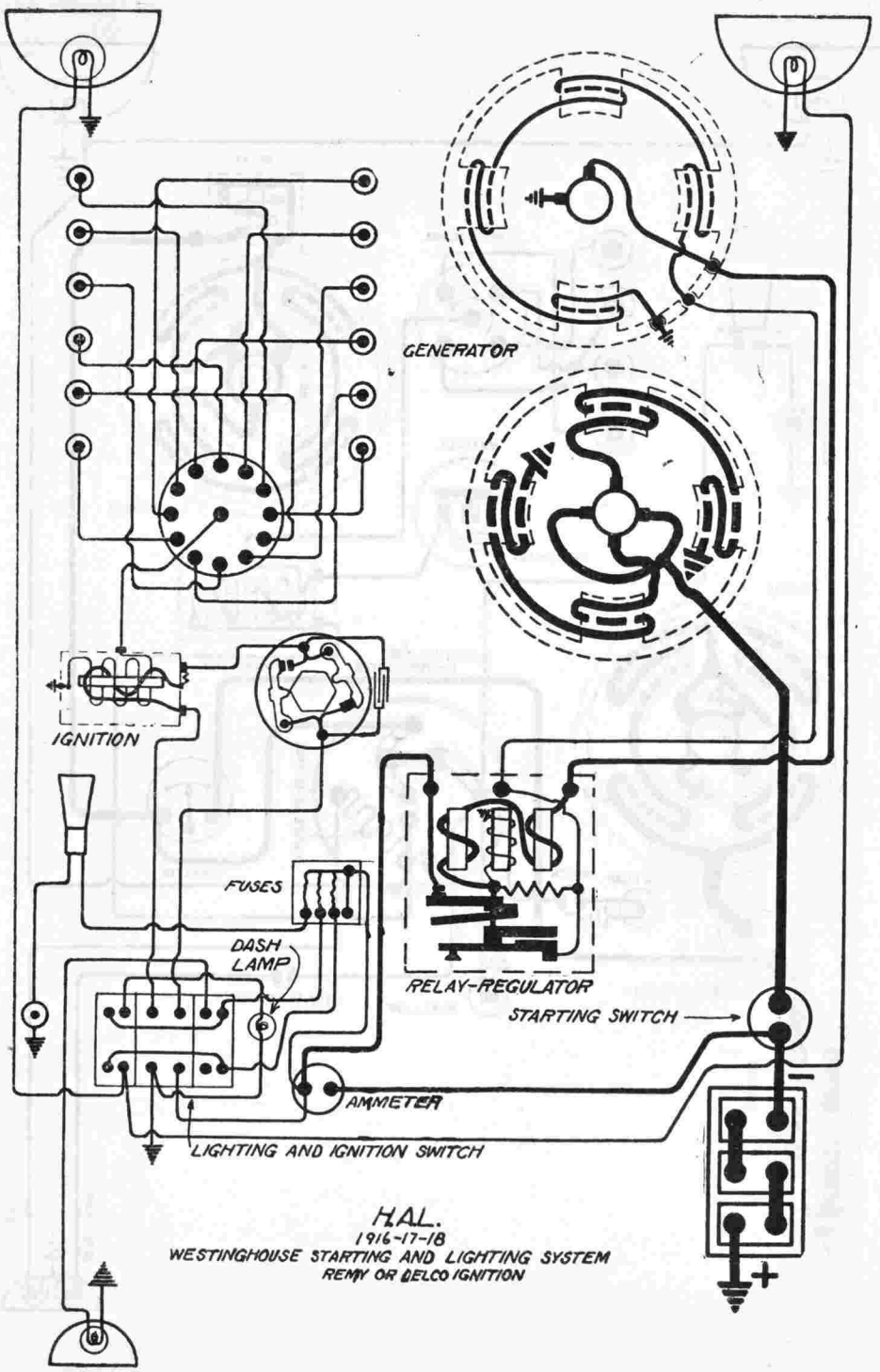
Generator.—Generator voltage regulation is by a vibrating regulator. Relay is combined with the regulator. The charging current should be about 1.5 amperes at closing and the discharge current 1.25 amperes at opening of relay contacts. The air gap between relay armature (moving member) and coil core should be .027 inch to .030 inch. Contacts should separate .013 inch to .017 inch. Adjust by bending brass prongs. Clean relay and regulator contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface them with a piece of well worn No. 00 sand paper, drawing a piece of unglazed paper between them, to remove all grit, before again putting into service. Generator should deliver 16 amperes at 7.2 volts.

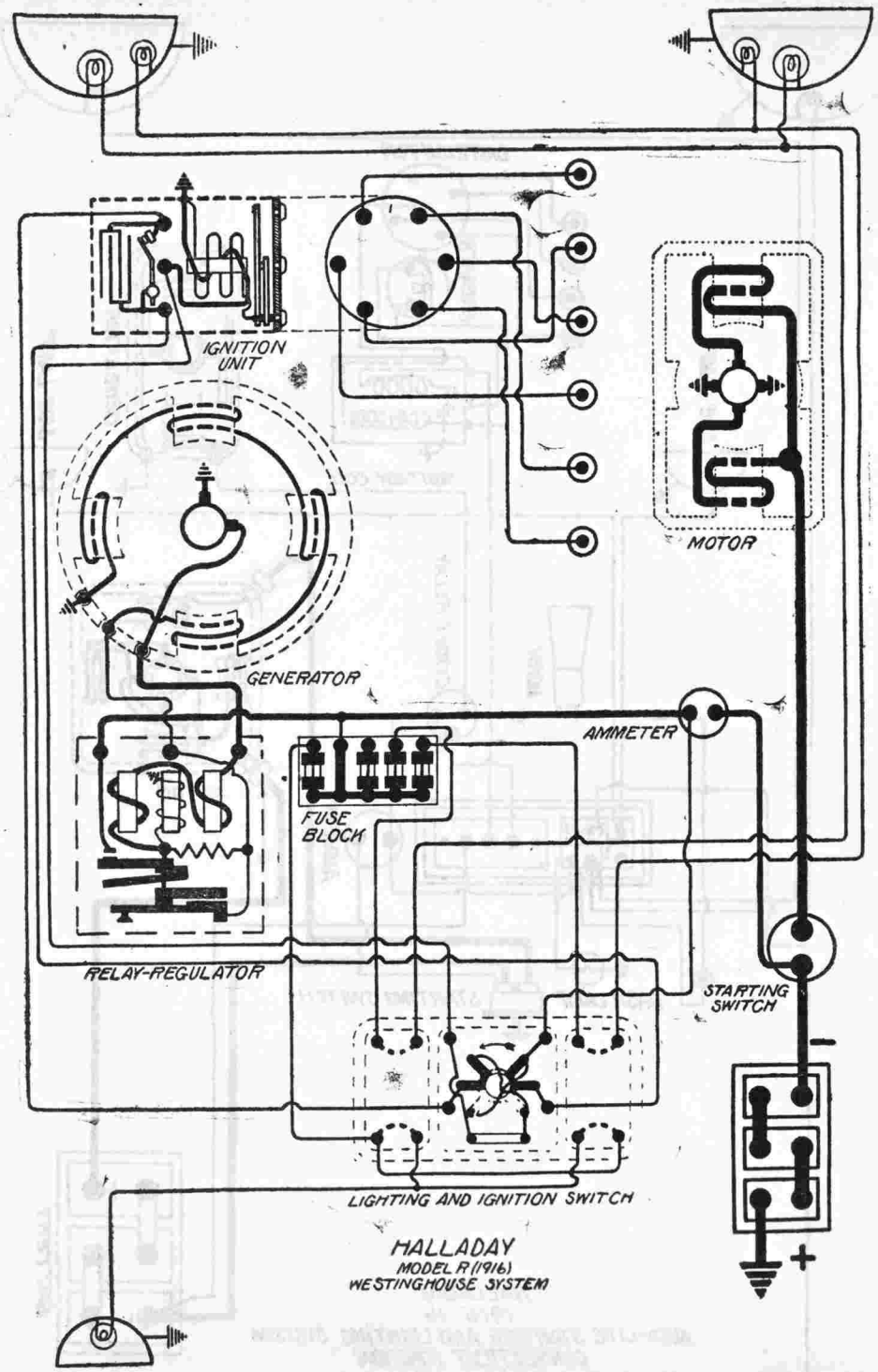
Oiling.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 20 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.

Fuses.—Fuses are 15 ampere.

Model Numbers.—Generator is Frame No. 450. Starter is Frame No. 750.





Halladay

Model R (1916)

Westinghouse Starting and Lighting System
Westinghouse Ignition

Battery.—Battery is 6 volt, 85 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate .006 inch to .008 inch. Should they become burned or pitted, affecting the ignition, resurface them with a fine, flat jeweler's file. The springs should exert just enough pressure on the distributor brushes to force them ¼ inch past the top of the holder when the distributor cap is removed, but should retain them firmly so that they do not tend to fall out. Brushes must move freely in their holders. Be sure that both brushes are in place when replacing the rotor. (There is a brush on both the top and bottom side of the rotor).

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position. Contacts are beginning to separate when the end at the distributor rotor is directly opposite the V notch on the rim of the case.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be about .023 inch.

Ballast Resistor.—There is a ballast resistor in the ignition switch. A fuse must not be permanently substituted for this resistor. In case it is necessary to operate the car with the ballast defective, a 5 ampere fuse may be used temporarily, but the ballast must be replaced as soon as possible, as continued operation without it will result in serious burning of the timer contacts.

Oiling.—Put 2 or 3 drops of light machine oil in the oiler at the side of breaker assembly every two weeks. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

Starter.—Starter is connected to engine through a Bendix drive. Cold engine, tight bearings, heavy oil or other obstructions, or damp, grounded or short circuited motor winding. or commutator bars will cause low speed and excessive current during the cranking operations

Oiling.—Put 4 or 5 drops of light engine oil in each of the starter oilers every month.

Generator.—Generator voltage regulation is by a vibrating regulator. Relay is combined with the regulator. The charging current should be 1 to 1.5 amperes at closing and the discharge current .5 to 1.25 amperes at opening of relay contacts. The air gap between relay armature (moving member) and coil core should be .027 inch to .030 inch. Contacts should separate .013 inch to .017 inch. Adjust by bending brass prongs. Clean relay and regulator contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface them with a piece of well worn No. 00 sand paper, drawing a piece of unglazed paper between them, to remove all grit, before again putting into service. Generator should deliver 14-16 amperes at 7.5 volts.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 17 cp. Dimmer lamps are 6-8 volts, 5 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.

HALLADAY

SERIES R (1915-16-17-18)
SERIES S AND T (1917-18)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

Battery.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded at the starting motor.

Ignition.—Breaker contacts should separate .023 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 2, 4, 3.

Spark Plug Gaps.—Spark plug gaps should be .027 inch.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Starter.—Starter is connected to the engine by a Bendix drive. Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current.

Oiling.—Starter bearings are packed with grease. Renew grease every six months. No oil is required.

Generator.—Generator current regulation is by reverse series field.

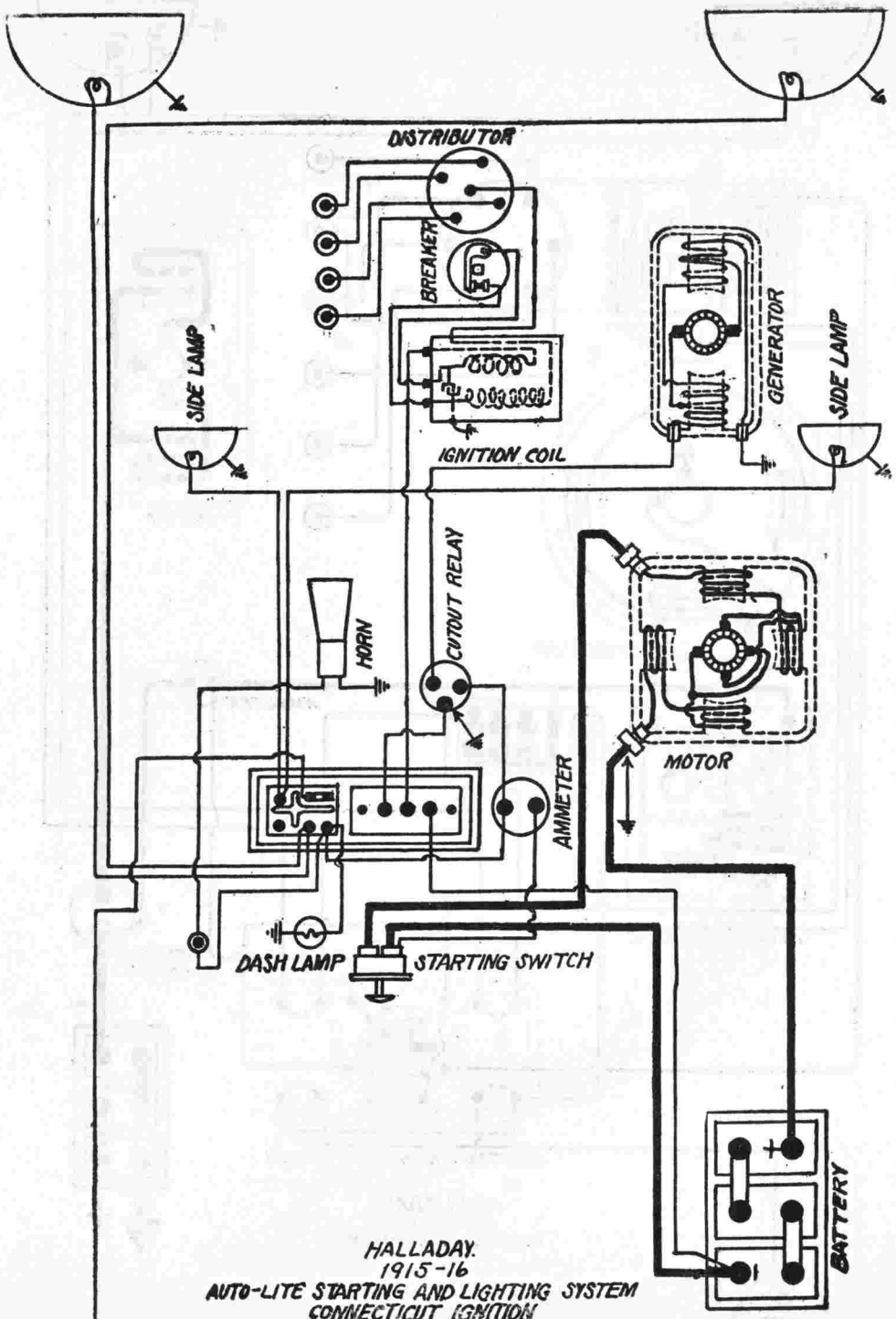
Amperes	GENERATOR DATA, MODEL GG	R. P. M.
5.0		750- 860
10.0		1225-1400
12.5		1600-1825
15.0		2175-2450
17.0-18		3200-3700

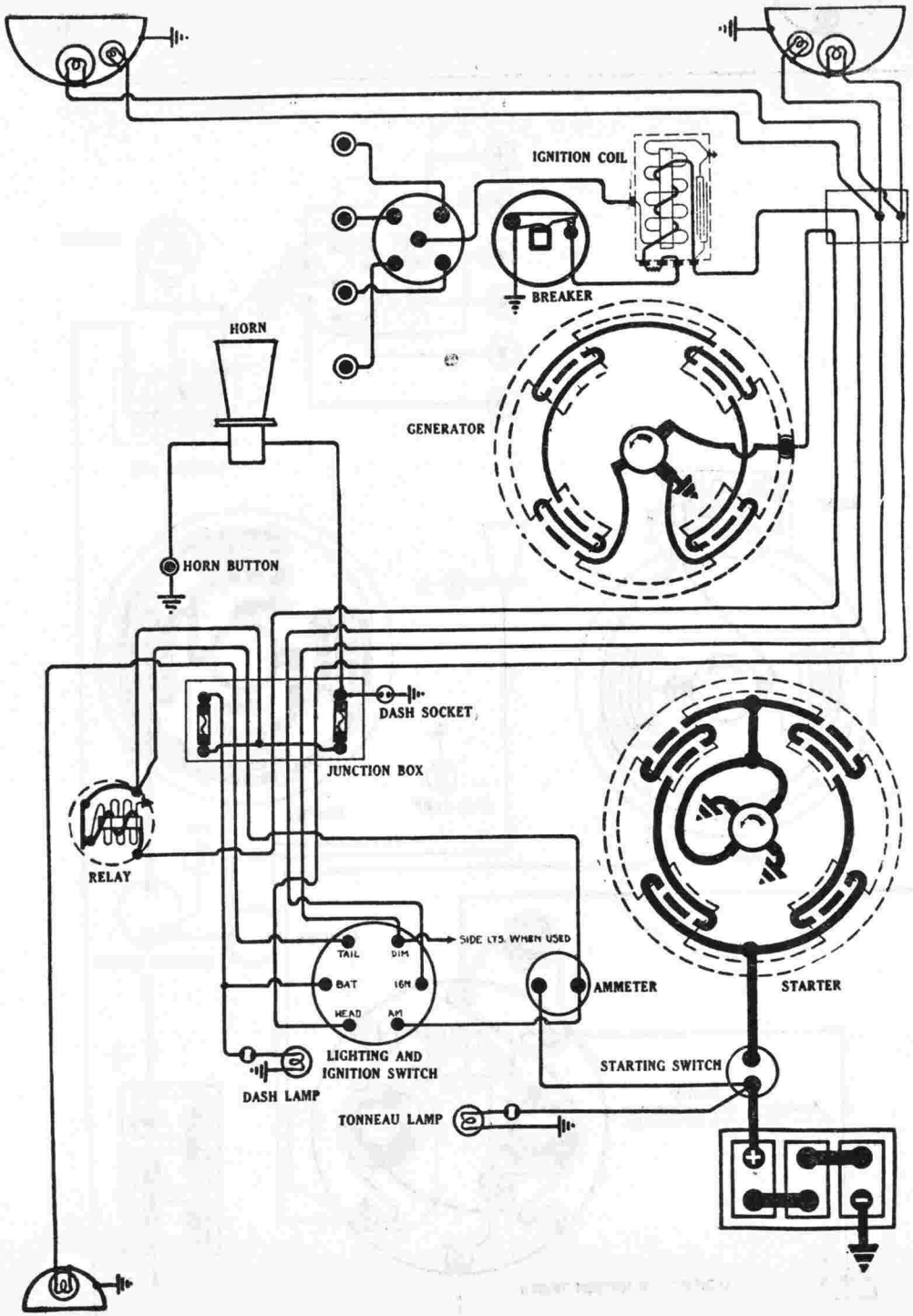
A variation of 1.5 amperes in these readings is allowable. Output may be changed slightly by changing brush pressure. Brush pressure should be 1 to 1¼ pounds. When operating freely as a motor, generator should take 2.8 amperes, armature revolving at 350 R. P. M. Much higher speed indicates damp, grounded or short circuited field coils. Greater current and lower speed indicates tight bearings, or damp, grounded or short circuited armature windings or commutator. Shunt field should take 1.1 amperes.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—Relay should close at 500-575 R. P. M. of generator armature. Charging current should be .5 to 1.5 amperes at closing, and discharge current 0 to 1 ampere at opening of relay contacts. Clean relay contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a strip of well worn No. 00 sand paper, drawing a piece of unglazed paper between them to remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 18 cp. Side lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.





HANDLEY-KNIGHT

MODEL A (1921) B (1922)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT OR AUTO-LITE IGNITION

BATTERY.—U. S. L., Type HDN-317-X, 6 volt, 162.6 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .025 inch. When the condition of the contacts affects the ignition resurface them with fine sandpaper. Remove all grit.

Oiling.—Fill the oil cup at the side of the distributor with a good grade of light machine oil every 1000 miles, and put 1 drop on the breaker arm bearing every 3000 miles.

Timing.—Breaker contacts begin to separate when the piston entering the power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—The spark plug gaps are .025 inch.

STARTER.—Model M.H. 1022. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data—MH.

Torque	R.P.M.	Amperes	Volts
2.0 lb. ft.	1160	110	5.8
6 lb. ft.	700	225	5.3
8 lb. ft.	580	275	5.0
10 lb. ft.	460	325	4.7
12 lb. ft.	375	365	4.4
17.5 lb. ft.	Lock	600	3.5

Oiling.—Put 5 or 6 drops of light engine oil in the starter oilers every two weeks.

GENERATOR.—Model G.K. 1011. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. The maximum charging rate is 13 to 16 amperes, reached at 1200 to 1400 R.P.M. of the armature.

Generator Test Data.—GK.

Amperes	Hot Test R.P.M.	Amperes	Cold Test R.P.M.
0.0	420	0	350
4	540	4	420
8	700	8	540
12	1000	12	710
13	1200-1400	16	1200-1400
11	2000	13	2000
9.4	2800	11	2800

Move the third brush in the direction of armature rotation to increase the charging rate, and in the opposite direction to decrease the charging rate.

Oiling.—Put 5 or 6 drops of light engine oil in the generator bearing oilers every week. If the car is driven more than 250 miles in a week, the oiling should be done every 250 miles.

RELAY.—The relay is mounted on the dash. Relay closes when the voltage of the generator reaches 6.5 to 7.5 volts, and opens when there is a discharge current of 0 to 2 amperes. Relay contacts separate .030 to .045 inch. Clean relay contacts by drawing unglazed paper between them. If bady burned or pitted resurface with worn No. 00 sand paper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer, dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Fuses are 20 amperes.

HANSON

MODEL 54 (1920-21) 54 AND 60 (1922-23-24-25)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION
7-R CONTINENTAL ENGINE

BATTERY:—Prest-O-Lite (1920-21) 6 volt, 80 ampere hour (1922) Type 613 RHN, 6 volt, 100 ampere hour. The negative (—) terminal is grounded..

IGNITION.—Coil Model No. 2159. Distributor Model No. 5207. Breaker contacts separate .018 inch. They are made of platinum. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oilstone.

OILING.—Put 3 or 4 drops of light engine oil in the ignition unit oilers every two weeks If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1⅜ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model No. 164 or 181. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, looking at the commutator end. Running free the starter takes 36 amperes at 6 volts. Lock torque is 27 lb. ft. at 2.75 volts. The brush tension should be 2¼ to 2¾ pounds on each brush.

Oiling.—Put 8 or 10 drops of light engine oil in each of the starter oilers every month or each 1000 miles. Remove the grease plug and refill the reduction gear housing with medium soft cup grease every six months. Saturate the wick in the oiler on the end of the Bendix gear with light engine oil once a year.

GENERATOR.—Model No. 165. Rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Maximum charging rate is 11-15 amperes, reached at 1200 R.P.M. of the armature, or 16-20 miles per hour.

Amperes	Generator Data	R.P.M.
Neutral		550
4		800
8		1000
11-15		1200
11-14		2000

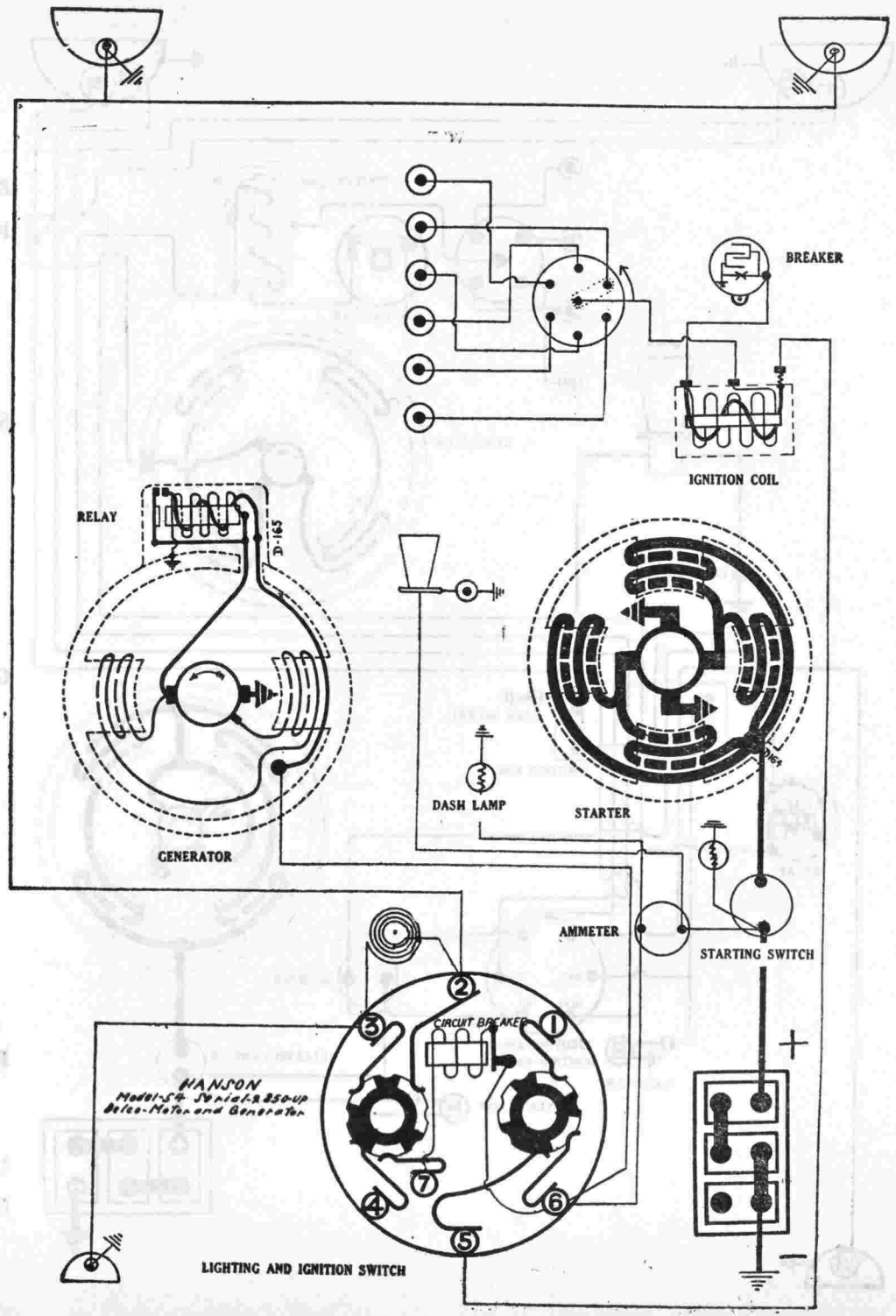
Charging rate is varied by adjustment of the third brush setting. To move the third brush, loosen the three screws holding the bearing retainer plate on the commutator end and shift the plate. Move in a counter-clockwise direction to increase the charging rate, or in the opposite direction to decrease the charging rate. Tighten the adjusting screws and reseat the brush after making the adjustment. Maximum charging rate must not exceed 16 amperes.

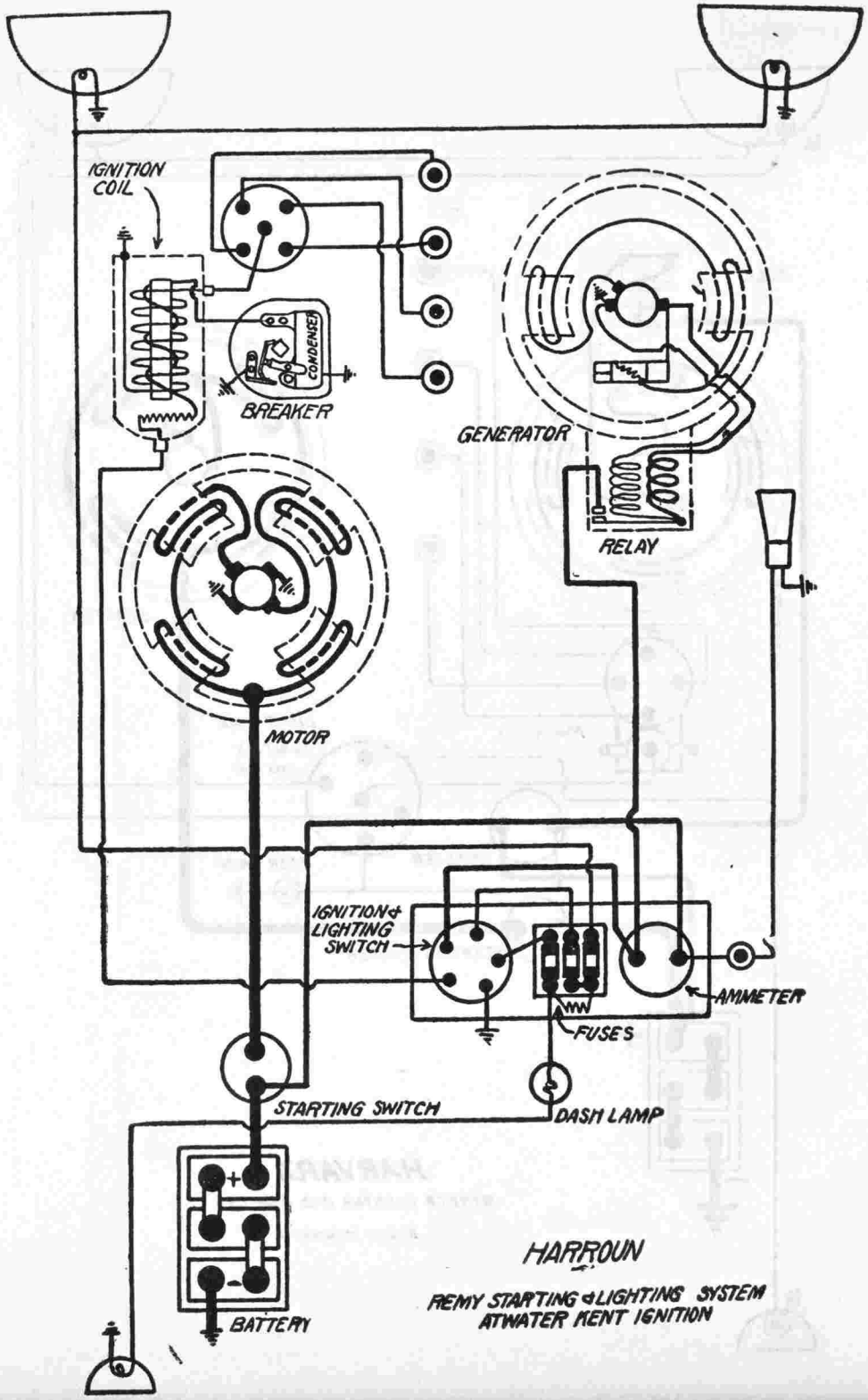
OILING.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes at 550-600 R.P.M. of the armature or 7-8 miles per hour, and opens at 500-550 R.P.M. of the armature or 5-6 miles per hour. Relay contacts separate .046 to .062 inch. Air gap between relay armature and coil core is .020 to .035 inch, contacts closed. To adjust relay, connect a voltmeter between the positive (+) generator brush and the ground. Then slowly speed up the generator and adjust the relay spring tension by turning the thumb nut, until the contacts close when the voltmeter indicates 7.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp. On 1920 and 1921 cars head lamps are 6-8 volt 15 cp. On 1920 cars, dimmer bulbs connected to No. 4 terminal were used instead of a dimming resistance.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start the vibrator, but 3-5 amperes will cause it to continue





HARROUN

MODEL AA-1 (1917-18-19) SERIAL NOS. 1 UP.

Remy Generating, Starting and Lighting System
Atwater Kent Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts separate .005 inch to .008 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Timing.—Breaker contacts separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in fully retarded position.

Firing Order:—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—The spark plug gaps are .020 inch to .025 inch.

Oiling.—Put several drops of light engine oil in the oil hole, exposed when distributor cap is removed, every two weeks. At the same time put a very small amount of vaseline on the cam, applying with a toothpick. If car is driven more than 500 miles in two weeks. these attentions must be given every 500 miles.

Starter.—Starter is connected to the engine through a Bendix drive.

STARTER DATA, 305-A

Torque	R. P. M.	Amperes	Volts
1 lb. ft.	2500	110-130	5.4-5.6
2 lb. ft.	1900	165-175	5.1-5.4
3 lb. ft.	1500	215-225	4.8-5.2
4 lb. ft.	1000	265-275	4.6-4.9
5 lb. ft.	650	325-335	4.3-4.5
9 lb. ft.	Lock	540-560	3.5-3.65

Oiling.—Put 5 or 6 drops of light engine oil in each of starter oilers every six months.

Generator.—Generator current regulation is by third brush system. A thermostat located in the brush rigging of the generator, cuts in a resistance at a temperature of 175° F., reducing the maximum charging rate 6 amperes. Resistance also acts as a shunt field fuse. The thermostat is intended to change the charging rate as demand of seasons or car operation requires. Never touch the thermostat points.

GENERATOR DATA, MODEL 233-A

Amperes	R. P. M.	Volts
0	525	6.4
7	780	7.1
14	1100	7.8
19.5-20.5	1680	8.6
19.0-20	2000	8.6
13.0-15	3000	8

Above tests made with relay in circuit and thermostat points closed, but without ignition. Field windings draw 5 amperes at 6.4 volts. Brush tension on third brush is 13 to 17 ounces, and on main brushes, 17 to 20 ounces.

Oiling.—Fill generator bearing oil wells with light engine oil every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

Relay.—Relay is No. 246-A, and is mounted on top of generator frame. It closes at 7-10 miles per hour and opens at 5-8 miles per hour. Air gap between relay contacts is .012 inch to .015 inch. Air gap between armature (moving member) and coil core is .012 inch to .015 inch, with contacts closed. Clean contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 17 cp. Tail and dash lamps are connected in series and are each 3-4 volt, 2 cp.

HARVARD
1920

DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH IGNITION

BATTERY.—Prest-O-Lite, Type 611-RHN, 6 volt, 120 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Type DU-4. Breaker contacts separate .014 to .016 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 2 or 3 drops of light machine oil in each of the magneto oilers every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUGS.—Diameter, 7/8 inch. Spark gaps are .030 inch.

STARTER.—Model D-366. Starter is connected to the engine through a Bendix drive. When cranking engine, starter takes 130 amperes, armature revolving at 1500 R.P.M.

Starter Data

Torque	R.P.M.	Amperes	Volts
0.0 lb. ft.	5600	25	6.4
2.5 lb. ft.	1400	150	5.8
5.0 lb. ft.	850	250	5.3
10.0 lb. ft.	250	420	4.6
14.0 lb. ft.	Lock	530	4.0

OILING.—Put several drops of light engine oil in the starter oilers every month.

GENERATOR.—Model No. C-306. Generator current regulation is by the third brush system. Maximum current output is 12-15 amperes, reached at 1200 R.P.M. of the armature or 20-25 miles per hour.

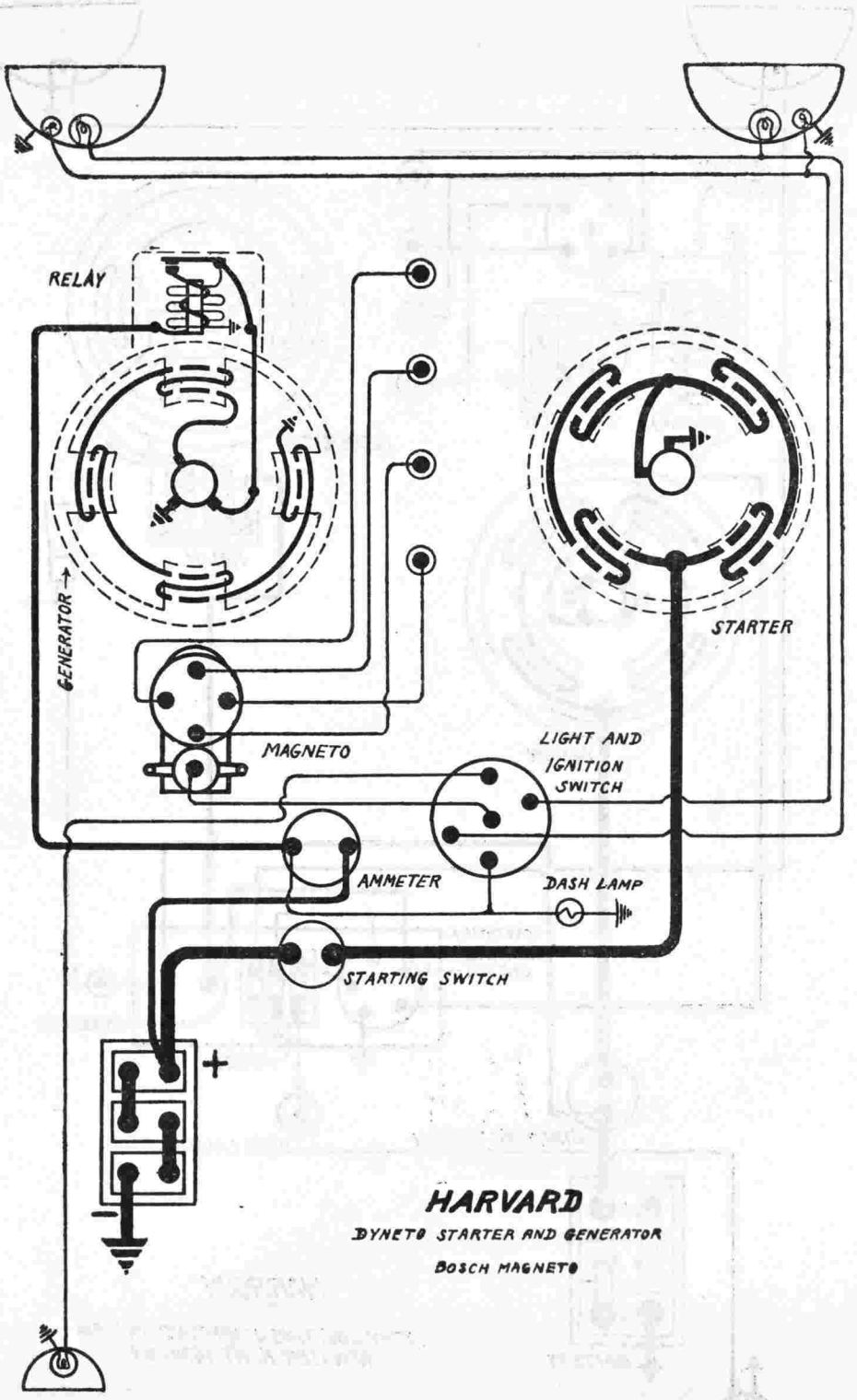
Generator Data

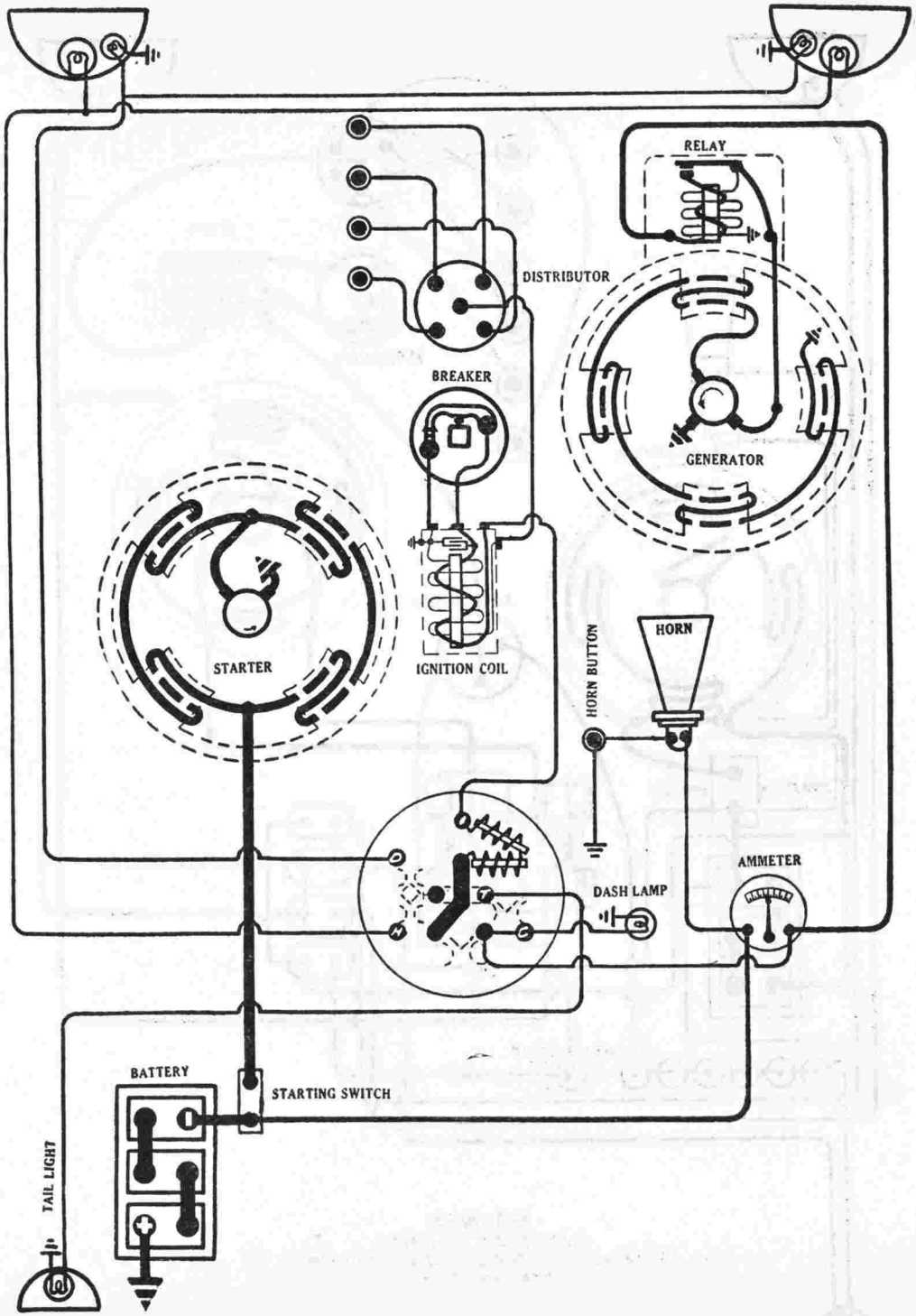
Amperes	Cold Test	R.P.M.	Amperes	Hot Test	R.P.M.
6		600	5		600
13		900	10		900
15		1200	12		1200
13.5		1600	11.5		1600
11.5		2000	10		2000

Shunt field current is 3.5 amperes at 6.5 volts. Charging rate is varied by adjustment of the third brush setting. Remove the leather plug in the commutator end of the generator, loosen the screw exposed and move in the direction of armature rotation to increase the charging rate. Move in the opposite direction to decrease the charging rate. Tighten the adjusting screw and replace the leather plug after adjustment is made.

OILING.—Put 4 or 5 drops of light engine oil in the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 450-500 R.P.M. of armature, and opens at 6-8 miles per hour or 400-450 R.P.M. of armature. Relay contacts separate 3/32 inch. Air gap between relay armature and coil core is 1/8 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into





HATFIELD

(1920-21)

DYNETO GENERATING, STARTING, AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—Willard, Type SJRN-4, 6 volts, 111 ampere hours capacity. The starting capacity for 20 minutes is 120 amperes, and the lighting capacity is 5 amperes for 22½ hours. The positive (+) terminal is grounded.

IGNITION.—Distributor Model No. 16. Coil Model M. Breaker contacts separate .018-.024 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface with a flat jeweller's file or on a medium hard oilstone.

Oiling.—Fill grease cup on side of distributor housing with soft cup grease once a month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles. Apply a very small amount of vaseline to the rotor track occasionally during the first 2000 miles. After that the rotor track becomes glazed and it is only necessary to keep it wiped clean. Apply a very small amount of vaseline to distributor cam head once a month.

Timing.—Breaker contact begins to separate when piston No. 1 is at top dead center, spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plugs.—The spark plug gaps are .025-.030 inch.

STARTER.—Model D-183. The starter is connected to engine by a Bendix drive. The direction of rotation is counter-clockwise, looking at commutator end. The starter cranks the engine at 150 R.P.M. taking a current of 130 amperes, at 3-4 volts. Brush tension is 2 pounds.

Starter Test Data

Amperes	Volts	Torque	R.P.M.
35	6	0	5000
480-500	4.2	13-14 lb. ft.	Lock

Oiling.—Put 4 or 5 drops of light engine oil into each starter oiler every two weeks. If the car is driven more than 500 miles in two weeks this care must be given every 500 miles.

GENERATOR.—Model C-224. The direction of rotation is counter-clockwise. Looking at commutator end. The third brush system is employed for current regulation. To adjust the charging rate of the generator, remove the leather plug in the commutator end plate, and loosen the screw exposed. Move the third brush in the direction of rotation (counter-clockwise) to increase the charging rate; and move the third brush in the opposite (clockwise) direction to decrease the charging rate. The maximum charging rate of 14 amperes is reached at 1400 R.P.M. of armature or 18 M.P.H. of car speed at high gear. Brush tension is 2 pounds.

Generator Test Data

Hot Test			Cold Test		
Amperes	R.P.M.	M.P.H.	Amperes	R.P.M.	M.P.H.
5	600		6	600	
10	900		13	900	
12 (Max.)	1200	20	15 (Max.)	1200	20
10	2000		12	2000	

Generator motoring freely takes a current of 4-6 amperes at 6 volts; and the field draws a current of 3½ amperes at 6 volts.

Oiling.—Put 4 or 5 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Relay closes at 8-10 M.P.H. or 450-500 R.P.M. of armature, at 6.5 volts, and opens at 6-8 M.P.H. or 400-450 R.P.M. of armature with a current discharge of 0-3 amperes. The contact gap is .125 inch, and the air gap between relay armature and coil core is .030 inch.

LIGHTING.—Connecticut Switch Model No. 96-8-Y is used. Head lights are each 6-8 volts, 15 cp. Dash and dimmer (or auxiliary) lights are each 6-8 volts, 4 cp. Tail light is 6-8 volts, 2 cp. All lights are of the single base type.

HAYNES

MODELS 30, 33, 34 AND 35 (1915-16)

LEECE-NEVILLE GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. There is also a set of 6 dry cells for auxiliary ignition purposes. The negative (—) terminal of storage battery and dry cells is grounded.

IGNITION.—Breaker contacts separate .018 to .020 inch. When the condition of the contacts affects the ignition, resurface with well worn No. 00 sandpaper or a fine, flat jeweler's file.

OILING.—Refill the grease cup under the breaker head with soft cup grease and turn down two turns every two weeks. If the car is driven more than 500 miles in two weeks this must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded positon.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .020 to .025 inch.

STARTER.—Type B-300. Starter is connected to the engine through a pinion shifted by the operator. Starter cranks the engine at 125-150 R.P.M., taking 200 amperes.

OILING.—Put 4 or 5 drops of light engine oil in each of the starter oilers every month.

GENERATOR:—Type CR-400. Generator current regulation is by third brush system. Maximum charging rate is 16 amperes, reached at 1200 R.P.M. of the armature or 20 miles per hour. Move the third brush in the direction of armature rotation to increase charging rate and in the opposite direction to decrease the charging rate. Reseat the brush after adjusting position.

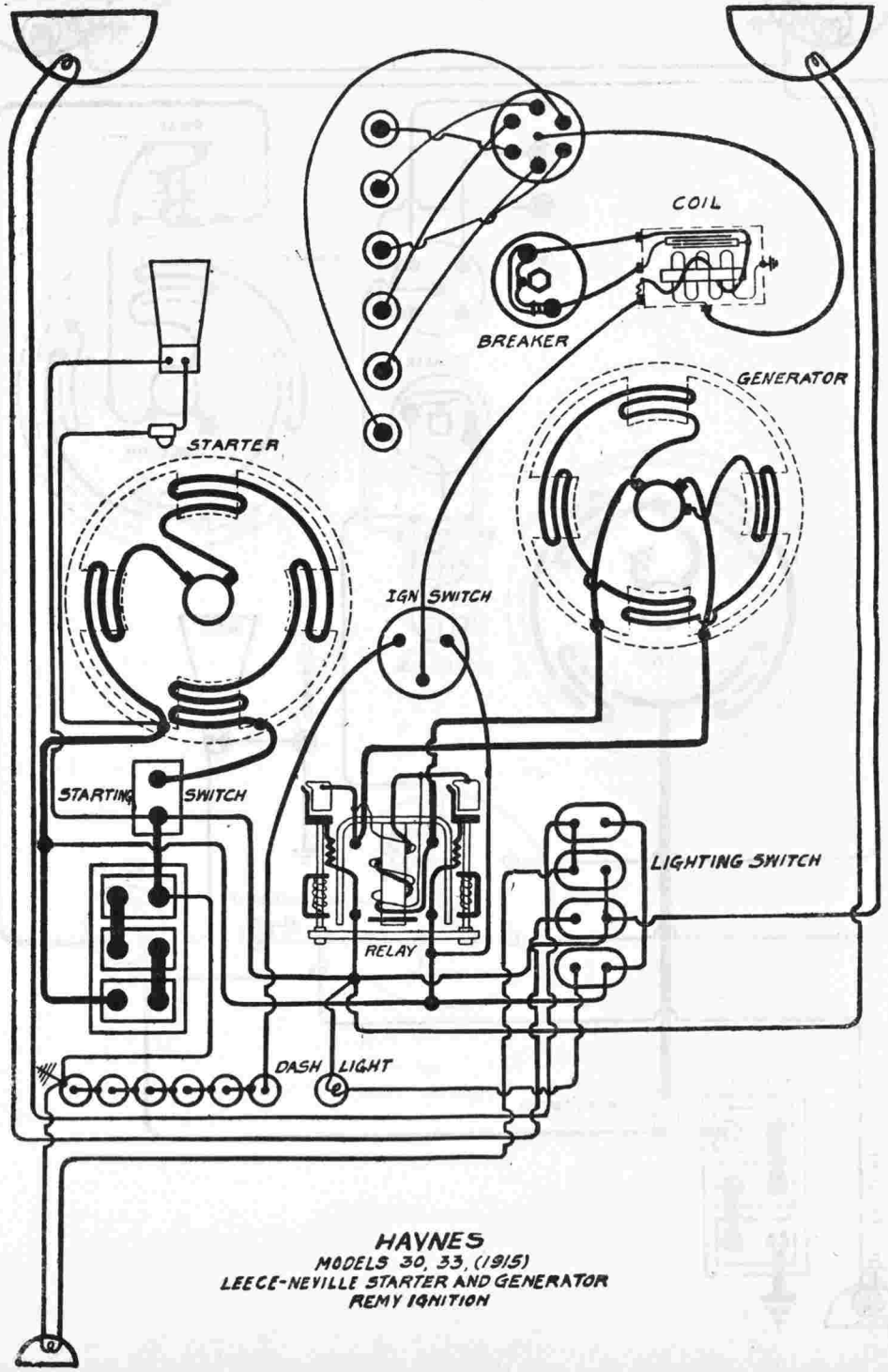
OILING.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 450-500 R.P.M. of the armature and opens at 6-8 miles per hour or 400-450 R.P.M. of the armature. Relay contacts separate 3/64 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

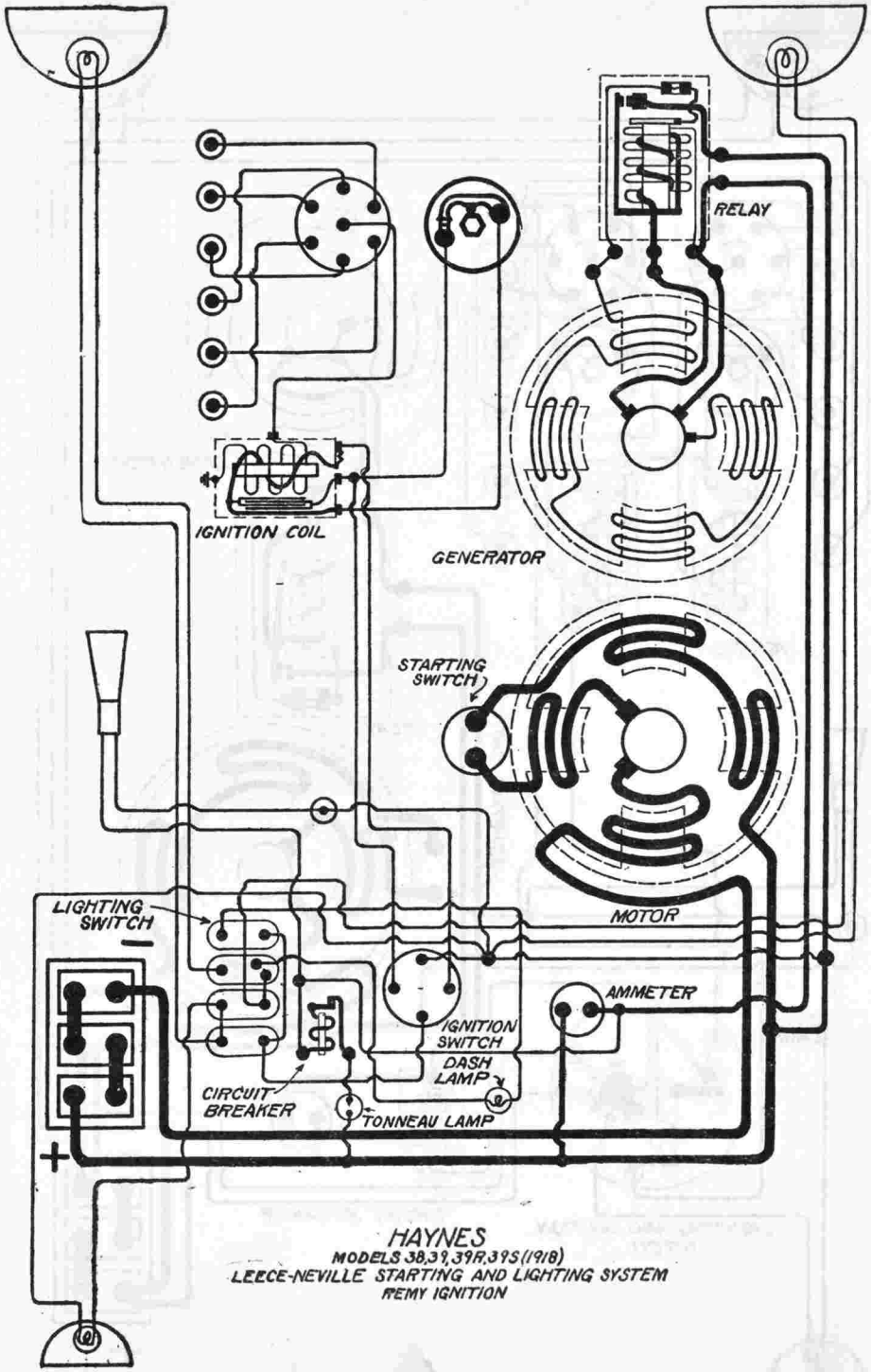
LAMPS.—Head lamps are 6-8 volt, 16 cp. Dimmer lamps, when supplied, are 6-8 volt, 4 cp. All other lamps are 6-8 volt, 2 cp.

FUSES.—There is a 5 ampere fuse on the relay base to protect the generator field windings.

CIRCUIT BREAKER.—A locking circuit breaker takes the place of fuses in the lighting and ignition circuits. A current of 25 amperes will cause the circuit breaker to operate.



HAYNES
MODELS 30, 33, (1915)
LEECE-NEVILLE STARTER AND GENERATOR
REMY IGNITION



MODEL 36, 36-R, 37 (1916-17) 38, 39, 39-R, 39-S (1918)
LEECE-NEVILLE STARTING AND LIGHTING SYSTEM
REMY IGNITION.

Battery.—Battery is 6 volt, 100 ampere-hour. The two wire system is used.

Ignition.—Breaker contacts should open .018 inch to .020 inch.

Care.—If they become badly burned or pitted, resurface them with a fine, flat jeweler's file or a small strip of worn No. 00 sand paper. Every month put a small trace of vaseline on the fiber bumper.

Timing.—Contacts should begin to separate when the top dead center mark on the fly-wheel is 1 inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—The proper spark plug gap is .020 inch to .025 inch.

Oiling.—Use soft cup grease in the grease cup under the distributor head and turn down two turns every two weeks. If the car is driven more than 500 miles in two weeks, screw down the grease cup every 500 miles.

Starter.—The starter is connected to the engine through a Bendix drive. Put several drops of light engine oil in each of the motor oilers every month. The starter should crank the engine at a speed of 125 to 150 R. P. M. Although the motor may take as large a current as 550 amperes when starting to turn the engine over, the current during full cranking speed should not exceed 200-225 amperes.

Generator.—Voltage regulation is by third brush system. The third brush is adjusted by turning the thumb nut, on the commutator end of the geneator, with a pair of pliers. Relay is mounted on the generator. Relay should close at 6-8 and open at 5-7 miles per hour, high gear car speed.

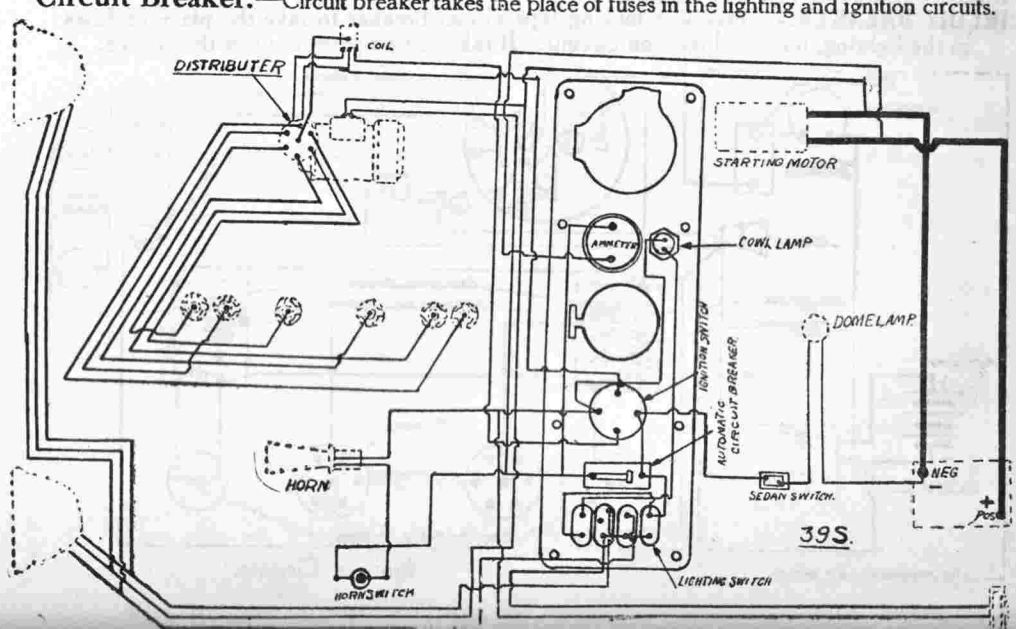
Charging Rates.—The maximum charging rate should not exceed 16 amperes. The maximum rate should be reached at 18-20 miles per hour.

Fuse.—There is a 5 ampere fuse in shunt field circuit, on relay base. Should this fuse burn out, look first for open circuits or defective connections in the charging circuit.

Trouble Shooting.—To test the field windings, lift the third brush and impress 6 volts on the field terminals. If the current flow is more than 4 amperes a short or ground exists. If less than 4 amperes flow look for broken wires or poor connections. Before replacing a burned fuse, always locate the fault which caused it to melt. Brushes which do not move freely in their holder will cause this fuse to burn out.

Lamps.—Head lamps are 6-8 volts, 16 cp. Dimmer lamps are 6-8 volts, 12 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp. Dome lamp is 6-8 volts, 4 cp. Tonneau lamp is 6-8 volts, 2-4 cp.

Circuit Breaker.—Circuit breaker takes the place of fuses in the lighting and ignition circuits.



HAYNES

MODELS 40, 40-R, 41, 44, 46 (1917-18-19-20)

LEECE-NEVILLE GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Battery is 6 volt, 115 ampere-hour. The two-wire system is used.

IGNITION.—Breaker contacts separate .020 to 025 inch. When the condition of the points affects the ignition, resurface with a fine flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on flywheel is ½ inch past indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1R, 6L, 4R, 3L, 2R, 5L, 6R, 1L, 3R, 4L, 5R, 2L.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER.—Starter is connected to engine through a Bendix drive. Starter cranks engine at 125 to 150 R.P.M. Current during cranking operation is 200 amperes, but current may reach 550 amperes when first starting to turn the engine over.

OILING.—Put 4 or 5 drops of light engine oil in each of starter oilers every month.

GENERATOR.—Generator current regulation is by third brush system. Third brush is moved by turning the nut on front head of generator with a pair of pliers. Maximum charging rate is 16 amperes, reached at 18-20 miles per hour.

TESTING GENERATOR.—To test for a short in the shunt field circuit, remove the third brush from its holder and connect it to the negative (—) terminal of a 6 volt storage battery. Then connect the positive (+) terminal of the battery to the positive (+) terminal of an ammeter and connect the negative (—) terminal of the ammeter to the screw at the end of the fuse clip. Four amperes should flow. A greater current indicates damp, grounded or short circuited field coils.

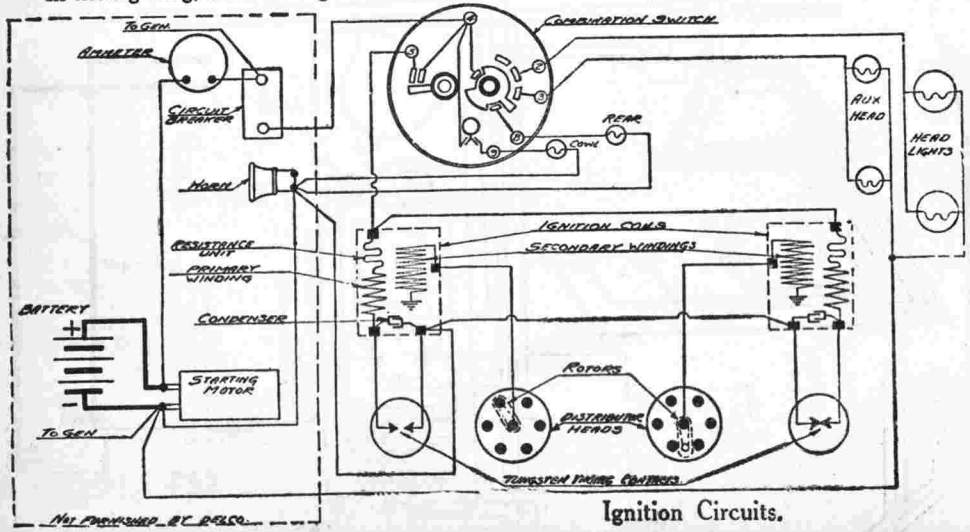
OILING.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Relay closes at 7-9 and opens at 5-7 miles per hour. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

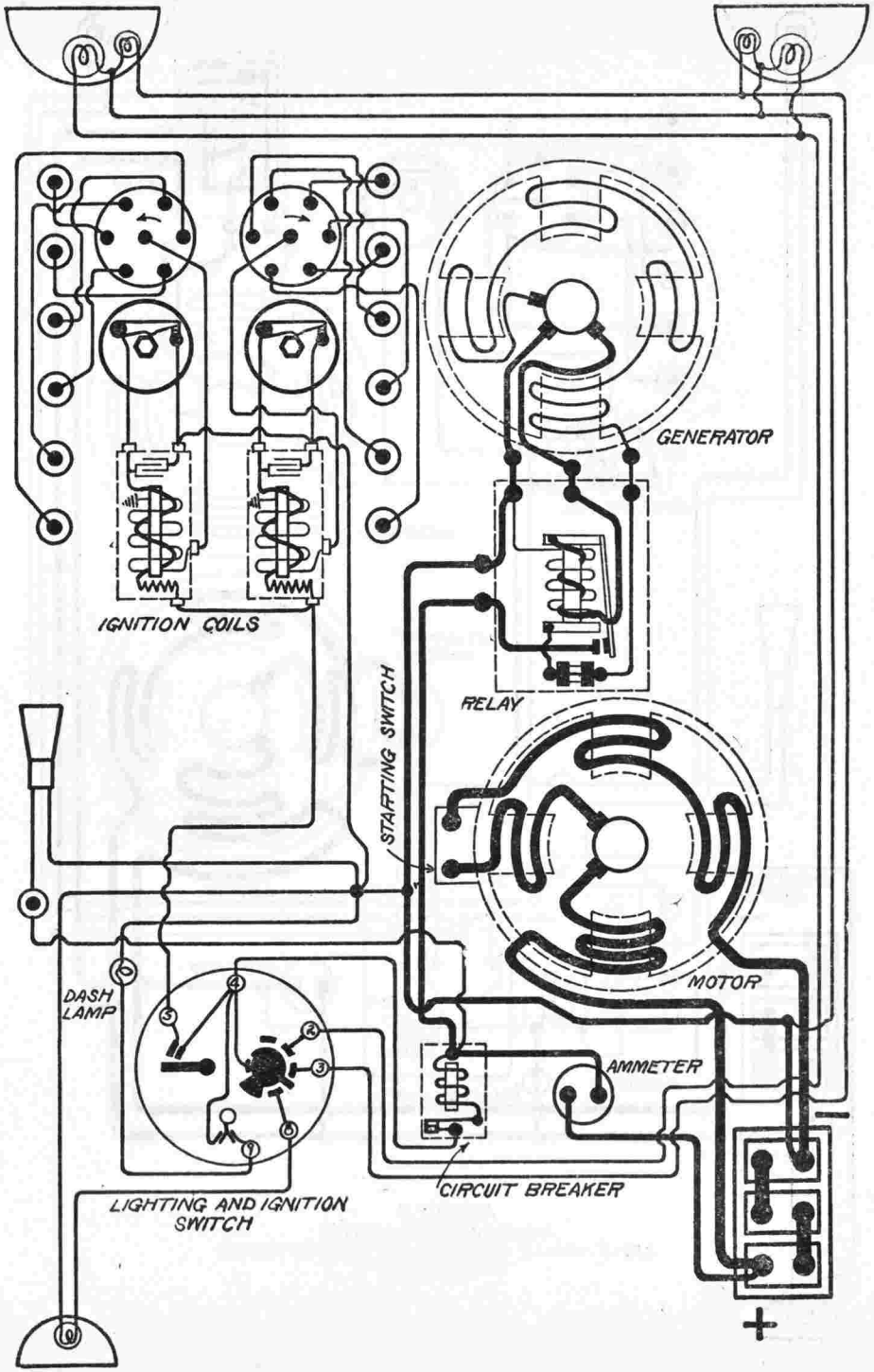
LAMPS.—Head lamps are 6-8 volt, 18 cp. Small head lamps are 6-8 volt, 12 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

FUSES.—Generator fuse is 5 ampere.

CIRCUIT BREAKER.—There is a locking type circuit breaker to take the place of fuses in the lighting, horn and ignition circuits. It takes 25 amperes to open this device.



Ignition Circuits.



MODEL 36, 36-R, 37 (1916-17) 38, 39, 39-R, 39-S (1918)
LEECE-NEVILLE STARTING AND LIGHTING SYSTEM
REMY IGNITION.

Battery.—Battery is 6 volt, 100 ampere-hour. The two wire system is used.

Ignition.—Breaker contacts should open .018 inch to .020 inch.

Care.—If they become badly burned or pitted, resurface them with a fine, flat jeweler's file or a small strip of worn No. 00 sand paper. Every month put a small trace of vaseline on the fiber bumper.

Timing.—Contacts should begin to separate when the top dead center mark on the fly-wheel is 1 inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—The proper spark plug gap is .020 inch to .025 inch.

Oiling.—Use soft cup grease in the grease cup under the distributor head and turn down two turns every two weeks. If the car is driven more than 500 miles in two weeks, screw down the grease cup every 500 miles.

Starter.—The starter is connected to the engine through a Bendix drive. Put several drops of light engine oil in each of the motor oilers every month. The starter should crank the engine at a speed of 125 to 150 R. P. M. Although the motor may take as large a current as 550 amperes when starting to turn the engine over, the current during full cranking speed should not exceed 200-225 amperes.

Generator.—Voltage regulation is by third brush system. The third brush is adjusted by turning the thumb nut, on the commutator end of the geneator, with a pair of pliers. Relay is mounted on the generator. Relay should close at 6-8 and open at 5-7 miles per hour, high gear car speed.

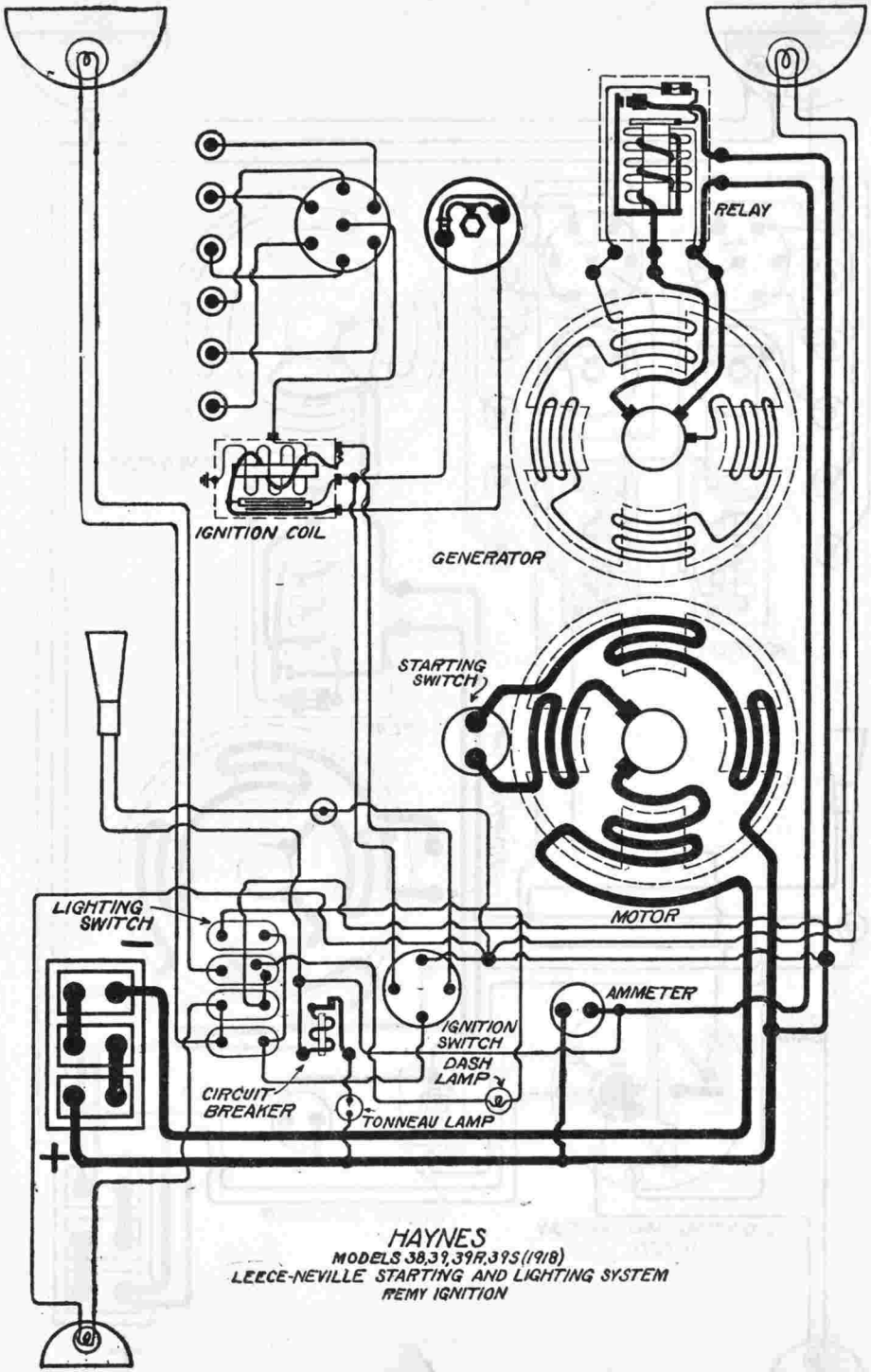
Charging Rates.—The maximum charging rate should not exceed 16 amperes. The maximum rate should be reached at 18-20 miles per hour.

Fuse.—There is a 5 ampere fuse in shunt field circuit, on relay base. Should this fuse burn out, look first for open circuits or defective connections in the charging circuit.

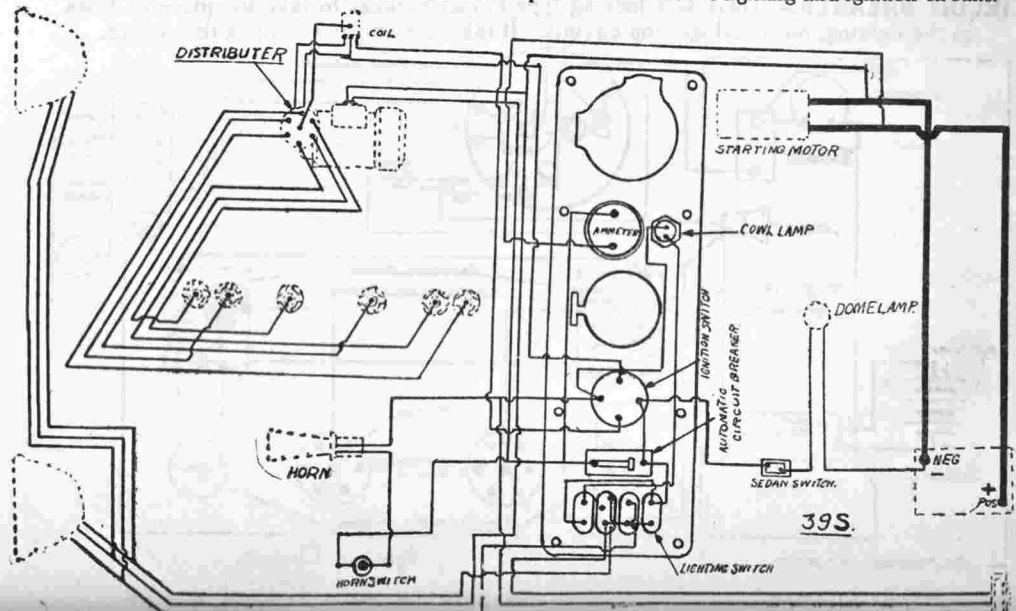
Trouble Shooting.—To test the field windings, lift the third brush and impress 6 volts on the field terminals. If the current flow is more than 4 amperes a short or ground exists. If less than 4 amperes flow look for broken wires or poor connections. Before replacing a burned fuse, always locate the fault which caused it to melt. Brushes which do not move freely in their holder will cause this fuse to burn out.

Lamps.—Head lamps are 6-8 volts, 16 cp. Dimmer lamps are 6-8 volts, 12 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp. Dome lamp is 6-8 volts, 4 cp. Tonneau lamp is 6-8 volts, 2-4 cp.

Circuit Breaker.—Circuit breaker takes the place of fuses in the lighting and ignition circuits.



HAYNES
MODELS 38,39,39R,39S(1918)
LEECE-NEVILLE STARTING AND LIGHTING SYSTEM
REMY IGNITION



HAYNES

MODELS 40, 40-R, 41, 44, 46 (1917-18-19-20)

LEECE-NEVILLE GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Battery is 6 volt, 115 ampere-hour. The two-wire system is used.

IGNITION.—Breaker contacts separate .020 to 025 inch. When the condition of the points affects the ignition, resurface with a fine flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on flywheel is ½ inch past indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1R, 6L, 4R, 3L, 2R, 5L, 6R, 1L, 3R, 4L, 5R, 2L.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER.—Starter is connected to engine through a Bendix drive. Starter cranks engine at 125 to 150 R.P.M. Current during cranking operation is 200 amperes, but current may reach 550 amperes when first starting to turn the engine over.

OILING.—Put 4 or 5 drops of light engine oil in each of starter oilers every month.

GENERATOR.—Generator current regulation is by third brush system. Third brush is moved by turning the nut on front head of generator with a pair of pliers. Maximum charging rate is 16 amperes, reached at 18-20 miles per hour.

TESTING GENERATOR.—To test for a short in the shunt field circuit, remove the third brush from its holder and connect it to the negative (—) terminal of a 6 volt storage battery. Then connect the positive (+) terminal of the battery to the positive (+) terminal of an ammeter and connect the negative (—) terminal of the ammeter to the screw at the end of the fuse clip. Four amperes should flow. A greater current indicates damp, grounded or short circuited field coils.

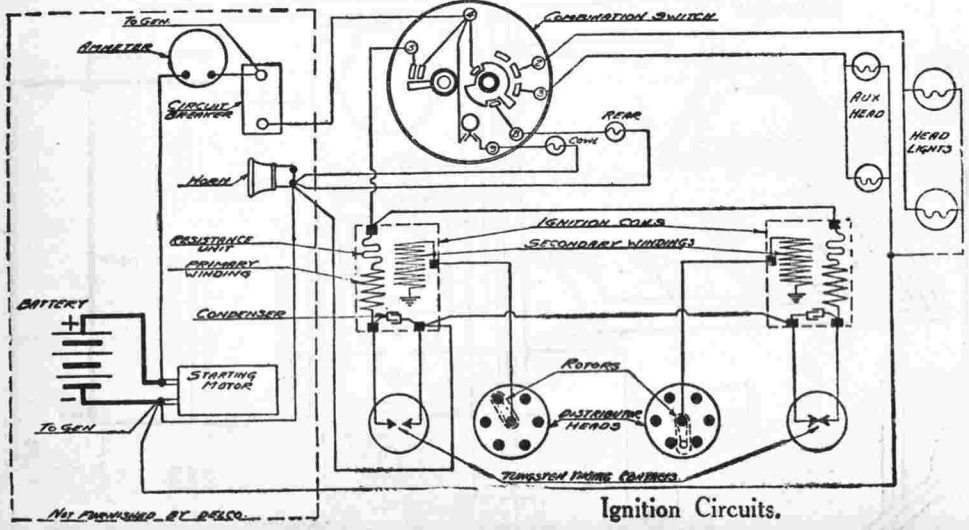
OILING.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Relay closes at 7-9 and opens at 5-7 miles per hour. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

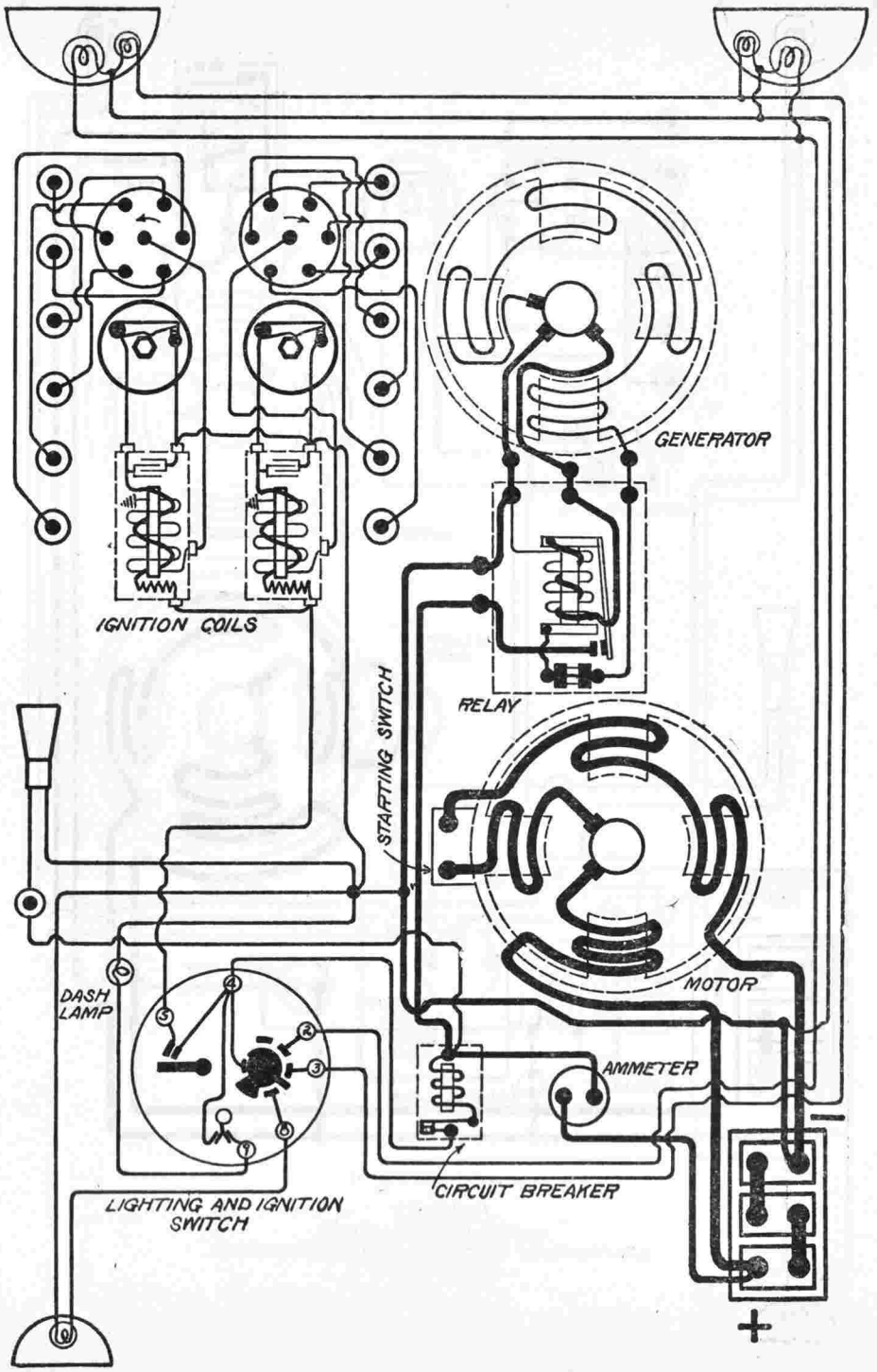
LAMPS.—Head lamps are 6-8 volt, 18 cp. Small head lamps are 6-8 volt, 12 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

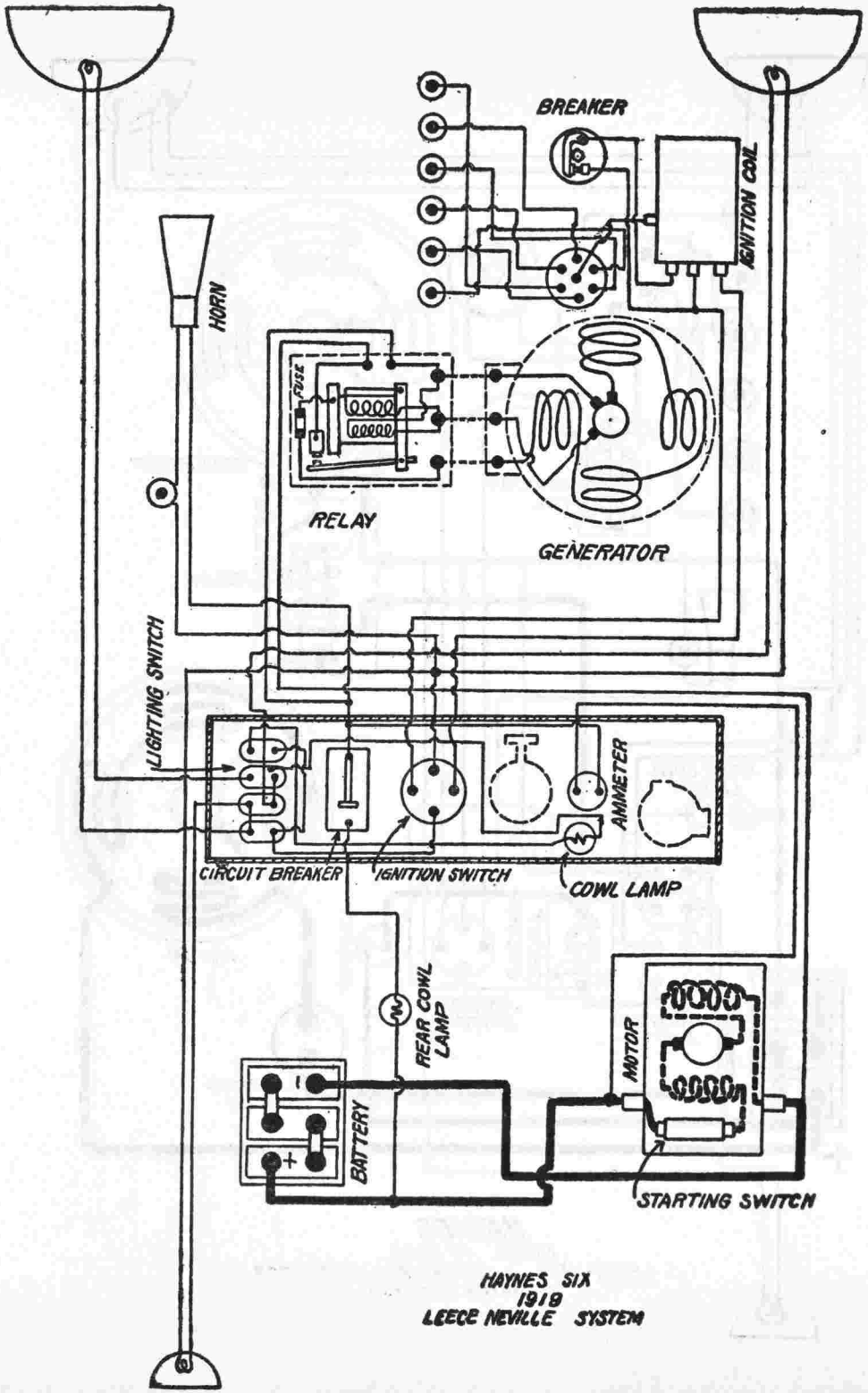
FUSES.—Generator fuse is 5 ampere.

CIRCUIT BREAKER.—There is a locking type circuit breaker to take the place of fuses in the lighting, horn and ignition circuits. It takes 25 amperes to open this device.



Ignition Circuits.





HAYNES SIX
1919
LEECE NEVILLE SYSTEM

Haynes

Model 45 Six Cylinder (1919)
Leece-Neville Generating, Starting and Lighting System
Kingston Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The two wire system is used.

Ignition.—Breaker contacts should separate .018 inch to .020 inch. Should they become badly burned or pitted, affecting the ignition, resurface with a very fine, flat jeweler's file or a worn strip of No. 00 sand paper. Ignition coil should take about 4 amperes, engine idle.

Timing.—Contacts should begin to separate when the top dead center mark on the flywheel is 1 inch past the indicator, spark control lever and breaker assembly in the fully retarded position. (There is a removable plate covering an opening on top of flywheel housing, through which flywheel may be viewed.)

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—The spark plug gaps should be .018 inch to .020 inch.

Oiling.—Refill grease cup under breaker head with soft cup grease and turn down once a month. Should car be driven more than 1000 miles in a month, this must be done every 1000 miles.

Starter.—Starter is connected to the engine through a Bendix drive. It should crank the engine at 125 to 150 R. P. M. The current during full cranking speed should be 200-225 amperes, although the current may reach as high as 550 amperes when first starting to turn the engine over. Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current. Starter rotates counter-clockwise, as viewed from the driving end.

Oiling.—Put several drops of light engine oil in starter oilers every month.

Generator.—Generator current regulation is by third brush. Generator output should be 15 amperes at 1200 R. P. M., of armature, or 20 miles per hour. Output is changed by turning the adjusting nut on front end cover of generator. Turning the nut to the lef increases the output. Turning the nut to the right decreases the output. Before turning the adjustment nut, loosen the lock screw just below and to the left of the nut, and tighten screw again after adjustment is made. Generator rotates clockwise as viewed fromt driving end.

Oiling.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Trouble Shooting.—To test for a short in theshunt field circuit, remove the third brush from its holder and connect it to the negative (—) terminal of a 6 volt storage battery. Then connect the positive (+) terminal of the battery to the positive (+) terminal of an ammeter and connect the negative (—) terminal of the ammeter to the screw at the end of the fuse clip. Four amperes should flow. If a larger current flows, there is a short in the field circuit. The generator will not operate when the fuse is burned out or removed

Relay.—Relay should close at 6-8 and open at 5-7 miles per hour. Charging current should be 1 to 3 amperes at closing, and the discharge current 0 to 1 ampere at opening of relay. Relay contacts should separate .030 inch. Clean relay contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a strip of well worn No. 00 sandpaper, and then draw a piece of unglazed paper between them to remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 21 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

Fuse.—There is a 5 ampere fuse on the relay base to protect the generator fields. It will burn out if the generator is run with high resistance in charging circuit, or if a short circuit

HAYNES

MODEL 45 (1919-20) SERIAL NOS. 33,500 to 38,500
LEECE-NEVILLE GENERATING, STARTING AND LIGHTING SYSTEM
KINGSTON IGNITION

BATTERY.—Willard, Type SXR-6, 6 volt, 100 ampere-hour. The two-wire system is used.

IGNITION.—Breaker contacts separate .020 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the grease cup under the breaker head with soft cup grease and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is ¾ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Type 186M. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 100-150 R.P.M., taking 150-250 amperes. Lock torque is 16 pound-feet, current being 700 amperes at 3.5 volts. Running freely, starter takes 60 amperes, armature revolving at 4000 R.P.M.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Type E400. Generator current regulation is by the third brush system. Maximum charging rate is 16 amperes, reached at 1200 R.P.M. of the armature or 20 miles per hour. Charging rate is varied by turning the adjusting thumb nut on the front end cover of the generator. Before turning the thumb nut, loosen the lock screw just below and to the left of the nut. Turn the nut to the left to increase the charging rate and to the right to decrease the charging rate. Tighten the lock screw after adjustment is made.

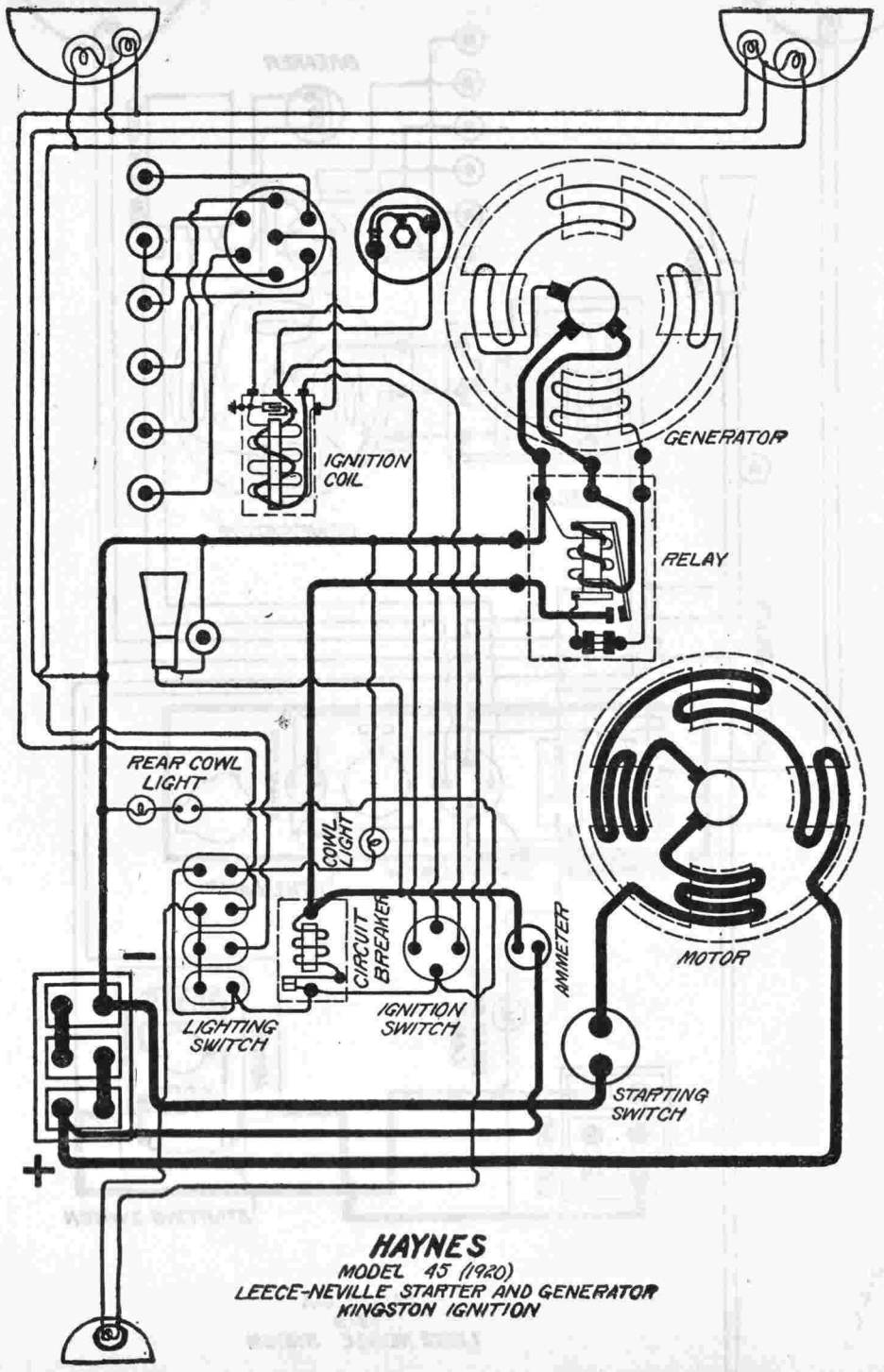
OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every 500 miles. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 450-500 R.P.M. of the armature and opens at 6-8 miles per hour or 400-450 R.P.M. of the armature. The charging current is 1-3 amperes at closing and the discharge current 0-1 ampere at opening of relay contacts. Contacts separate .030 inch. Clean contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

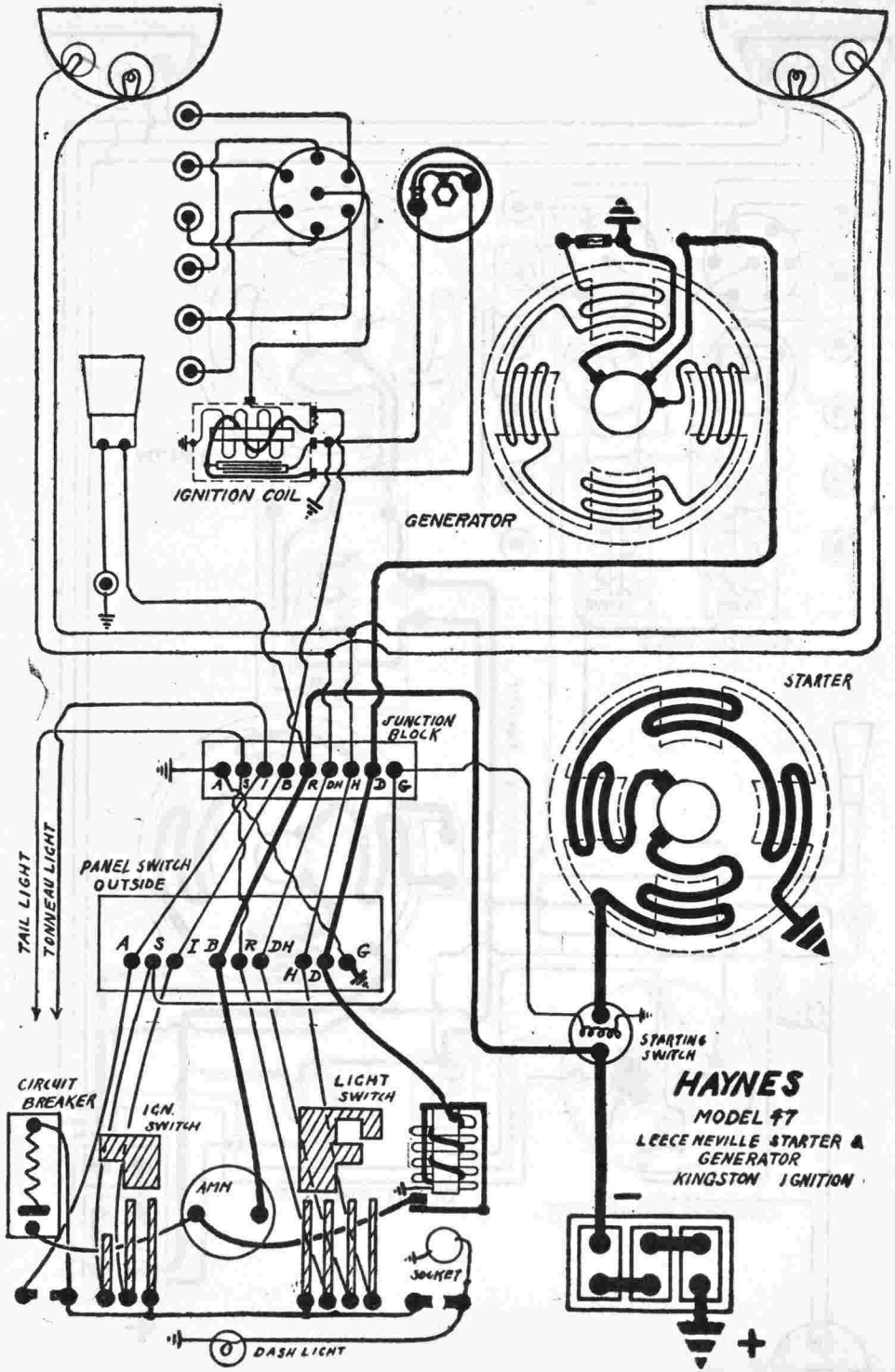
LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSE.—Fuse on relay base is 5 ampere.

CIRCUIT BREAKER.—A circuit breaker takes the place of fusesin the lighting and ignition circuits. It requires 25 amperes to open the circuit.



HAYNES
MODEL 45 (1920)
LEECE-NEVILLE STARTER AND GENERATOR
KINGSTON IGNITION



HAYNES

MODEL 47 (1920)

LEECE-NEVILLE GENERATING, STARTING AND LIGHTING SYSTEM
KINGSTON IGNITION

BATTERY.—Willard, 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .018 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper. every two weeks. If the car is driven more than 500 miles in two weeks, this must be

OILING.—Refill the grease cup under the breaker head with soft cup grease and turn down done every 500 miles.

TIMING.—Breaker contacts begin to separate when the flywheel marking "Inlet" is at the indicator, spark control lever and breaker assembly in the fully retarded position. This mark is 25/64 inch past the top dead center mark.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

SPARK PLUGS.—Diameter, 7/8 inch. Spark gaps are .025 inch.

STARTER:—Model 318-M. Starter is connected to the engine through a Bendix drive. Starting switch is of the magnetic type, controlled by the ignition switch. When the ignition switch handle is depressed all the way down, the ignition system is connected and the starting switch operates. With the switch handle in the middle position, ignition only is in operation. Starter cranks the engine at 100-150 R.P.M., taking 150-250 amperes, Running freely starter takes 60 amperes, armature revolving at 4000 R.P.M. Lock torque is 16 pound-feet, current being 700 amperes at 3.5 volts.

OILING.—Put 5 or 6 drops of light engine oil in the starter bearing oilers every month.

GENERATOR:—Model No. G-326. Rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Normal maximum charging rate is 16 amperes, reached at 20 miles per hour or 1200 R.P.M. of the armature. Charging rate is varied by turning thumb screw at the rear of the generator. Turn to the right (facing the rear end of the generator) to increase the charging rate, and to the left to decrease the charging rate. Never increase the maximum charging rate above 20 amperes. Field fuse, mounted on generator, is 5 ampere.

OILING.—Put 5 or 6 drops of light engine oil in the rear generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles. Clean out and repack the front compartment with soft cup grease every month.

RELAY.—Relay is mounted on the rear of the dash panel. Relay closes at 8-10 miles per hour or 500 R.P.M. of the armature and opens at 6-8 miles per hour or 450 R.P.M. of the armature. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface wih well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 16 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSE.—Generator field fuse is 5 ampere, 1¼ inches long and ¼ inch in diameter.

CIRCUIT-BREAKER.—A circuit-breaker takes the place of fuses. The air gap between the armature and coil core, and hence the current which the circuit-breaker will permit to flow through it, is adjustable by turning a screw, reached with a small screw driver through a hole in the bottom of the case.

HAYNES

MODEL 48 (1920)

LEECE-NEVILLE GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Willard, 6 volt, 120 ampere-hour. The two-wire system is used.

IGNITION.—Model No. 5155. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 3 or 4 drops of light engine oil in the two oil holes in the top of the distributor driving-gear housing every two weeks. If the tracks of the rotor buttons in the distributor heads are not well polished, apply a small amount of vaseline with a soft cloth. Every six months remove the plate on the top of the unit and repack the housing with soft cup grease.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly one-third advanced.

FIRING ORDER.—The firing order is 1R, 6L, 4R, 3L, 2R, 5L, 6R, 1L, 3R, 4L, 5R, 2L.

SPARK PLUGS.—Diameter, 7/8 inch. Spark gaps are .025 inch.

STARTER:—Model No. 166-M. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 100-150 R.P.M., taking 150-250 amperes. Running freely starter takes 60 amperes, armature revolving at 4000 R.P.M. Lock torque is 16-pound feet, current being 700 amperes at 3.5 volts.

OILING.—Put 5 or 6 drops of light engne oil in the starter bearing oilers every month.

GENERATOR:—Model No. G-109. Rotation is counter-clockwise, looking at commutator end. Generator current regulation is by the third brush system. Normal maximum charging rate is 16 amperes, reached at 20 miles per hour, or 1200 R.P.M. of the armature. Charging rate is varied by turning the thumb screw at the rear of the generator. Turn to the right (facing rear end of generator) to increase the charging rate and to the left to decrease the charging rate. Never increase the maximum charging rate above 20 amperes. Field fuse, mounted on the relay base, is 5 ampere.

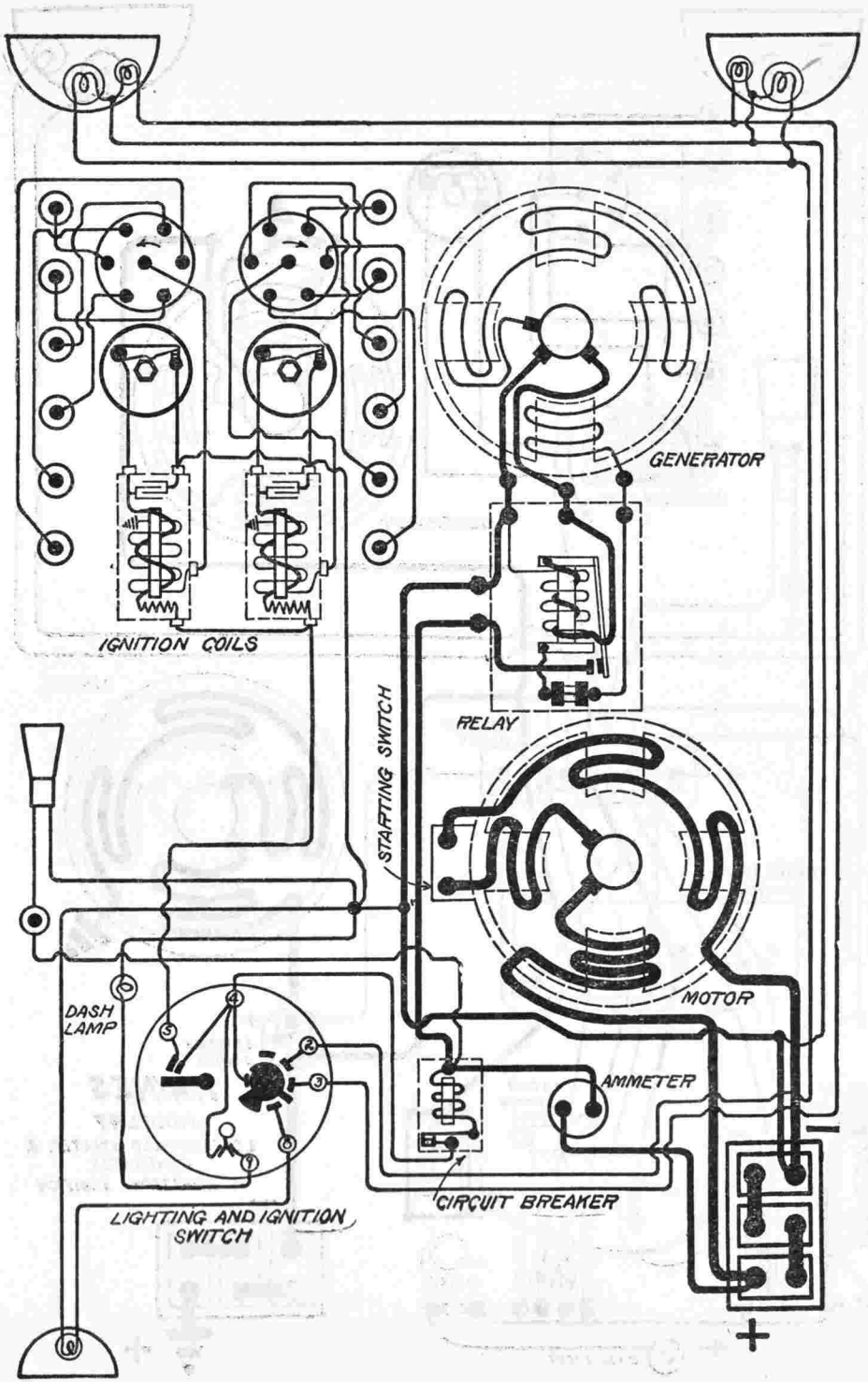
OILING.—Put 5 or 6 drops of light engine oil in the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

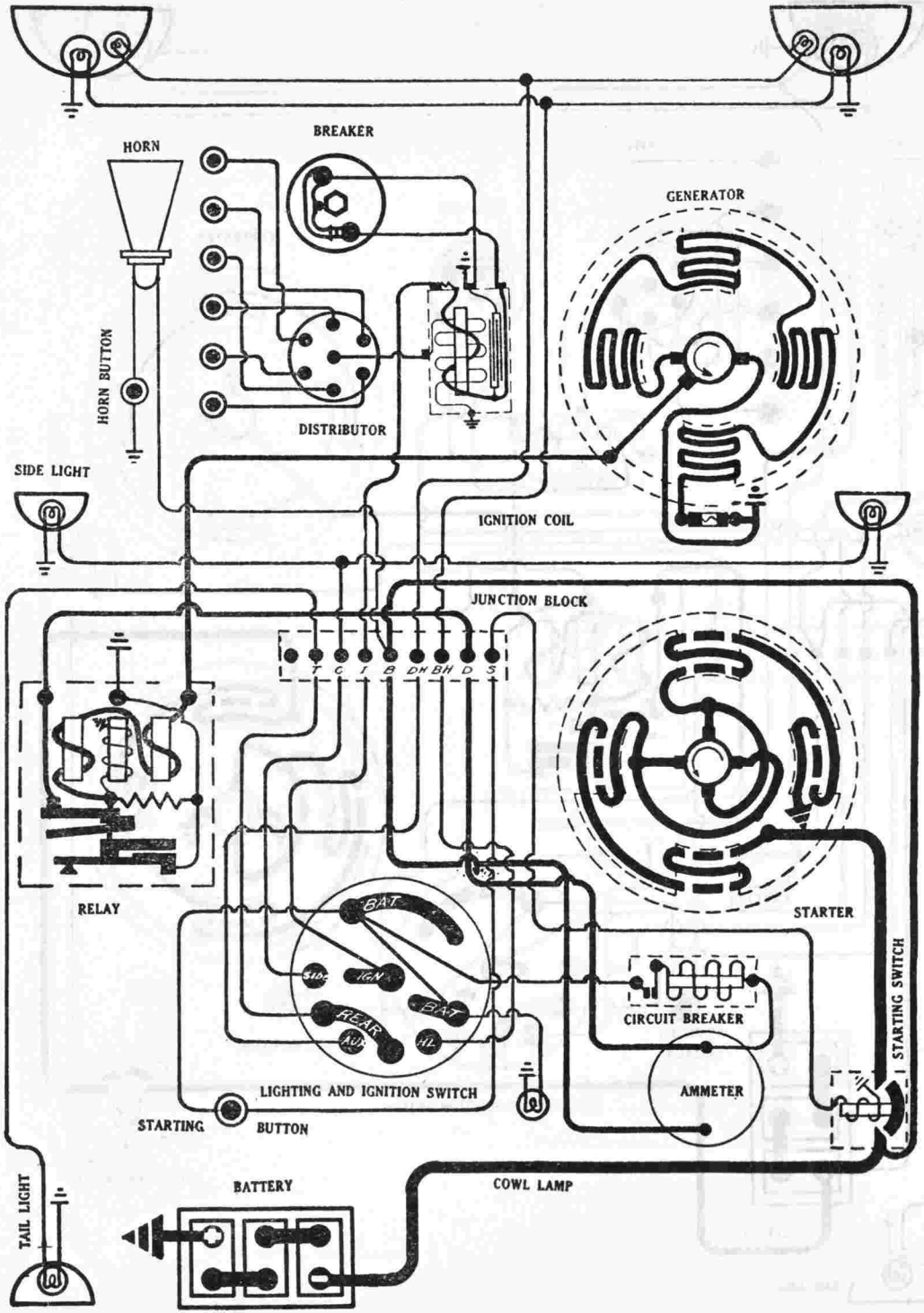
RELAY.—Relay is mounted on the generator frame. Relay closes at 8-10 miles per hour or 500 R.P.M. of the armature and opens at 6-8 miles per hour or 450 R.P.M. of the armature. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 16 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSE.—Generator field fuse is 5 ampere, 5/8 inch long.

CIRCUIT-BRAKER.—A circuit-breaker takes the place of fuses in the lighting and ignition circuits.





HAYNES

MODELS 50 (1921) AND 55 (1922)
LEECE-NEVILLE GENERATING, STARTING AND LIGHTING SYSTEM
KINGSTON IGNITION

BATERY.—Prest-O-Lite, Type 615-S. H. C. for 1922. **Willard, Type SJRN-5** for 1921. 6 volts, 132 ampere-hour. Starting capacity—135 amperes for 20 minutes. Lighting capacity—5 amperes for 20 hours. The positive (+) terminal is grounded.

IGNITION.—Kingston Battery Ignition. Breaker contacts separate .018 inch. If condition affects ignition, remove and resurface on a hard oilstone.

Timing.—Breaker contacts begin to open when piston No. 1 is slightly past top dead center on power stroke, setting "Inlet Open" on flywheel at indicator mark. Spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—Spark plug gaps are .025 inch.

Oiling.—Put 5 or 6 drops of light engine oil into distributor oiler every 500 miles.

STARTER:—Model No. 318-M, 388-M. Direction of rotation is counter-clockwise, looking at commutator end. Starter cranks the engine at 1100 R.P.M. of armature at 42°F., taking 400 amperes at 4 volts. Motor running freely takes 60 amperes at 6 volts. The lock torque is 15 pound-feet, current being 675 amperes at 3.2 volts.

Starter Test Data

Torque	R.P.M.	Amperes	Volts
1 lb. ft.	2200	165	5.2
5 lb. ft.	840	330	4.3
10 lb. ft.	245	540	3.4
15 lb. ft.	0	675	3.2

The brush tension is 3 pounds.

Oiling.—No oil is necessary, as oilless bearings are used.

GENERATOR:—Model 326-G, 424-G. Direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. The maximum charging rate is 18 amperes (cold) reached at 1200 R.P.M. The main brush tension is 2½ pounds, and the third brush tension is 2 pounds.

Generator Test Data

Amperes	Hot Test R.P.M.	Amperes	Cold Test R.P.M.
0	430	0	430
10	800	14.5	800
15	1200	18	1200
13	1600	15	1600

Oiling.—Place a few drops of light engine oil in each generator oiler once every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Model No. 13-CC-6. Closes at 450-500 R.P.M., 8-10 M.P.H., 6.5 volts; opens at 400-450 R.P.M., 6-7 M.P.H., 0-2 amperes discharge. Relay contacts separate .047 inch. Air gap between relay armature and coil core is .063 inch, contacts closed.

LAMPS.—Head lamps, 6-8 volts, 21 cp. Auxiliary lights, 6-8 volts, 6 cp. Dash and tail lamps, 6-8 volts, 2 cp.

FUSES.—Generator field fuse is 5 amperes.

CIRCUIT BREAKER.—A circuit breaker is used instead of fuses in the lighting and ignition circuits.

HAYNES

MODEL 57 (1923)

LEECE-NEVILLE GENERATING, STARTING AND LIGHTING SYSTEM
KINGSTON IGNITION

BATTERY.—Prest-O-Lite, Type 615-SHC, 6-8 volts, 125 ampere-hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model No. 68. Distributor Model No. 42. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a hard oilstone.

Oiling.—Put 5 or 6 drops of light engine oil into distributor oilers every two weeks. If car is driven over 500 miles in two weeks, these attentions must be given once every 500 miles.

Timing.—Breaker contacts just opens when piston No. 1 is slightly past top center on power stroke, when marking "Inlet Open" on flywheel indicator, and spark control lever and breaker assembly is fully retarded.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—Spark plug gaps separate .025 inch.

STARTER.—Model No. 448-M. The direction is rotation, looking at commutator end, is clockwise. Cranks the engine at 1100 R.P.M., requiring 300 amperes.

Starter Test Data

Torque	R.P.M.	Amperes
2 ft. lbs	2050	150
4 ft. lbs.	1350	240
6 ft. lbs.	920	330
8 ft. lbs.	700	390
20 ft. lbs.	0 (Stalled)	750

Brush tension on all brushes is 2½ to 3 lbs.

Oiling.—No oiling is required for this starter.

GENERATOR.—Model No. 474-G. The direction of rotation looking at commutator end is counter-clockwise. The third brush system is used to regulate the current. The maximum charging rate is 15 amperes, reached at 1200 R.P.M. of armature.

Generator Test Data

Amperes	Hot Test R.P.M.	Amperes	Cold Test R.P.M.
0	430	0	430
5	620	5	550
10	800	10	660
15	1200	15	840
12	1800	18	1200
		15	1600

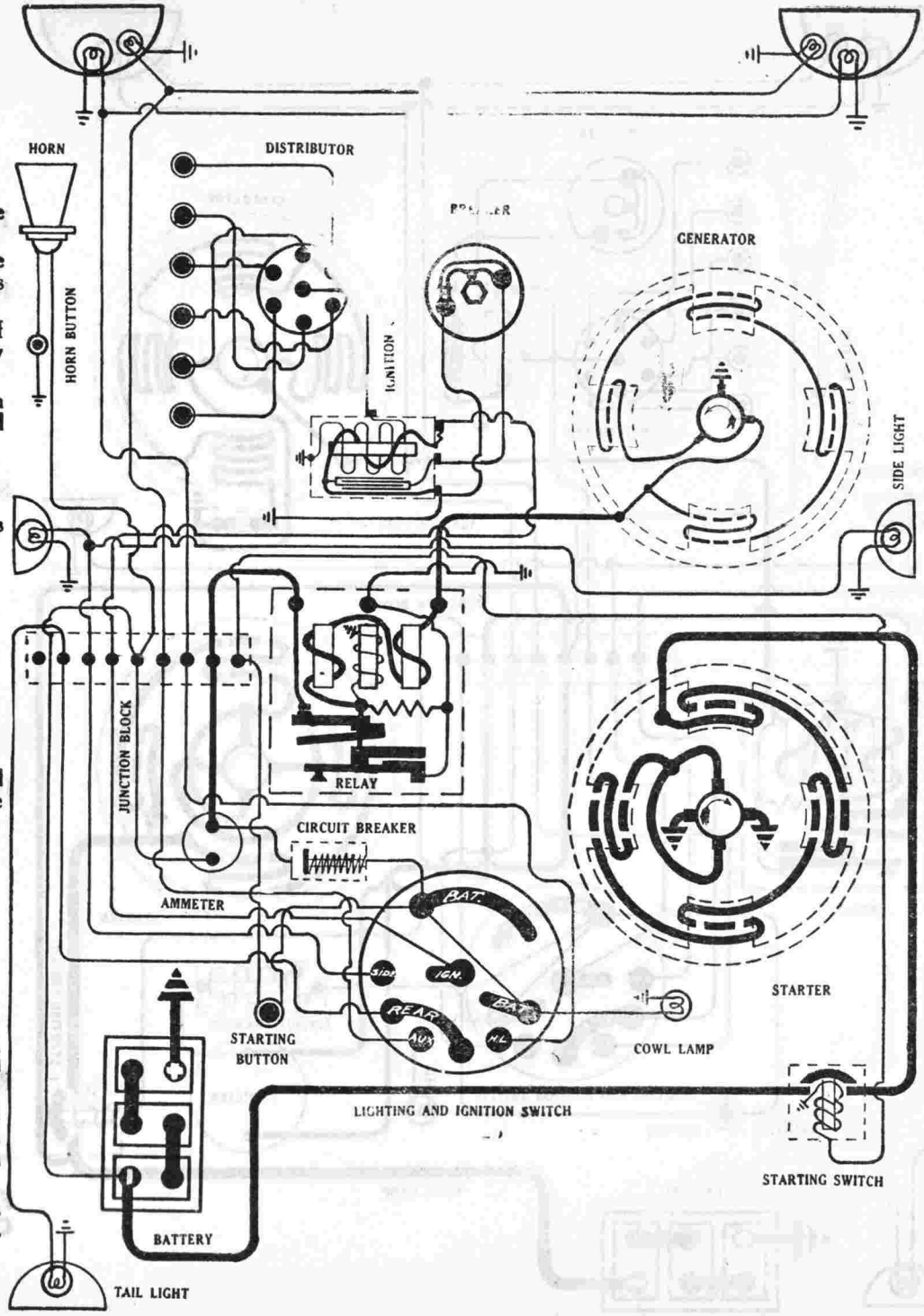
Brush tension—Main brushes, 2 to 2½ lbs. Third brush—2 lbs.

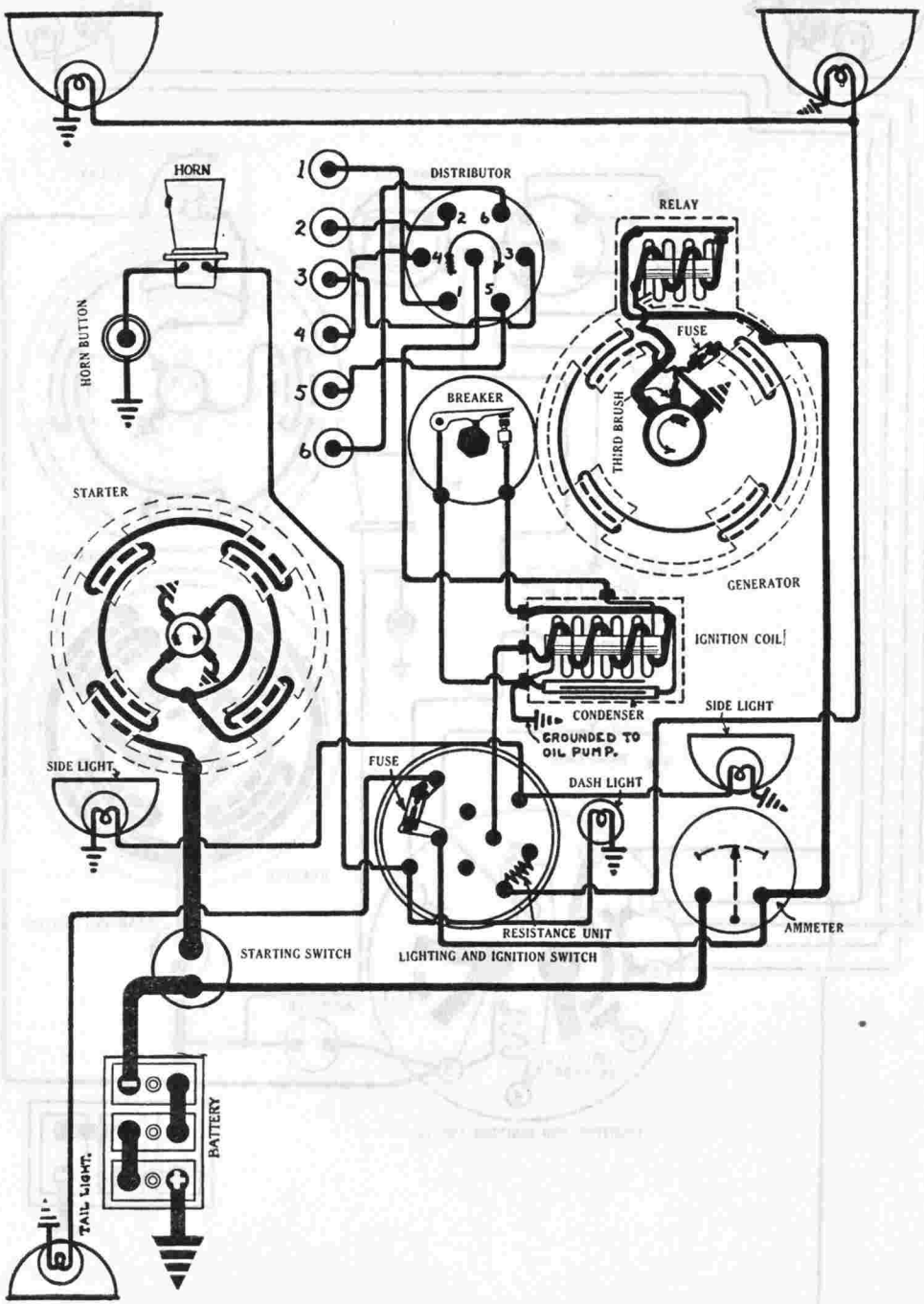
Oiling.—Put 5 or 6 drops of light engine oil into generator oilers every two weeks. If car is driven over 500 miles in two weeks, these attentions must be given every 500 miles.

RELAY.—Leece-Neville, Model No. 13-CC-6. Relay closes at 7 miles per hour, or 450 R.P.M. of armature, and opens at 7 miles per hour. Relay contacts separate 1/16 inch, air gap between regulator, armature and coil core is 1/64 inch, when contacts are closed.

LAMPS.—Head lamps are 6-8 volts, 21 cp. Dimmer lamps are 6-8 volts, 6 cp. Dash lamps are 6-8 volts, 2 cp. Tail lamps are 6-8 volts, 2 cp. Stop light, 6-8 volt, 21 cp.

FUSES.—Only one generator field fuse used in car.





HAYNES

MODEL 60 (1923-24-25)
LEECE-NEVILLE GENERATING, STARTING AND LIGHTING SYSTEM
KINGSTON IGNITION

BATTERY:—Prest-O-Lite. Type 615-SHC. 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 150 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 27 hours.

IGNITION:—Coil Model 68. Distributor Model 42. Breaker contacts separate .018-.020 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone.

Oiling:—Put 5 or 6 drops of light oil in each of the distributor oilers every two weeks or each 500 miles.

Timing:—Breaker contacts begin to separate when piston No. 1 entering power stroke is slightly past top dead center when the flywheel mark "Inlet open" is opposite the indicator mark on the flywheel housing. The spark control lever and breaker assembly must be in the fully retarded position.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plugs are S.A.E. 7/8-18. Gaps are .025 inch.

STARTER:—Model 447-M. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, looking at the commutator end.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3100	6	40
15 "	Lock	4	420

Oiling:—Starter bearings do not require oiling.

GENERATOR:—Model 504-G. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove commutator cover band and loosen two nuts on third brush bracket. Then shift third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the nuts after making the adjustment. The maximum charging rate is 18 amperes (cold) reached at 1200 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	450	0	6.5	450
14	—	800	10	—	800
18	—	1200	15	—	1200

Oiling:—Put 4 or 5 drops of light oil in the generator oilers every two weeks or each 500 miles.

RELAY:—Type GC-6. Relay is mounted on the generator. Relay contacts close at 450 R.P.M. when the generator voltage reaches 6.5 volts and open with a discharge current of 0-4 amperes. Contacts separate .062 inch. Air gap is .016 inch with contacts closed.

LIGHTING:—Briggs and Stratton Switch Model 37200. Head lights are 6-8 volt, 21 cp. S.C. Dash, tail and side lights are each 6-8 volt, 3 cp. S.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuse on switch is 20 amperes.

H. C. S.

SERIES 1,2,3, AND 4 (1920-21-22-23)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Willard, 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2170. Distributor Model No. 5246. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 4 or 5 drops of light engine oil in the distributor shaft bearing every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly one-third advanced.

SPARK PLUGS.—Diameter, 7/8 inch. Spark gaps are .030 inch.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

STARTER:—Model No. 187 or 185. The direction of rotation is counter-clockwise looking at the commutator end. Starter is connected to the engine through a Bendix drive. The lock torque is 14 pounds-feet.

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR.—Model No. 186. Rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Maximum charging rate is 14 amperes, reached at 1000 R.P.M. of the armature, or 16-20 miles per hour.

Amperes	Generator Data	R.P.M.
Neutral		285
9.5		500
14		1000
12.5		1400
10		2000

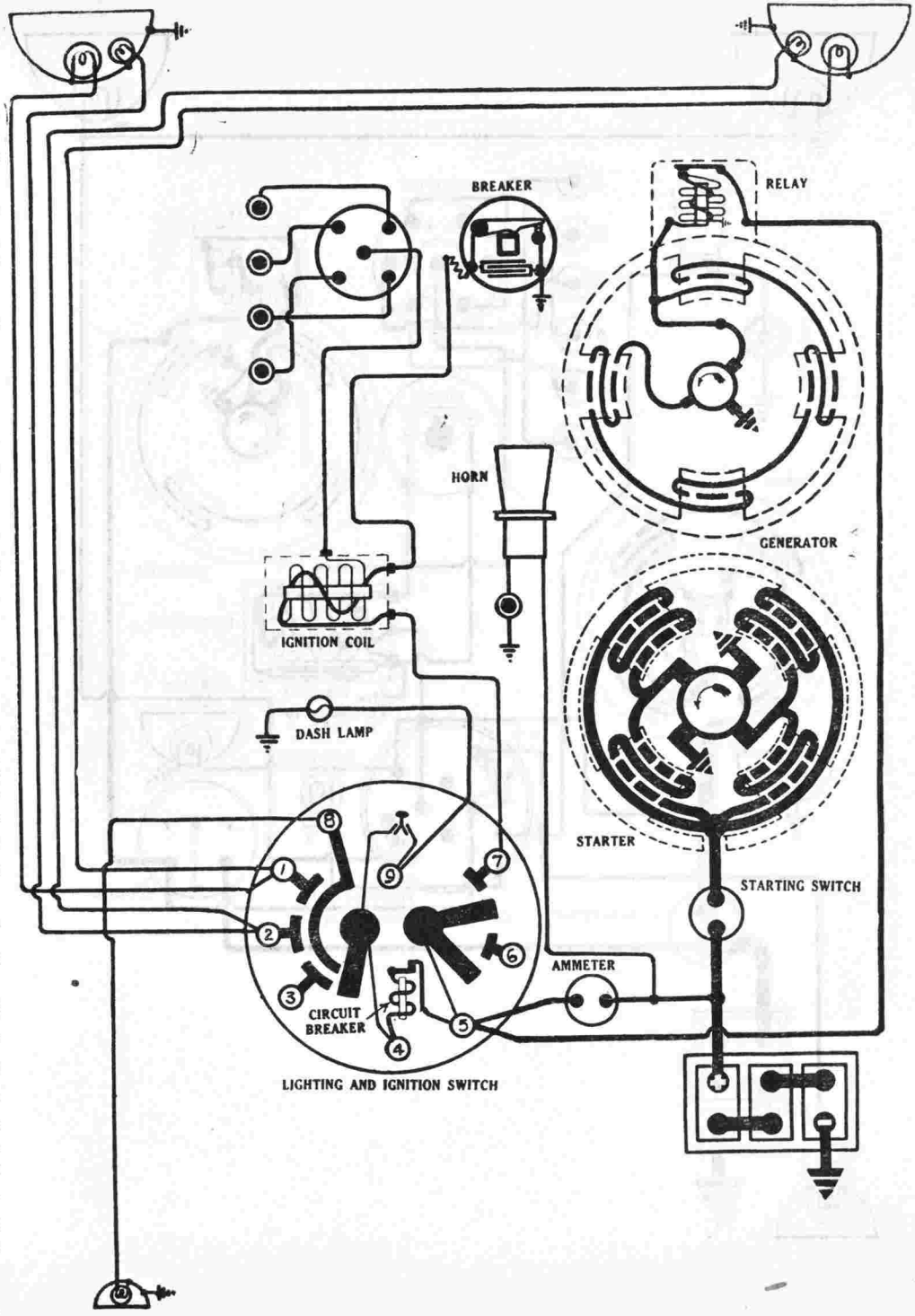
Charging rate is varied by adjustment of the third brush setting. To vary the charging rate, first loosen the clamp nut on the front end of the generator one or two turns. Then turn the third brush adjusting screw in a clockwise direction to increase the charging rate or in a counter-clockwise direction to decrease the charging rate. Tighten the clamp nut and reseat the brush after adjusting position. Maximum charging rate must not exceed 16 amperes.

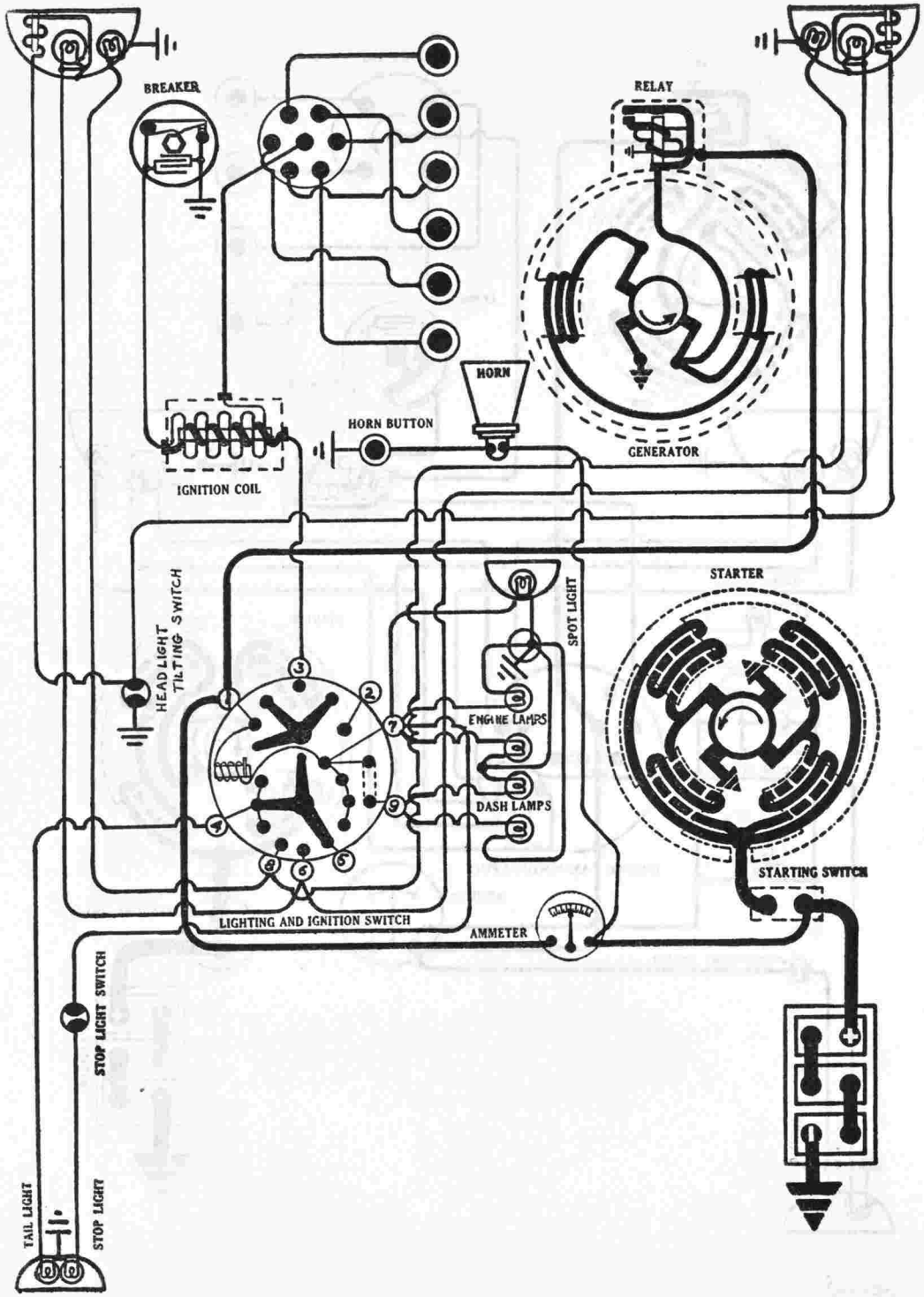
OILING.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes at 285-300 R.P.M. of the armature or 7-8 miles per hour, and opens at 250-285 R.P.M. of the armature or 5-6 miles per hour. Relay contacts separate .046 to .062 inch. Air gap beween relay armature and coil core is .020 to .035 inch, contacts closed. To adjust relay, connect a voltmeter between the positive (+) generator brush and the ground. Then slowly speed up the generator and adjust the relay spring tension by bending the slowly speed up the generator and adjust the relay spring tension by turning the thumb nut, until the contacts close when the voltmeter indicates 7.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

tail lamps are 6-8 volt, 2 cp. On the 1920 and 1921 cars head lamps are 6-8 volt, 15 cp.

CIRCUIT-BREAKER.—A vibrating circuit-breaker mounted on the back of the switch [illegible] It requires a current of 25-30 amperes to start this device





H. C. S.

SERIES 4 MODEL 6 (1923-24-25)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SJR-4, 6 volt, 120 ampere-hour. The negative (—) terminal is grounded.

IGNITION: — Coil Model No. 2178. Distributor Model No. 5259. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling:—Put 4 or 5 drops of light engine oil in the distributor shaft bearing every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING: — Breaker contacts begin to separate when piston No. is one-half inch past top dead center on compression stroke, with the spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plugs:—Diameter, 7/8 inch. Spark gaps are .030 inch.

STARTER.—Model No. 185. .The direction of rotation is counter-clockwise, looking at the commutator end. Starter is connected to the engine through a Bendix drive. The lock torque is 24 lb. ft. at 2.75 volts. Running free the starter draws 50 amperes at 6 volts. The tension of each of the starter brushes should be from 2¼ to 2¾ pounds.

Oiling:—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR:—Model No. 256. Rotation is counter clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Maximum charging rate is 14 amperes, reached at 1000 R.P.M. of the armature, or 16-20 miles per hour.

Amperes	Generator Data	R.P.M.
Neutral		285
9.5		500
14		1000
12.5		1400
10		2000

Charging rate is varied by adjustment of the third brush setting. To vary the charging rate, loosen the generator cover band and shift the third brush mounting plate by means of the handle attached. Shift the third brush in the direction of rotation (counter-clockwise) to increase the charging rate and in the opposite direction to decrease the charging rate. The maximum charging rate must not exceed 17 amperes. The tension of the generator brushes should be from 1¼ to 1¾ pounds each.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY:—Relay is mounted on the generator frame. Relay closes at 285-300 R.P.M. of the armature or 7-8 miles per hour, and opens at 250-285 R.P.M. of the armature or 5-6 miles per hour. Relay contacts separate .046 to .062 inch. Air gap between relay armature and coil core is .020 to .035 inch, contacts closed. To adjust relay, connect a voltmeter between the positive (+) generator brush and the ground. Then slowly speed up the generator and adjust the relay spring tension by bending the long brass stop until the contacts close when the voltmeter indicates 6¾-7½ volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit and adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

CIRCUIT BREAKER:—A vibrating circuit-breaker mounted on the back of the switch takes the place of fuses. It requires a current of 25-30 amperes to start this device vibrating. While vibrating, the current is 10-15 amperes.

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H. C. S.

TAXICAB MODELS O AND L (1925-26) SERIAL NOS. 3600 UP
AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

BATTERY.—Prest-O-Lite, Type 613-SHK. 6 volt. Starting capacity is 130 amperes for 20 minutes. Lighting capacity is 5 amperes for 22.5 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model TC-30. Distributor Model T-4242. Breaker contacts separate .018-.020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file. If excessively worn, the points should be replaced.

Mounting.—Distributor is mounted on generator at left of engine.

Oiling.—Fill the oiler on the side of the distributor housing with light engine oil every month or each 1000 miles if the car is driven more than 1000 miles in a month. Put one drop of oil on the breaker arm pivot and place a small bit of vaseline on the surface of the breaker cam applying with a toothpick.

Timing.—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center.

Firing Order.—The firing order is 1-2-4-3.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .030 inch.

STARTER.—Model 952. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 1¾-2 pounds each. Starter switch is Model S-203.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	6	60
12 "	Lock	4	450

Mounting.—Starter is mounted at right of engine by a standard S. A. E. No. 1 flange mounting.

Oiling.—Starter bearings are self oiling. They require no attention.

GENERATOR.—Model 1269. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the generator output, loosen the generator cover band and shift the third brush mounting plate. Shifting the plate in the counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. The maximum charging rate is 16-18 amperes reached at 1100-1300 R.P.M. of the generator armature.

Generator Data

Amperes	Volts	R.P.M.
0	6.5-7.5	550
10	....	800
16-18	8	1100

Motoring freely generator draws 6 amperes at 6 volts. The shunt field current is 6.6 amperes at 6 volts. Field resistance at 70° F. is .9 ohms. Generator brush tension should be 1½-1¾ pounds each.

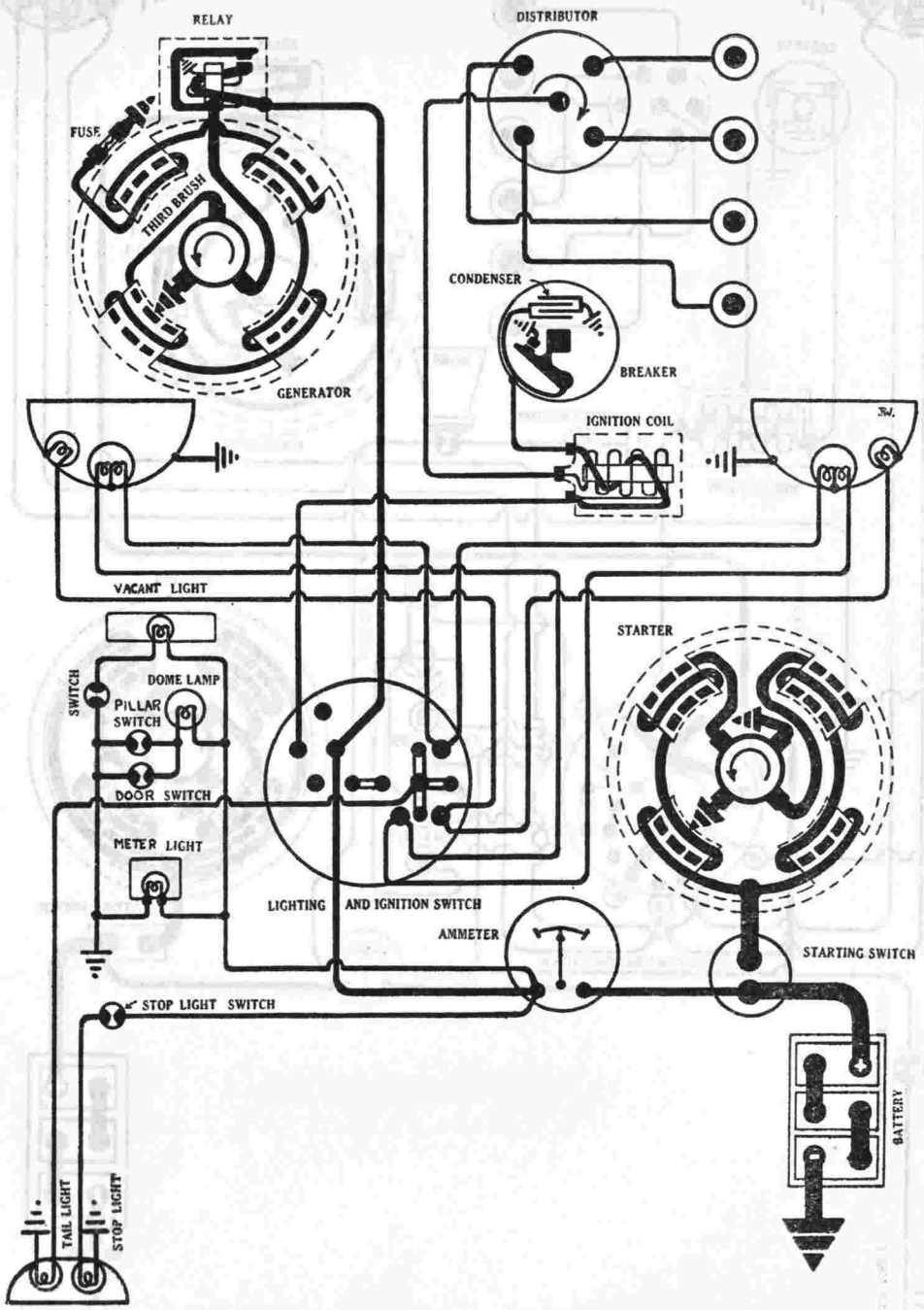
Mounting.—Generator is mounted at left of engine by a standard S. A. E. No. 2 flange mounting.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY.—Relay is mounted on the generator. Relay contacts close at 500 R.P.M. when the voltage of the generator reaches 6.5-7.5 volts and open at 450 R.P.M. with a discharge current of 1-3 amperes. Contacts separate .015 inch. Air gap between relay armature and coil core is .010 inch, contacts closed. The resistance of the shunt coil is 45 ohms.

LIGHTING.—Switch Model S-106. Head and stop lamps are each 6-8 volt, 21 cp. S. C. Side lamps (in head lamp) are 6-8 volt, 6 cp. S. C. Dome and tail lamps are each 6-8 volt, 4 cp. S. C.

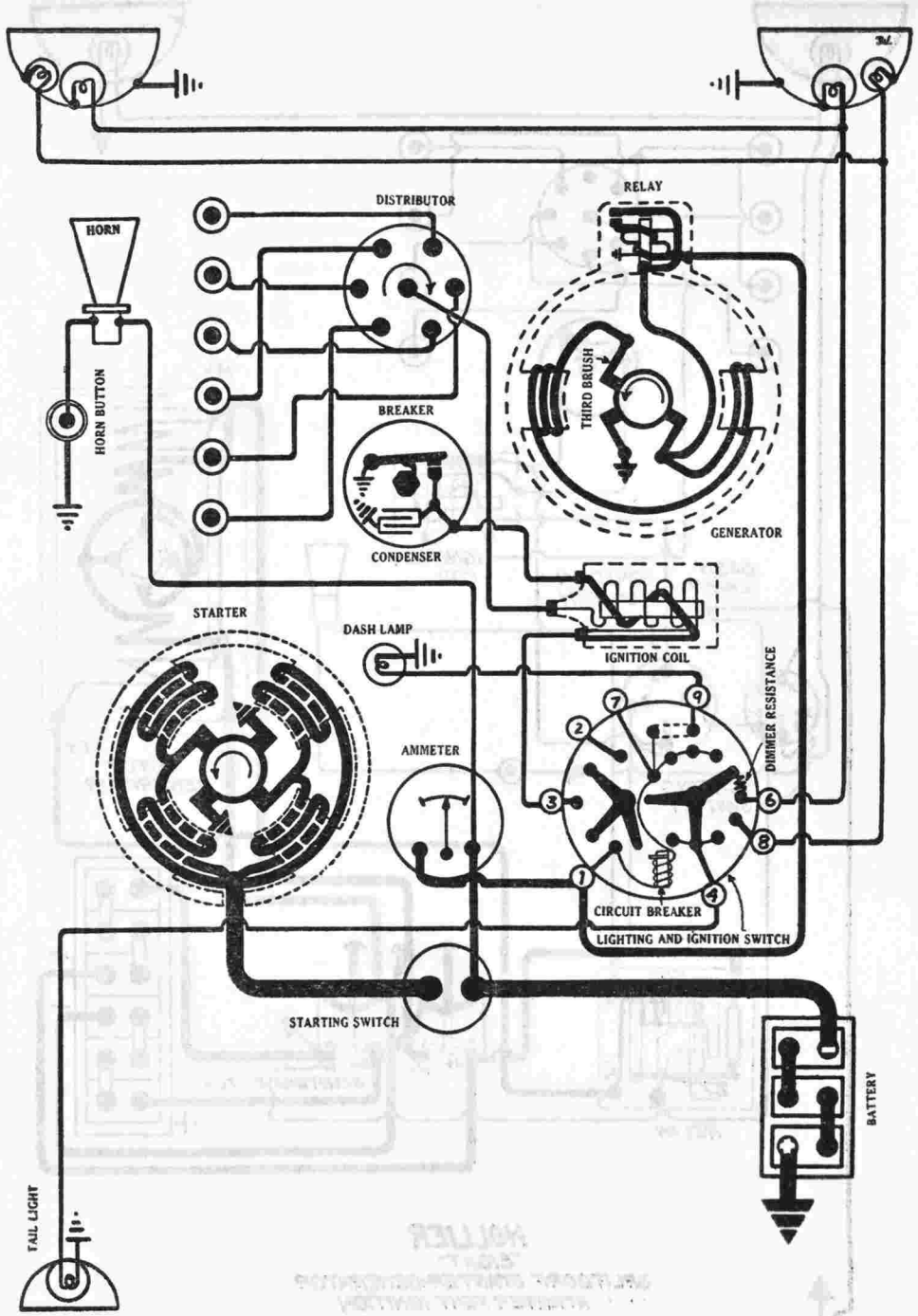
FUSES.—Generator field fuse is 7.5 amperes.



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HERTZ

MODEL D1 (1925-26)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION



BATTERY.—Vesta, Type R6-DJ-13Y Form 235. 6 volt. Starting capacity is 105 amperes for 20 minutes. Lighting capacity is 5 amperes for 12 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model 2182. Distributor Model 5278. Distributor is mounted on the generator. Breaker contacts separate .015-.0225 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone or with a fine, flat jeweler's file. The tension of the breaker arm spring should be 13-16 ounces.

Oiling.—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

Timing.—Breaker contacts begin to separate when piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position. To set timing, retard spark lever and crank engine until piston No. 1 reaches this position. Then loosen the adjustment nut on the side of the distributor housing and rotate the distributor until breaker contacts begin to separate. Then tighten the nut. Make certain that the rotor is under the segment connected to the spark plug in cylinder No. 1.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER.—Model 286 and 313. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 2¼-2½ pounds each. Starter switch is Model 1953.

Model 286 Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	4	60
8 "	Lock	3	450

Model 313 Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	4	60
11 "	Lock	3	450

Oiling.—Starter bearings are self oiling. They require no attention.

GENERATOR.—Model 301 and 312. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the generator output, loosen the generator cover band and shift the third brush mounting plate by means of the handle on the plate. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. The brush spring tension should be 1¼-1¾ pounds each.

Model 301 and 312 Generator Data (Hot)

Amperes	R.P.M.
5	800
15 min.	1600

Oiling.—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY.—Relay is mounted on top of the generator. Relay contacts close when the voltage of the generator reaches 6.75-7.5 volts and open with a discharge current of 1-3 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .015-.020 inch, contacts closed.

LIGHTING.—Switch Model 1276. Head and stop lamps are 6-8 volt, 21 cp. S. C. Side lamps are 6-8 volt, 4 cp. S. C. Tail and dash lamps are each 6-8 volt, 2 cp. S. C.

CIRCUIT BREAKER.—A vibrating circuit breaker is mounted on the back of the switch. A current of 25-30 amperes causes this device to vibrate. While operating the current is 10-15 amperes.

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HOLLIER

MODELS 158, 168, 178, 188, 196, 198, 206 (1915-16-17-18-19)
SPLITDORF-APELCO GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY.—Willard, 6-12 volt, 45 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Type K-2. Contacts separate .010 to .012 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Put a drop of light machine oil on each of the wearing parts of breaker, and 4 or 5 drops of light machine oil in the oil hole beside the notched shaft, every two weeks. Put a very small amount of vaseline on the notched shaft, applying with a toothpick. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—Cylinders are numbered from front to rear. Left hand bank (viewed from the drivers seat) are 1, 2, 3, 4, and the right hand bank are 5, 6, 7, 8. Firing order is 1, 6, 3, 5, 4, 7, 2, 8.

Spark Plug Gaps.—Spark plug gaps are .020 inch.

STARTER-GENERATOR.—Type A-25. Starter is chain connected to engine crank shaft. The starting switch changes battery connections, connecting the two halves in series for starting, and in parallel for charging.

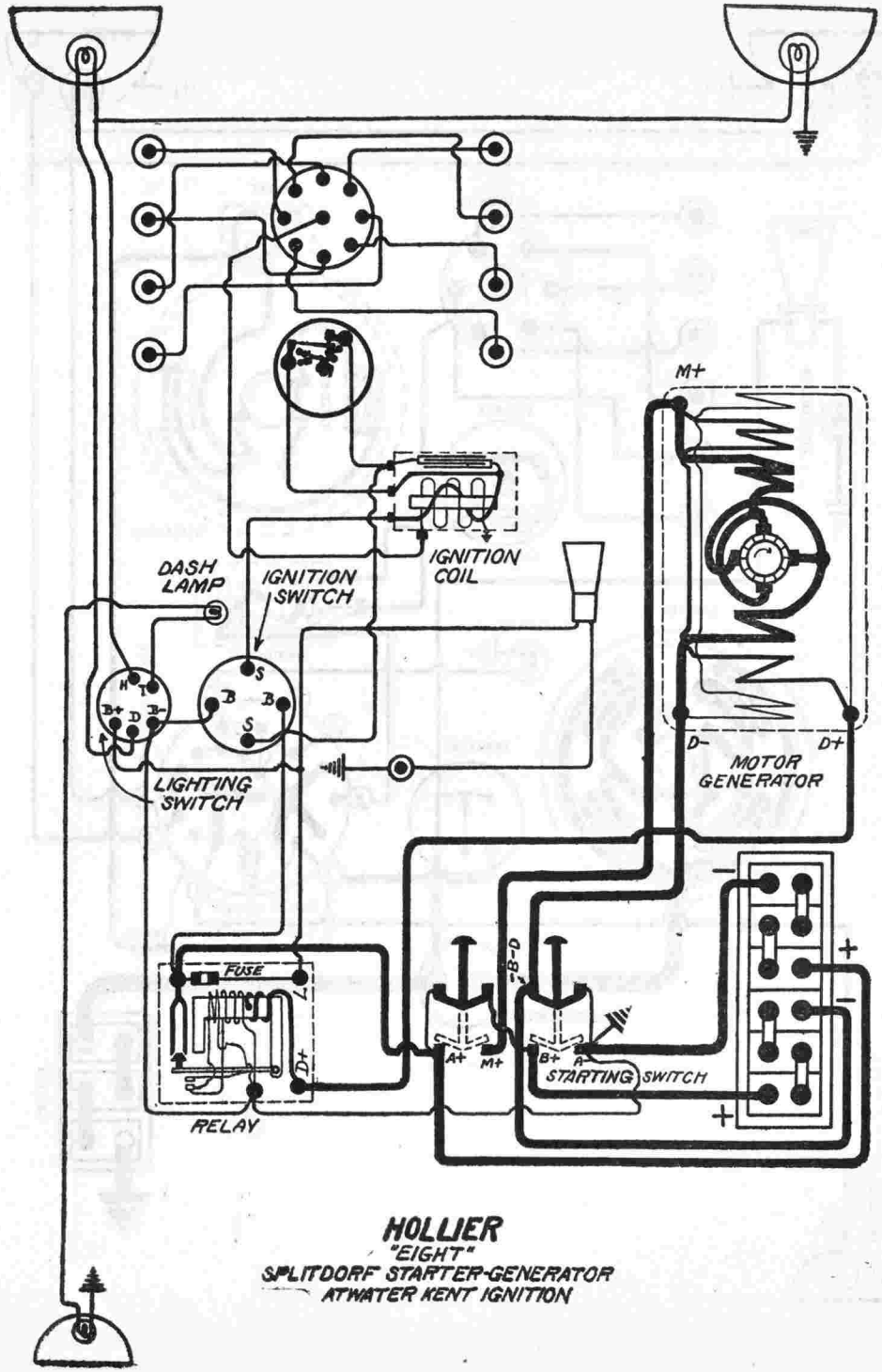
GENERATOR.—Generator current regulation is by reverse series field. Generator delivers 15 amperes at 1500 R.P.M. If it is necessary to operate generator with battery disconnected. connect terminal —D and +D on generator to prevent burning out of windings and lamps.

Oiling.—Put several drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

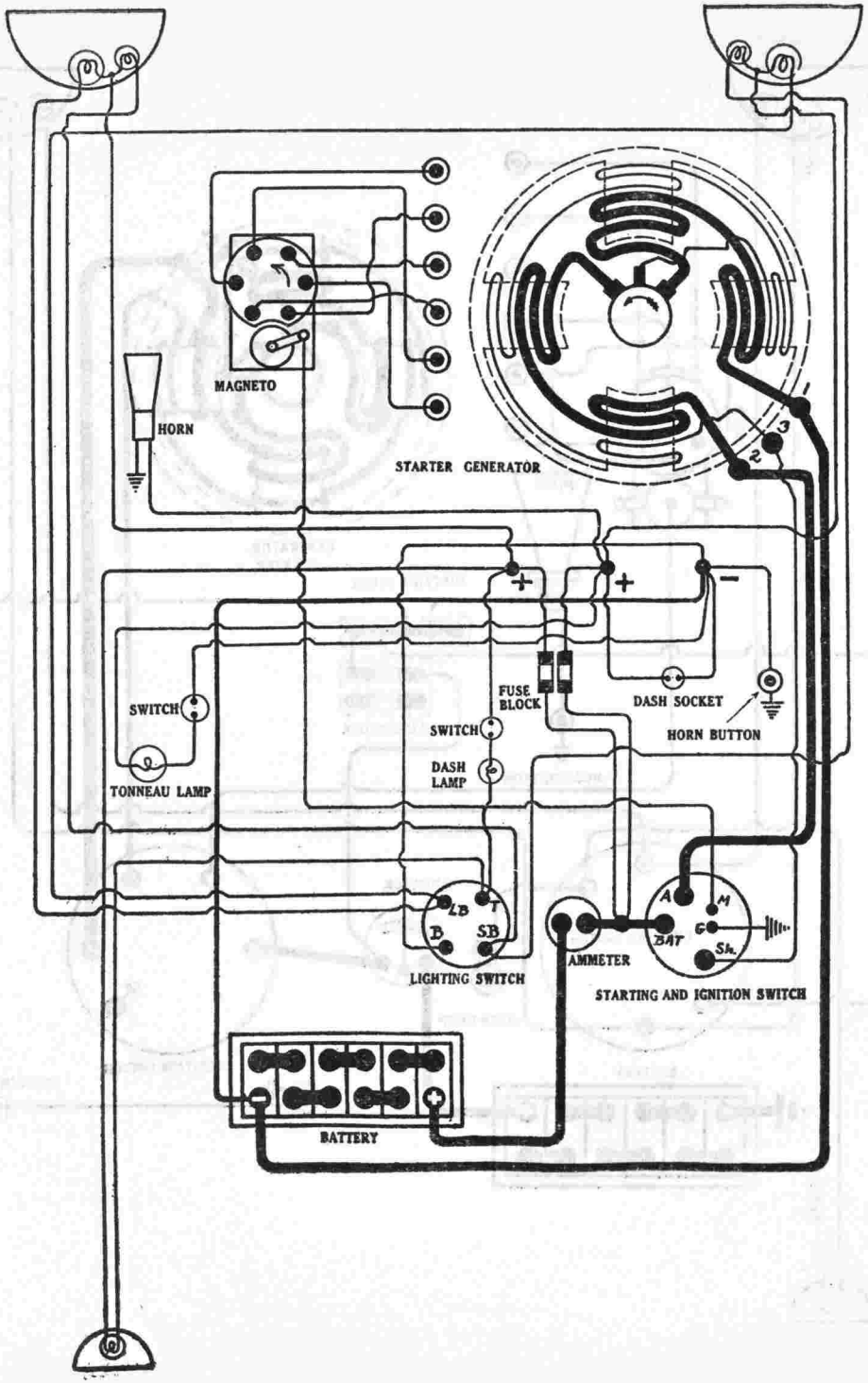
RELAY.—Cutout relay closes at 7-9 miles per hour and opens at 5-7 miles per hour. Charging current is 1-3 amperes at closing and the discharge current 0-1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dash and tail are 3-4 volt, 2cp. They are in series.

FUSES.—Fuse on back of indicating automatic switch (relay) is 15 ampere.



HOLLIER
"EIGHT"
SPLITDORF STARTER-GENERATOR
ATWATER KENT IGNITION



HOLMES

MODELS 1, 2, 3, 4 (1918-19-20-21)
DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
EISEMANN MAGNETO IGNITION

BATTERY.—Willard (1918-19). 12 volt, 100 ampere hour. **(1920-21) Type SJR-27.** 12 volt, 80 ampere hour. The two wire system is used.

IGNITION.—Eisemann, Type GSA-6. Breaker contacts separate .012 to .015 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 2 or 3 drops of light engine oil in each of the magneto oilers every month. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1½ inches before the indicator, spark control in the fully retarded position.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .028 inch.

STARTER-GENERATOR.—Model K4R. Starter-generator is connected to the engine through a chain drive. Starter cranks the engine at 200 R.P.M., current being 60 amperes. Lock torque is 40 pound-feet, current being 210 amperes, at 10.5 volts. Torque at 400 R.P.M. is 9 pound-feet, current being 60 amperes at 11 volts. Running freely starter current is 6.5 amperes at 11.5 volts, armature revolving at 700 R.P.M.

GENERATOR.—Generator current regulation is by third brush system. Maximum charging rate is 12 amperes, reached at 1650 R.P.M. of the armature or 18-20 miles per hour. Generator begins to supply current at 850 R.P.M. of the armature or 9-10 miles per hour.

Amperes	Generator Data	R.P.M.
0		850
5		975
12		1650
8		4000

Oiling.—Put 4 or 5 drops of light engine oil in each of the starter-generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, this oiling must be done every 500 miles.

RELAY.—There is no relay. The circuit between the generator and battery is controlled by the starting and ignition switch.

LAMPS.—Head lamps are 12-16 volt, 21 cp. Dimmer lamps are 12-16 volt, 6 cp. Dash and tail lamps are 12-16 volt, 2 cp. On the 1918-19-20 cars head lamps are 12-16 volt, 30 cp.

FUSES.—Fuses are 15 ampere.

HOLMES

SERIES 4 (1921-22-23-24)
DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
EISEMANN MAGNETO IGNITION

BATTERY.—Willard, Type SJR-27, 12 volt, 70 ampere-hour. **The negative (—) terminal is grounded.**

IGNITION:—Eisemann, Type GSA-6. Breaker contacts separate .012 to .015 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandapaper.

Oiling:—Put 2 or 3 drops of light engine oil in each of the magneto oilers every month. f the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

Timing:—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1½ inches before the indicator, spark control in the fully retarded position.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plug Gaps:—Spark plug gaps are .028 inch.

STARTER-GENERATOR:—Model K4R. Starter-generator is connected to the engine through a chain drive. Starter cranks the engine at 200 R.P.M., current being 60 amperes. Lock torque is 40 pound-feet, current being 210 amperes, at 10.5 volts. Torque at 400 R.P.M. is 9 pound-feet, current being 60 amperes at 11 volts. Running freely starter current is 6.5 amperes at 11.5 volts, armature revolving at 700 R.P.M.

GENERATOR:—Generator current regulation is by third brush system. Maximum charging rate is 12 amperes, reached at 1650 R.P.M. of the armature or 18-20 miles per hour. Generator begins to supply current at 850 R.P.M. of the armature or 9-10 miles per hour.

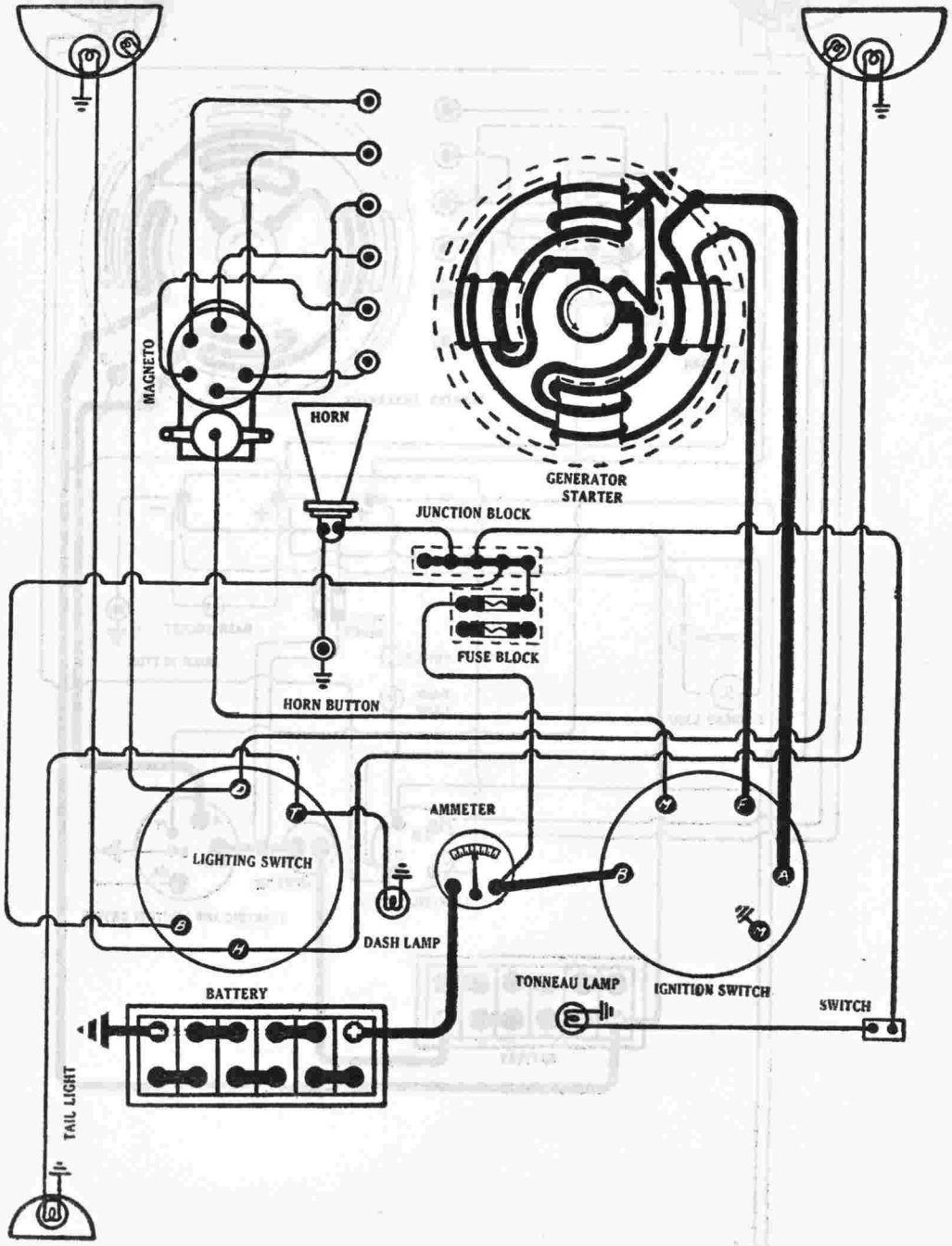
Amperes	Generator Data	R.P.M.
0		850
5		975
12		1650
8		4000

Oiling:—Put 4 or 5 drops of light engine oil in each of the starter-generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, this oiling must be done every 500 miles.

RELAY:—There is no relay. The circuit between the generator and battery is controlled by the starting and ignition switch.

LAMPS:—Head lamps are 12-16 volt, 21 cp. Dimmer lamps are 12-16 volt, 6cp. Dash and tail lamps are each 12-16 volt, 2 cp. Tonneau lamp is 12-16 volt, 2 cp.

FUSES:—Fuses are 15 ampere.



Hudson

Model 6-54 (1915)

Delco Generating, Starting and Lighting System

Delco Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded. There is also a set of 6 dry cells connected in series, so arranged that they may be switched into the ignition circuit should other sources of pressure fail.

Ignition.—Breaker contacts separate .010 inch. When contacts are closed, contact blade and clip separate .015 inch. See that pigtail conducting current to the contact blade is not disconnected. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper.

Oiling.—Put 3 or 4 drops of light engine oil in timer bearing oiler every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Timing.—Breaker contacts begin to separate when the mark "A—" on flywheel is at indicator, spark control lever and breaker assembly in the fully advanced position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .027 to .030 inch.

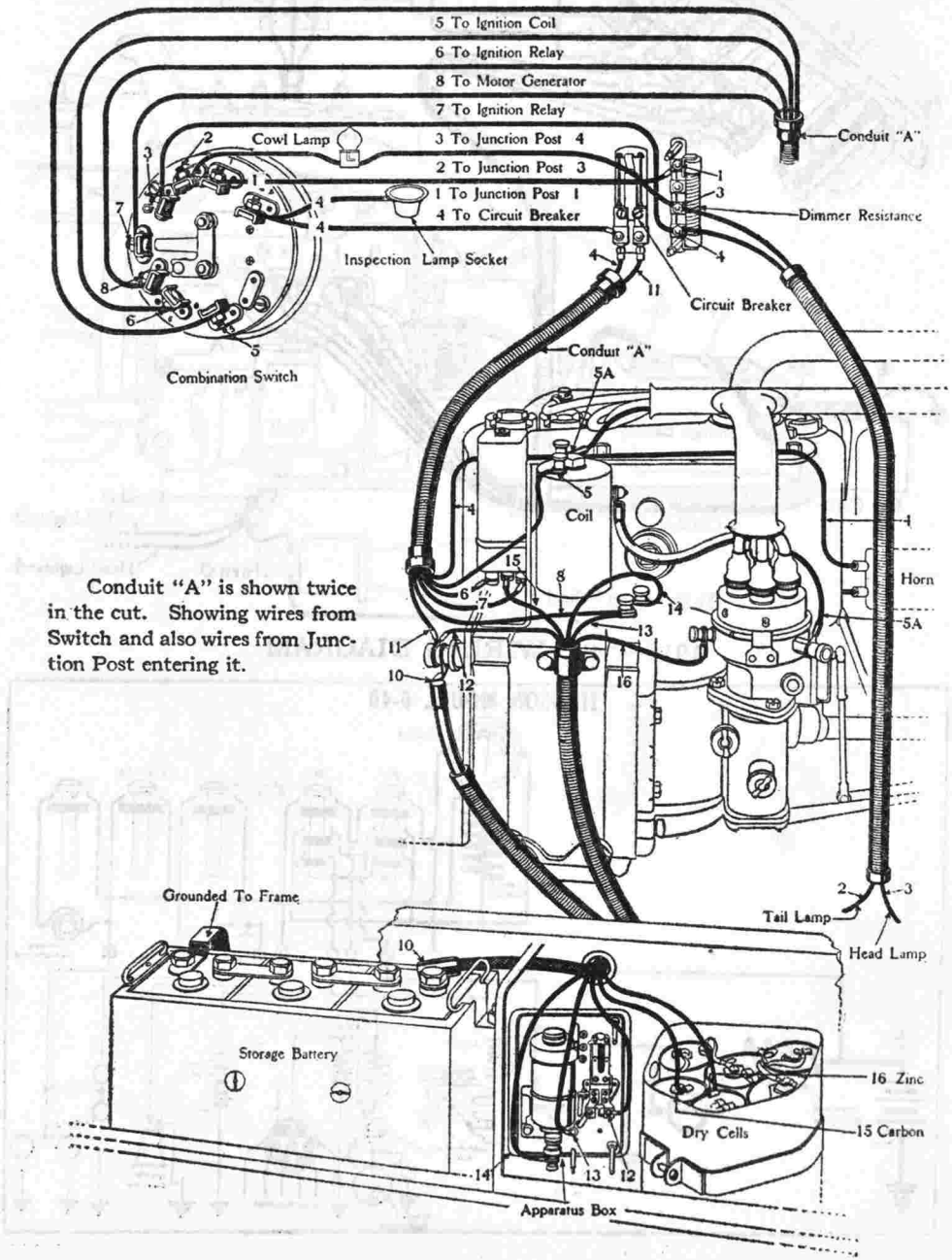
Starter-Generator.—Model No. 20. Starter and generator are combined into one unit, but are electrically separate. Starter is connected to engine through a set of reduction gears meshed by operator.

Generator.—Generator voltage regulation is by a mercury regulator. Maximum generator current of 18-20 amperes is reached at 20-25 miles per hour, or 1000-1500 R. P. M., of armature.

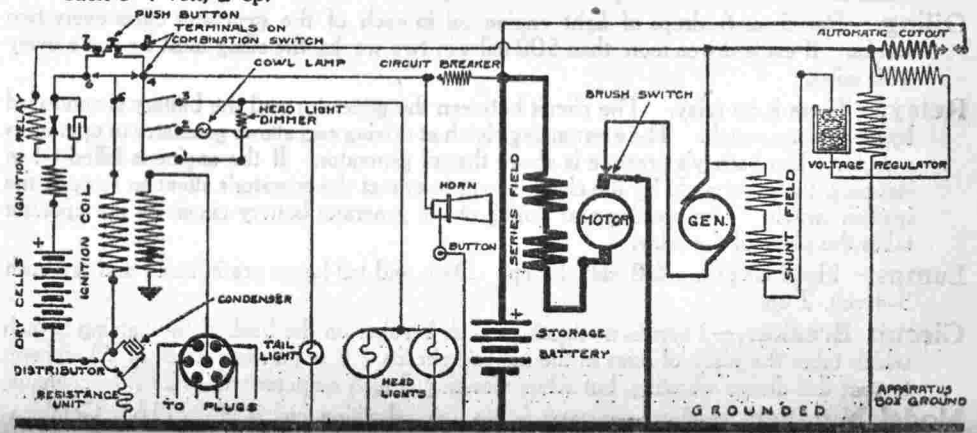
Oiling.—Put several drops of light engine oil in each of starter-generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles. Refill grease cup at end of idler gear shaft, with soft cup grease and turn down every month.

Relay.—Relay closes at 7-9 miles per hour or 400-450 R. P. M., of armature, and opens at 5-7 miles per hour, or 350-400 R. P. M., of armature. Charging current is 1 to 3 amperes at closing and the discharge current 0 to 1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are in series. They are each 3-4 volt, 2 cp.



Conduit "A" is shown twice in the cut. Showing wires from Switch and also wires from Junction Post entering it.



Hudson

Model 6-40 (1916) (Serial Nos. G-10001 to G-40000)
Delco Generating, Starting and Lighting System
Delco Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts separate .010 inch. When contacts are closed contact blade and clip separate .015 inch. See that pigtail conducting current to the contact blade is not disconnected. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper.

Oiling.—Put several drops of light engine oil in upper ball bearing every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Timing.—Breaker contacts begin to separate when the line "A" on the flywheel is at the indicator, spark control lever and breaker assembly in the fully advanced position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .027 to .030 inch.

Starter-Generator.—Starter and generator are combined into one unit, but are electrically separate. Starter is connected to the engine through a set of reduction gears meshed by the operator. Two overrunning clutches are provided. In connection with the ignition switch, a circuit is closed allowing a current to flow through the generator windings, causing the armature to revolve slowly, aiding the meshing of the reduction gears. One clutch permits this rotation, and also permits a relatively high speed of the armature, necessary when operating as a starter. The second overrunning clutch prevents the engine from driving the armature through the reduction gears. Depressing the starting pedal meshes the reduction gears, opens the generator circuit and allows the motor brush to come in contact with the commutator, closing the starter circuit and cranking the engine. When the pedal is released, a spring reverses these operations.

Generator.—Generator voltage regulation is by automatic field rheostat, operated from a governor on the distributor shaft.

GENERATOR DATA, MOTOR-GENERATOR No. 66

Amperes	R. P. M.
Neutral	350
5-11	500
16-20	900-1050
15	1125
9-14.5	1500

Charging rate is varied by changing regulating resistance spool. There are six different spools available namely, Nos. 633, 703, 702, 701, 817 and 955. No. 633 is wound with the largest wire, the sizes reducing in the order named. Installing a spool of larger wire increases the output. The spools have a wide brass cap at one end and a narrow cap at the other end. Minimum output with each spool is obtained when installed with the narrow cap at the bottom. The contact arm must bear on the resistance spool with a pressure of 6 ounces. A poor contact between the arm and spool will cause the generator to motor at excessive speed when the ignition switch is closed.

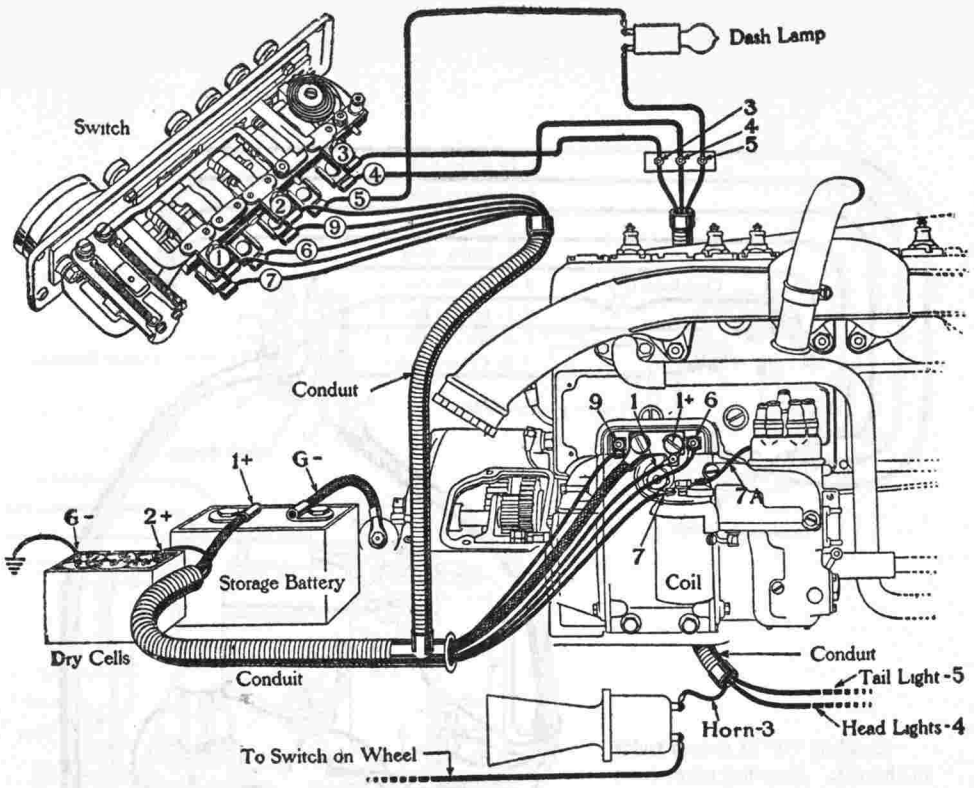
Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch. The overrunning clutch at driving end allows generator to operate as a motor when battery's pressure is above that of generator. If the engine is killed when stopping, the noise made by the clutch serves to attract the operator's attention to open the ignition switch. The opening and closing of the generator-battery circuit by the operator takes the place of the relay.

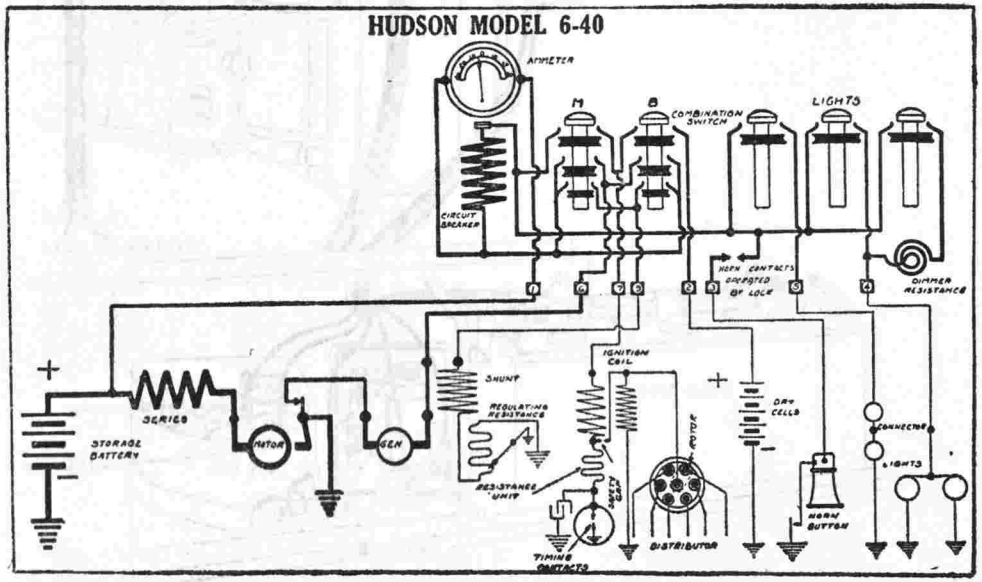
Lamps.—Head lamps are 6-8 volt, 17 cp. Dash and tail lamps are in series and are each 3-4 volt, 2 cp.

Circuit Breaker.—There is a vibrating circuit breaker on the back of the lighting switch which takes the place of fuses in the lighting circuits. It requires a current of 25 amperes to start this device vibrating, but when vibrating 3 to 5 amperes will cause it to continue.

Model Numbers.—Motor-generator is No. 66. Ignition coil is No. 2116. Combina-

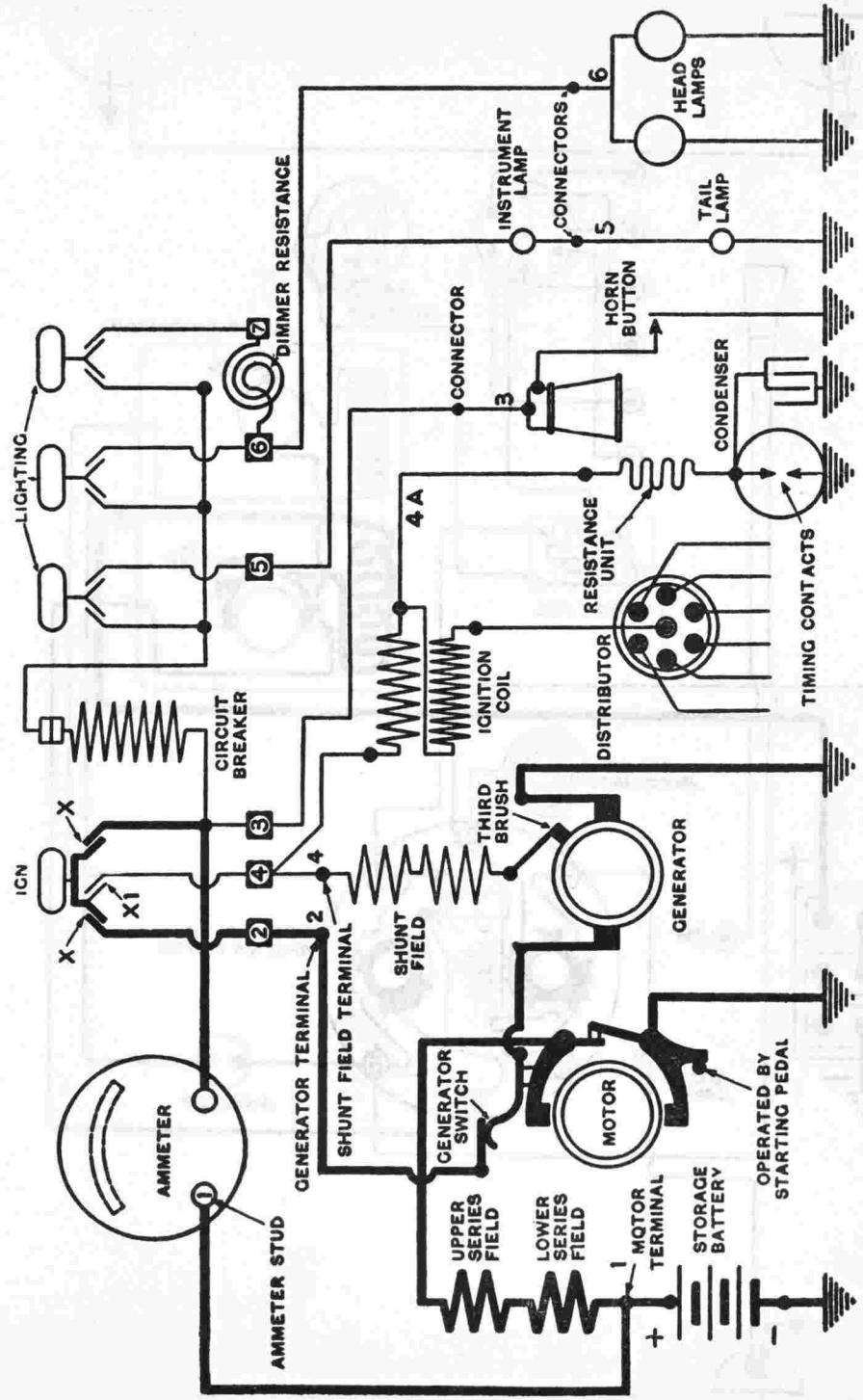


1916—"40" WIRING DIAGRAM



HUDSON

SUPER-SIX MODEL (1917-18)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION



Circuit Diagram

BATTERY.—Exide, Type 3X-15-1, 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2127. Distributor Model No. 5147. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone

TIMING.—Breaker contacts begin to separate when the flywheel mark "A—" is at the indicator, spark control lever and breaker assembly in the fully advanced position. The mark "A—" is one-half inch before the top dead center mark "DC 1 & 6".

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—The spark plug gaps are .025 to .028 inch.

OILING.—Put several drops of light engine oil in distributor bearing oiler every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles. Thoroughly clean out and repack driving gear housing with soft cup grease every six months.

STARTER-GENERATOR.—Model 82. Starter and generator are combined into one unit. Starter is connected to engine through a set of reduction gears and a pinion shifted by the operator. Raising and lowering of the motor brushes serves as a starting switch.

GENERATOR.—Generator current regulation is by third brush system. Generator begins to supply current at 6-8 miles per hour, or 450-500 R.P.M. of armature.

Generator Data

M.P.H.	Amperes	R.P.M.	Amperes
9	5	440	Neutral
12	10	880	8.0-11
18	16	1200	14.0-16
24	17	1400	14.0-16
30	15	2000	11.0-13
36	13	2500	8.5-10.5
42	11		

Machines should be tested hot. Output may be varied by adjusting third brush. Moving third brush in the direction of armature rotation will increase the output. Moving it in the opposite direction will decrease the output.

Oiling.—Put 6-8 drops of light engine oil in rear generator oiler every two weeks. Put oil in the front oiler until it begins to flow out the drain provided. All gears and sliding surfaces of the starter transmission must be kept well oiled.

Relay.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are in series. They are each 3-4 volt, 2 cp.

Circuit Breaker.—There is a vibrating type circuit breaker in the lighting switch to take the place of fuses in the light circuits. It should take 25 amperes to start this device vibrating, but once set vibrating, 3 to 5 amperes will cause it to continue.

Model Numbers.—Motor-generator is No. 82. Motor clutch is No. 12207. Ignition coil is No. 2127. Combination switch is No. 1106 on 1918 and No. 1071 on 1917 cars. Distributor is No. 5147 on 1918 and No. 5134 on 1917

HUDSON

SUPER-SIX, MODELS N AND O (1919-20)
DELCO GENERATING ,STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Exide, Type 3-X-15-1, 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2170. Distributor Model No. 5203. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or again the flat side of an emery wheel, finishing on a hard oil stone

OILING.—Put several drops of light engine oil in the distributor bearing oilers every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles. Thoroughly clean out and repack the driving gear housing with soft cup grease every six months.

TIMING.—Breaker contacts begin to separate when the flywheel mark "A—" is at the indicator, spark control lever and breaker assembly in the fully advanced position. The mark "A—" is one-half inch before the top dead center mark "DC 1 & 6".

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .028 inch.

STARTER-GENERATOR.—Model No. 140. Starter and generator are combined into one unit. Starter is connected to the engine through a set of reduction gears, meshed by the operator. Two overrunning clutches are provided. In connection with the ignition switch, a circuit is closed, allowing current to flow through the generator windings, causing the armature to revolve slowly, aiding the meshing of the reduction gears. One clutch permits this rotation, and also permits a relatively high speed of the armature, necessary when operating as a starter. The second overrunning clutch prevents the engine driving the armature through the reduction gears. Depressing the starter pedal meshes the reduction gears, opens the generator circuit, and allows the motor brushes to come in contact with the commutator, closing the starter circuit and cranking the engine. When the pedal is released, a spring reverses these operations.

GENERATOR.—Generator current regulation is by third brush system.

Amperes	Generator Data—Model No. 140	R.P.M.
0		440
8-11		800
14-16		1300
11-14		2000
8-11		2500

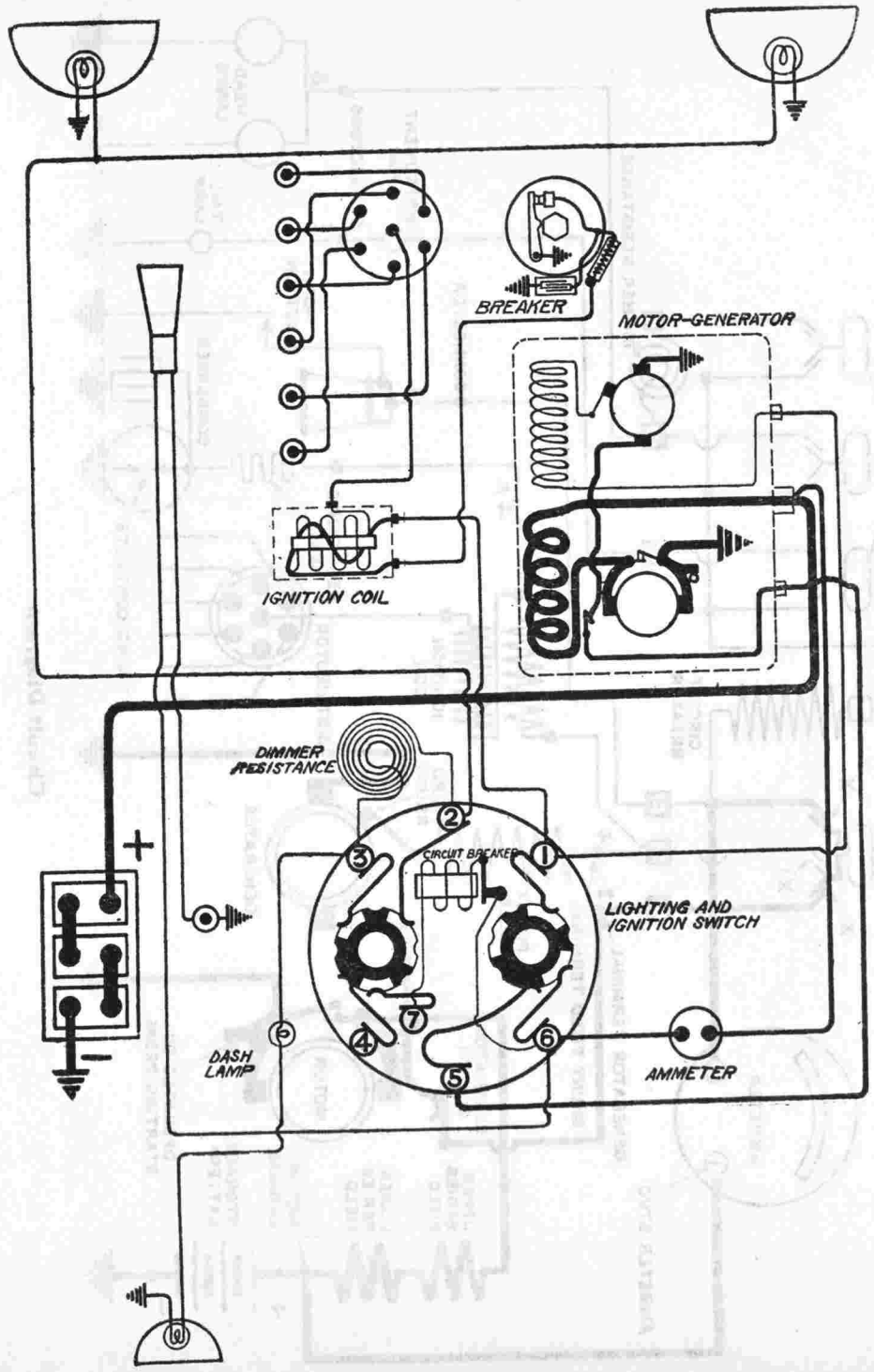
Charging rate is varied by adjusting the third brush setting. Loosen the two screws in the third brush arm, and lengthen the arm to increase the charging rate. Shorten the arm to decrease the charging rate. Reseat the brush after adjusting position.

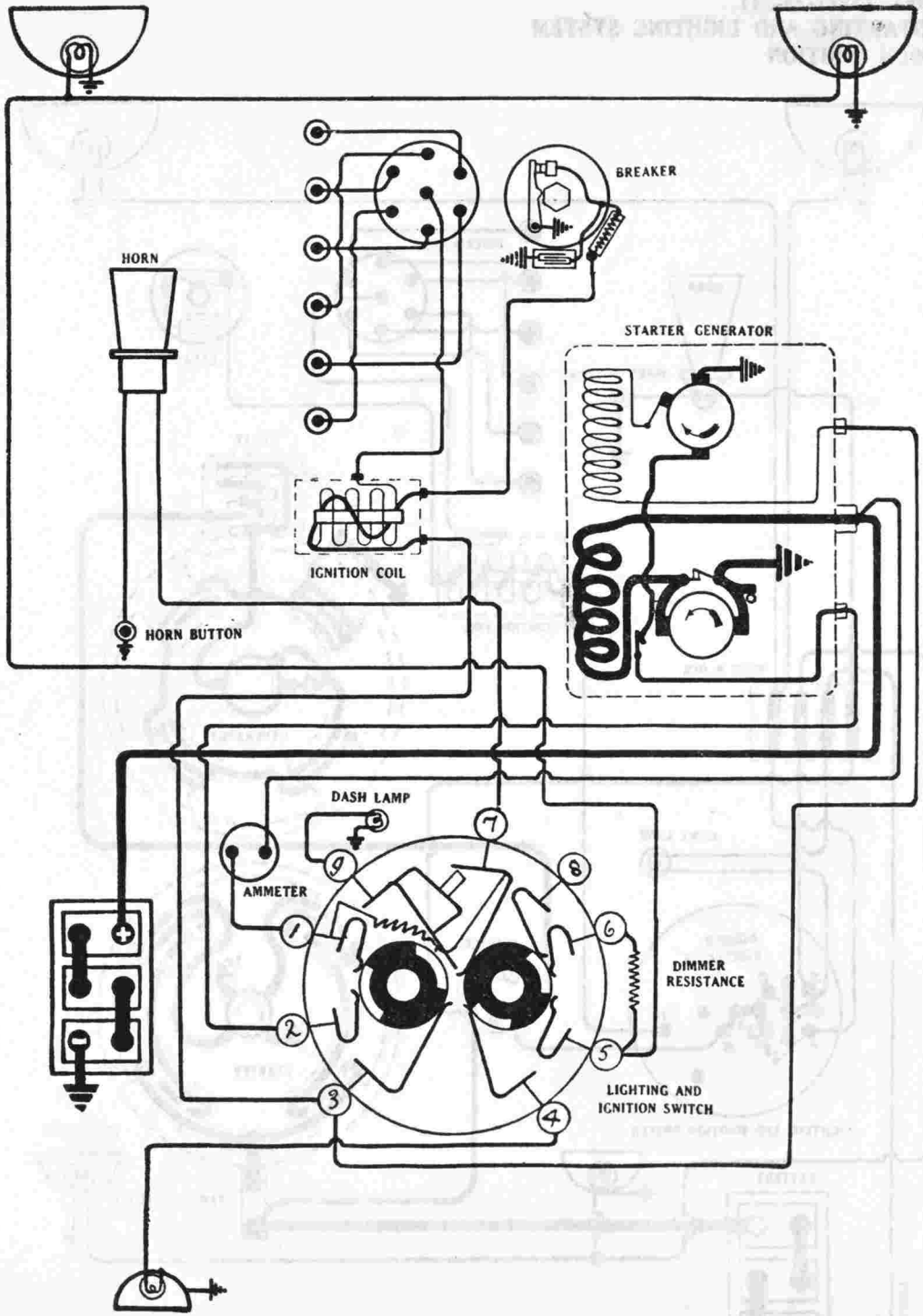
OILING.—Put 5 or 6 drops of light engine oil in each of the starter-generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are 3-4 volt, 2 cp.

CIRCUIT-BREAKER.—A vibrating circuit-breaker takes the place of fuses. It requires a current of 25 amperes to start the vibrator, but 3-5 amperes will cause it to





HUDSON

SUPER-SIX MODEL O (1921-22)
R.H.D. EXPORT MODEL (1923)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Exide, Type EX-15-1, 6 volt, 105 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2170. Distributor Model No. 5223. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Put several drops of light engine oil in the distributor bearing oilers every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles. Thoroughly clean out and repack the driving gear housing with soft cup grease every six months.

Timing.—Breaker contacts begin to separate when the flywheel mark "A—" is at the indicator, spark control lever and breaker assembly in the fully advanced position. The mark "A—" in one-half inch before the top dead center mark "DC1 & 6".

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .025 to .028 inch.

STARTER-GENERATOR.—Model No. 188. Starter and generator are combined into one unit. Starter is connected to the engine through a set of reduction gears meshed by the operator. Two overrunning clutches are provided. In connection with the ignition switch, a circuit is closed, allowing current to flow through the generator windings, causing the armature to revolve slowly, aiding the meshing of the reduction gears. One clutch permits this rotation, and also permits a relatively high speed of the armature, necessary when operating as a starter. The second overrunning clutch prevents the engine driving the armature through the reduction gears. Depressing the starter pedal meshes the reduction gears, opens the generator circuit, and allows the motor brushes to come in contact with the commutator, closing the starter circuit and cranking the engine. When the pedal is released, a spring reverses these operations.

GENERATOR.—Generator current regulation is by third brush system.

Amperes	Generator Data. Model No. 188	R.P.M.
Neutral		600
6		800
10-12		1000
15		2000

Charging rate is varied by adjusting the third brush setting. Loosen the two screws in the third brush arm, and lengthen the arm to increase the charging rate. Shorten the arm to decrease the charging rate. Reseat the brush after adjusting position.

Oiling.—Put 5 or 6 drops of light engine oil in each of the starter-generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dash and tail lamps are 6-8 volt, 2 cp. On 1921 cars head lamps are 6-8 volt, 15 cp.

CIRCUIT-BREAKER.—A vibrating circuit-breaker takes the place of fuses. It requires a current of 25 amperes to start the vibrator, but 3-5 amperes will cause it to continue.

HUDSON

SUPER-SIX MODEL (1922-23-24)
AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

BATTERY.—Exide, Type 3-XC-15-1, 6 volts, 106 ampere-hour capacity. The starting capacity is 114 amperes for 20 minutes. The lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model TC-30. Compensating Timer-Distributor Model TC-6100. The direction of rotation of the distributor is clockwise, looking from the top of the distributor. The coil is mounted on the engine side of dash and is dust and waterproof. The timer-distributor is mounted on the right side of the engine over the gear housing. Contacts are made of tungsten and separate .020 inch. Contact surface should be flat. When the condition of the contact points affects the ignition, remove and resurface with a fine, flat jeweler's file or on a medium hard oilstone. If the points are excessively worn, they should be replaced.

Oiling.—Fill distributor oiler on the side of the distributor housing with light engine oil. Put one drop of oil (less rather than more) on the interrupter lever pivot. Place a bit of grease or vaseline about the size of a match head on the side of the interrupter fibre block nearest to the pivot post. Follow closely the above lubrication directions every month. If the car is driven more than 1000 miles in a month, care must be given every 1000 miles.

Timing.—Breaker contact points begins to separate when the flywheel marking is opposite the indicator on flywheel case with No. 1 piston on the compression stroke, and spark control lever and breaker assembly fully advanced. To adjust timing, place spark control lever in fully advanced position, loosen clamping screw on timer arm and turn the distributor housing opposite to direction of rotation of the rotor shaft until points just open. Tighten the clamping screw, being careful not to disturb the relative position of the timing arm and housing.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plugs.—Spark plugs diameters are of the metric scale, gaps are .030 inch.

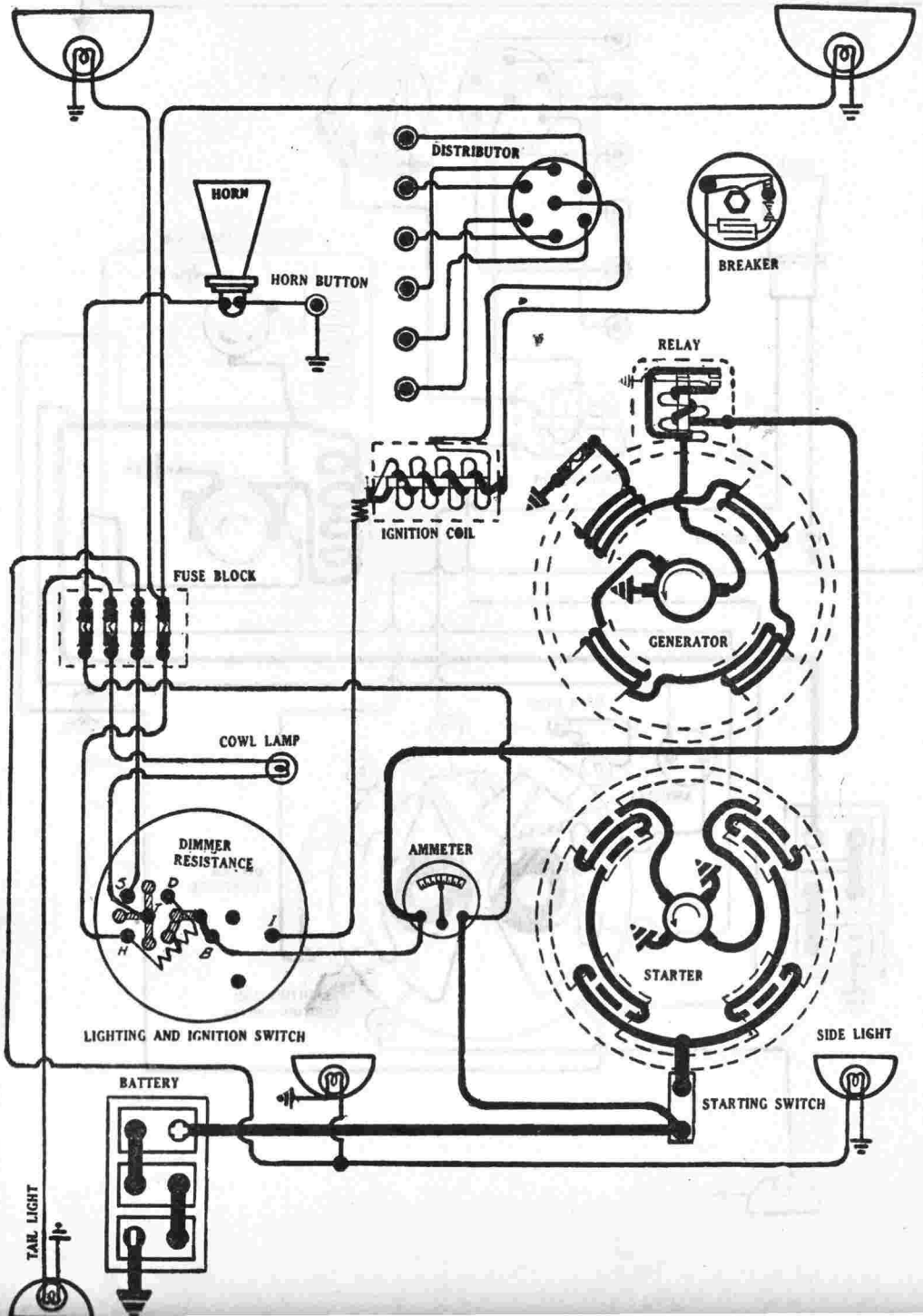
STARTER.—Model No. 926. The starter is a four pole, series wound motor. Starting mechanism, which is operated by foot pedal, carries an over-running clutch. See that motor connections are tight and clean. Keep commutator clean wiping it off with a clean cloth slightly moistened with gasoline. Wipe dry before operating. Motor takes 125-200 amperes to crank engine at 150 R.P.M. The direction of rotation is counter-clockwise, looking at commutator end.

Starter Test Data.

R.P.M.	Amperes	Volts	Torques	H.P.
3800	70.0	5.75	0	0
2250	100.0	5.7	0.6 lb. ft.	0.3
1000	200.0	4.0	3.6 lb. ft.	0.65
500	300.0	4.5	7.0 lb. ft.	0.76
250	400.0	4.0	11.0 lb. ft.	0.5
Lock	525.0	3.5	16.25 lb. ft.	0.0

Oiling.—Fill oilers on each end of starter with light engine oil once every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

GENERATOR:—Model No. 1217, 1238, 1252. Direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. The charging rate is varied by loosening the screws on the commutator end plate and moving the third brush in the direction of rotation (counter-clockwise) to increase the output, and the reverse direction to decrease the charging rate. The maximum charging rate is 14-15 amperes at 8 volts, reached at 1100 R.P.M. of generator armature. See that the commutator is not dirty or pitted.



HUDSON

SUPER-SIX MODEL (1922-23-24)
AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

Clean commutator by holding a piece of cloth slightly moistened with gasoline against it. Wipe dry before operating. If the commutator is rough or slightly pitted, smooth it by using No. 00 Sandpaper. Brush contact surface must conform to the curvature of the armature.

Generator Test Data

Amperes	Volts Cold Test	R.P.M.	Amperes	Volts Hot Test	R.P.M.
0.0	7.0	400	0.0	6.8	450
8.0	7.4	600	4.0	7.2	600
12.0	7.8	800	7.5	7.5	800
14.3 (Max.)	8.0	1100	10.3 (Max.)	7.6	1200
10.6	8.0	2000	8.5	7.7	2000
7.8	7.6	3000	6.2	7.2	3000

Field Amperes (Cold)

R.P.M.	600	1200	1600	2000	3000
Amperes	2.9	2.1	1.6	1.3	0.7

Oiling.—Put 4 or 5 drops of light engine oil into each of the generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Relay closes at 6.5-7.5 volts, and opens at 0-2 amperes discharge. Relay contacts separate .015 inch, and the air gap between relay armature and coil core is .010 inch, contacts closed. The relay is mounted on top of the generator frame and is enclosed within a metal case. To adjust relay connect ammeter in series with battery and gradually slow down generator. The contacts should open at the limits given above. Adjust by loosening or tightening the adjusting screws on the side of the relay. Be sure to resolder the screw after adjustment so as to eliminate the possibility of the screw becoming loose and changing the tension. Clean the contacts by drawing fine sandpaper between them.

LIGHTING.—**Type S-106 Switch** is used. The switch is mounted on the dash and is supplied with two faced levers one for controlling the lighting system and the other for operating the ignition system. The terminals on the back of the switch are marked for proper connections wires. Head lights are 6-8 volts, 21 cp., S.C. Side lamps are 6-8 volts, 2 cp., S.C. Dash and tail lights are connected in series. They are each 3-4 volts, 2 cp., D.C. and S.C. respectively.

FUSES.—Generator fuse is 5 amperes. All lighting and other fuses are 10 amperes.

HUDSON

SUPER-SIX (1925)

AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION.

BATTERY:—Prest-O-Lite, Type 615-JFK. 6 volt, 100 ampere hour. The starting capacity is 120 amperes for 20 minutes. The lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. TC-30. Distributor Model T-6100. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine flat jeweler's file or on a medium hard oilstone. If excessively worn, points should be replaced.

Oiling:—Fill the oiler on the side of the distributor housing with light engine oil and place one drop of oil on the interrupter lever pivot every month or each 1000 miles if the car is driven more than 1000 miles in a month. Place a small bit of medium heavy cup grease on the face of the breaker cam every month.

Timing:—Breaker contacts begin to separate when the flywheel marking "A" is opposite the indicator on the flywheel housing with piston No. 1 on compression stroke and manual spark control lever in the fully advanced position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are metric. Gaps should be .025 inch.

STARTER:—Model No. 926. Starter is connected to the engine through a manual gear shift incorporating a set of reduction gears and an overrunning clutch. Pressing down on the starting pedal meshes the gears and closes the starting switch allowing the starter to crank the engine. When the pedal is released, a spring reverses these operations. The starter cranks the engine at 150 R.P.M. taking 125 to 200 amperes. Rotation is counter-clockwise, looking at the commutator end.

Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3800	5.75	70
3.6 "	1000	4	200
7 "	500	4.5	300
16.25 "	Lock	3.5	525

Oiling:—Starter is equipped with oilless bearings. They require no attention.

GENERATOR:—Model No. 1274, 1281. Direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the charging rate, loosen the screws holding the inner commutator end plate upon which the third brush is mounted, and shift the brush. Shifting the third brush in the direction of generator rotation increases the charging rate and in the opposite direction decreases the charging rate. Tighten the screws after making the adjustment.

Generator Data.

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
3	6.75	600	3	6.5	725
7	7.1	700	8	7.5	900
13	7.6	900	10	7.8	1000
17	8	1300	13	8	1350
13	8	1950	11	7.8	2000

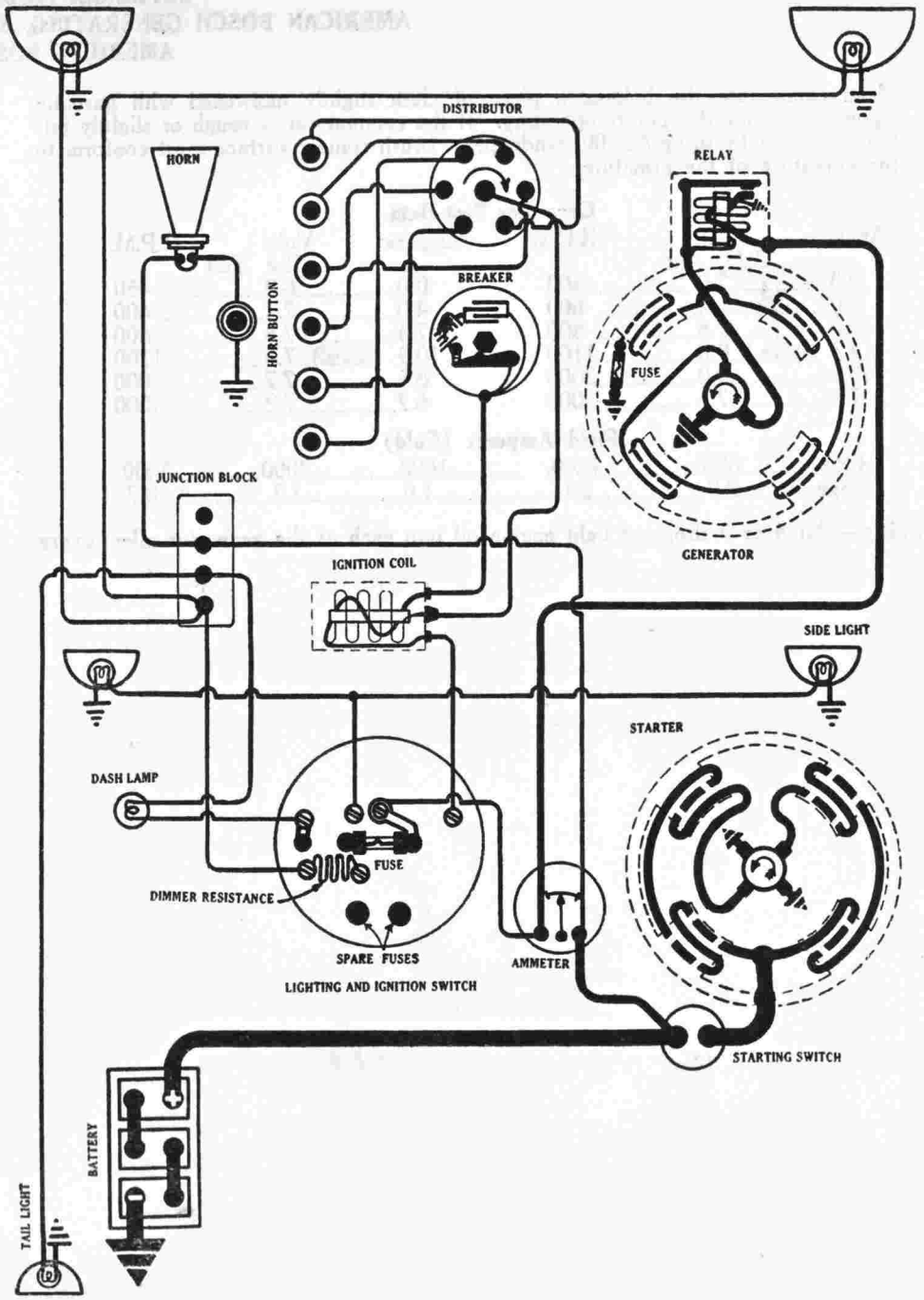
Operating as a motor, the generator draws 6 amperes at 6 volts. The brush spring tension should be 1½ to 1¾ pounds each. The shunt field draws 6.6 amperes at 6 volts.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Relay is mounted on top of the generator. Contacts close when the voltage to 3 amperes. Relay contacts separate .015 inch. Air gap between the relay of the generator reaches 6.5 to 7.5 volts and open with a discharge current of 1 armature and coil core is .010 inch, contacts closed. The resistance of the shunt coil is 45 ohms.

LIGHTING:—Head lamps are 6-8 volt, 21 cp.S.C. Side lamps are 6-8 volt, 2 cp.S.C. Dash and tail lamps are connected in series. They are 3-4 volt, 2 cp. D.C. and S.C. respectively.

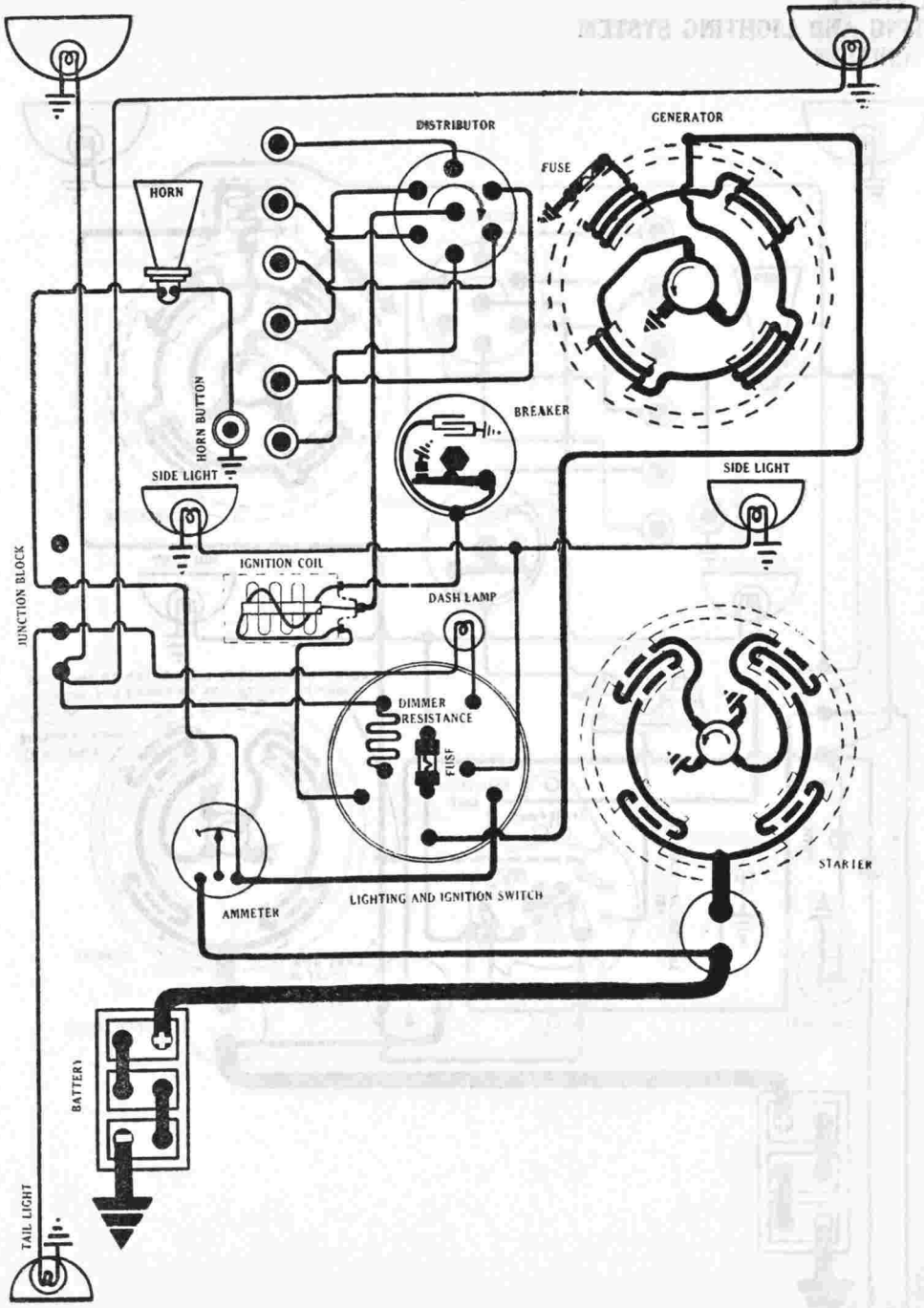
FUSES:—Generator field fuse is 7.5 amperes. Lighting fuse is 20 amperes. Two



HUDSON

SUPER-SIX (1926)

AMERCAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION



BATTERY:—Prest-O-Lite, Type 615-JFK. 6 volt, 100 ampere hour. The starting capacity is 120 amperes for 20 minutes. The lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. TC-30. Distributor Model T-6322. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine flat jeweler's file or on a medium hard oilstone. If excessively worn, points should be replaced.

Oiling:—Fill the oiler on the side of the distributor housing with light engine oil and place one drop of oil on the interrupter lever pivot every month or each 1000 miles if the car is driven more than 1000 miles in a month. Place a small bit of medium cup grease on the face of the breaker cam every month.

Timing:—Breaker contacts begin to separate when the flywheel marking "A" is opposite the indicator on the flywheel housing with piston No. 1 on compression stroke and manual spark control lever in the fully advanced position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are metric. Gaps should be .025 inch.

STARTER:—Model No. 949. Starter is connected to the engine through a manual gear shift incorporating a set of reduction gears and an overrunning clutch. Pressing down on the starting pedal meshes the gears and closes the starting switch allowing the starter to crank the engine. When the pedal is released, a spring reverses these operations. The starter cranks the engine at 150 R.P.M. taking 125 to 200 amperes. Rotation is counter-clockwise, looking at the commutator end.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3800	5.75	70
3.6 "	1000	4	200
7 "	500	4.5	300
16.25 "	Lock	3.5	525

Oiling:—Starter is equipped with oilless bearings. They require no attention.

GENERATOR.—Model No. 1282. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the charging rate, insert a special Bosch key in the hole on the generator end plate above the bearing retainer plate and shift the third brush by turning the key. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. The third brush may be shifted by hand by removing the commutator cover band.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
3	6.75	600	3	6.5	725
7	7.1	700	8	7.5	900
13	7.6	900	10	7.8	1000
17	8	1300	13	8	1350
13	8	1950	11	7.8	2000

Operating as a motor, the generator draws 6 amperes at 6 volts. The brush spring tension should be 1½ to 1¾ pounds each. The shunt field draws 6.6 amperes at 6 volts.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—No relay is used. The circuit between the generator and the battery is controlled by the ignition switch. Turning off the ignition disconnects the generator and prevents the battery discharging.

LIGHTING:—Head lamps are 6-8 volt, 21 cp. S.C. Side lamps are 6-8 volt, 2 cp. S.C. Dash and tail almps are connected in series. They are 3-4 volt, 2 cp. D.C. and S.C. respectively.

Switch:—Lighting switch is Model S-125.

FUSES:—Generator field fuse is 7.5 amperes. Lighting fuse is 20 amperes. Two spare fuses are provided in a holder at the bottom of the switch.

NOTE:—A windshield wiper and stop light are used on some cars. They are connected to the 'Horn' terminal of the junction block.

HUDSON

SUPER-SIX (1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

BATTERY:—Prest-O-Lite, Type 6-15-JFK, 6 volt. Starting capacity is 120 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model CE-4001. Distributor Model IGA-4011. Breaker contacts are set to separate when new at .020-.024 inch; after 800 to 1000 miles operating contacts should be checked and set, if necessary, at .018-.020 inch. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone.

Oiling:—Put 6 or 8 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Put one drop of oil in the breaker arm pivot pin every week or each 250 miles. Place a small bit of vaseline on the face of the breaker cam under the fiber bumper every 5000 miles.

Timing:—Breaker contacts begin to separate when piston No. 1 on compression stroke reaches a position when the flywheel marking "A" is opposite the mark on the flywheel case. The manual advance lever must be in the fully advanced position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are Metric standard. Gaps are .025 inch.

STARTER:—Model MUA-4001 (R.H. Drive), Model MUA-4002 (L.H. Drive). Starter is connected to the engine through a sliding gear shift built in the starting switch. Pressing down on the starting pedal meshes the gears and closes the starting switch. When the pedal is released a spring reverses these operations. Starter brush tension should be 1¾-2¼ pounds each. Starter cranks the engine at 110 R.P.M. taking 250 amperes at 5.5 volts.

Starter Data
Model MUA-4001

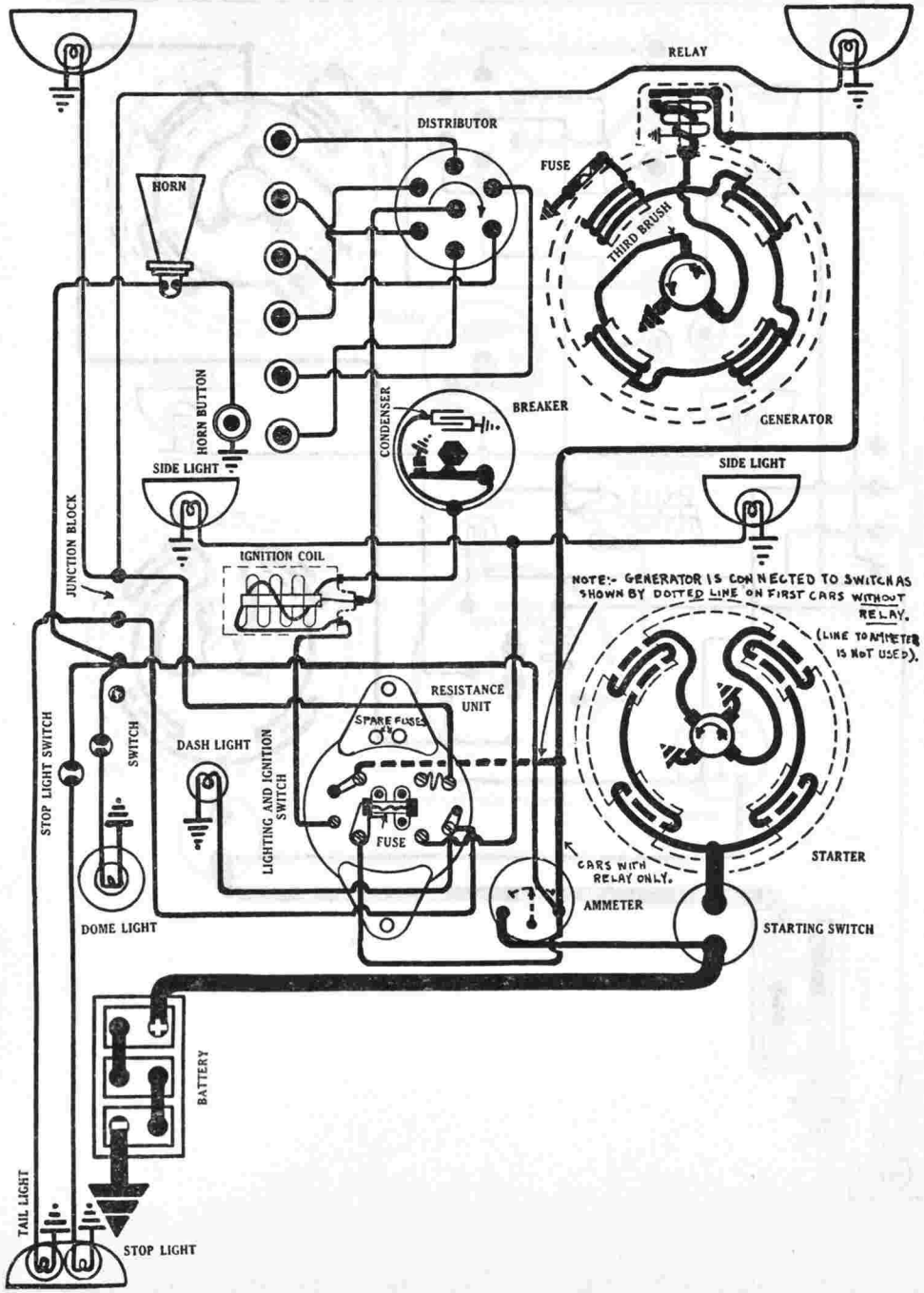
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4200	6	50
2 "	1500	5.3	130
4 "	1000	5.0	200
6 "	600	4.6	275
8 "	450	4.2	340
12.7 "	Lock	3.6	480

Starter Data
Model MUA-4002

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4200	6	50
2 "	1500	5.3	130
4 "	1000	5.0	200
6 "	600	4.6	275
8 "	450	4.2	340
22 "	Lock	3.5	500

Oiling:—Starter has oilless graphite-bronze bearings. They require no attention.

GENERATOR:—Model GAB-4001. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush sys-



HUDSON

SUPER-SIX (1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

tem. To adjust charging rate, remove commutator cover band and shift the third brush mounting plate by tapping on the mounting lug with a screwdriver. Shift the third brush in counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The mounting plate is held in any desired position by the friction between the mounting lug and the generator end plate. Maximum charging rate of 17.5 amperes is reached at 1300 R.P.M. of the generator.

Generator Data

Cold Test (72°F)			Hot Test (206°F)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
4	6.8	630	4	6.8	750
10	7.4	780	10	7.6	1000
14	7.8	950	13	8.0	1400
17	8.0	1300	11	7.8	2000
13	7.8	1950			

Motoring freely at 355-390 R.P.M. generator draws 4.7-5.2 amperes at 6 volts. Shunt field current is 6.1-6.8 amperes at 6 volts. Tested separately each coil draws 24.4-27.2 amperes at 6 volts. Generator brush tension should be 1.0-1.5 pounds

Generator GAB 4008 has a 7½ ampere field fuse mounted on top of generator just forward of commutator end head. It also carries a circuit breaker mounted on top of the generator just forward of the field fuse. (Further data on relay is given under RELAY.)

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—On generator GAB 4001 no relay is used. The generator is connected to the battery through the ignition switch. With engine stopped and ignition switch on battery discharges through generator windings.

On generator GAB 4008 relay model CB-4014 is used. Relay closes at 545-620 generator R.P.M. at 7.9 volts. Charging current at closing of contacts not over 5 amperes. Contacts separate .025-.035 inch. Air gap is .010-.030 inch with points closed.

LIGHTING:—Clum Switch Model 10643. Auto-Lite No. XA-319. Head and stop lamps are each 6-8 volt, 21 cp. S. C. Side, dash and tail lamps are each 6-8 volt, 3 cp. S. C.

FUSES:—Lighting fuse mounted on switch is 20 amperes.

HUDSON

SUPER-SIX (1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

BATTERY:—Prest-O-Lite, Type 6-15-JFK, 6 volt. Starting capacity is 120 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model CE-4001. Distributor Model IGA-4023 and IGA-4024. Breaker contacts separate .020-.024 inch when new. After 1000 miles of operation contact gap should be set at .018-.020 inch. Resurface contacts whenever necessary with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 25° (engine). Automatic advance begins at 400 R.P.M. (engine). Maximum automatic advance is 50° (engine) at 3200 R.P.M. Breaker arm spring tension is 18-20 ounces. Distributor is fitted with an Electro-lock. When distributor is removed for servicing, the Electro-lock must be removed with the distributor.

Oiling:—Put 6 or 8 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Put one drop of oil in the breaker arm pivot every week or each 250 miles. Place a small bit of vaseline on the face of the breaker cam under the fiber bumper every 5000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 1¼ inches (on the flywheel) before top dead center with the spark control lever in the fully advanced position. To set timing, crank engine until piston No. 1 reaches this position. The flywheel mark will then be opposite the indicator visible through crankcase opening.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are Metric standard. Gaps are .025 inch.

STARTER:—Model MUA-4001 (R.H. Drive), Model MUA-4002 (L.H. Drive). Starter is connected to the engine through a sliding gear shift built in the starting switch. Pressing down on the starting pedal meshes the gears and closes the starting switch. When the pedal is released a spring reverses these operations. Starter brush tension should be 1¾-2¼ pounds each. Starter cranks the engine at 110 R.P.M. taking 250 amperes at 5.5 volts.

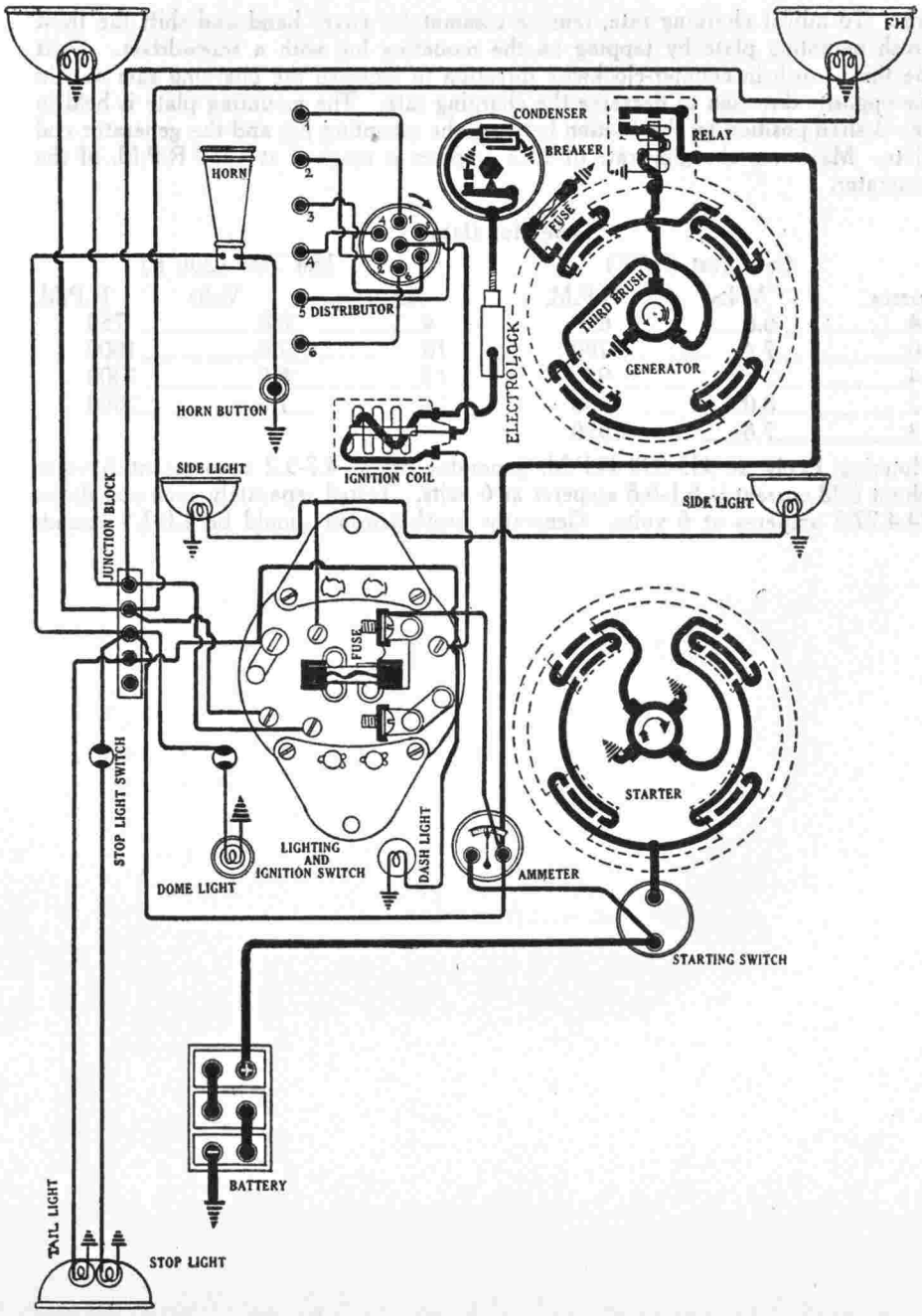
Starter Data
Model MUA-4001

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4200	6	50
2 "	1500	5.3	130
4 "	1000	5.0	200
6 "	600	4.6	275
8 "	450	4.2	340
12.7 "	Lock	3.6	480

Starter Data
Model MUA-4002

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4200	6	50
2 "	1500	5.3	130
4 "	1000	5.0	200
6 "	600	4.6	275
8 "	450	4.2	340
22 "	Lock	3.5	500

Oiling:—Starter has oilless graphite-bronze bearings. They require no attention.



HUDSON

SUPER-SIX (1927)

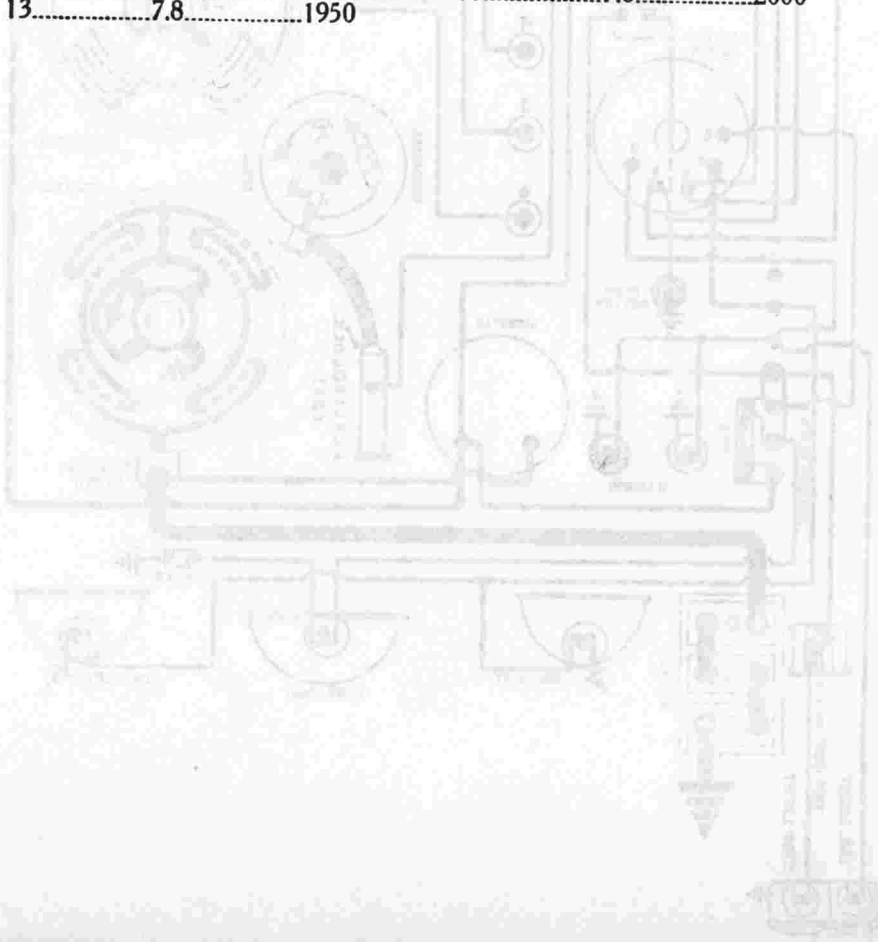
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

GENERATOR:—Model GAB-4008. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust charging rate, remove commutator cover band and shift the third brush mounting plate by tapping on the mounting lug with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The mounting plate is held in any desired position by the friction between the mounting lug and the generator endplate. Maximum charging rate of 17.5 amperes is reached at 1300 R.P.M. of the generator.

Generator Data

Cold Test (72°F)			Hot Test (206°F)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
4	6.8	630	4	6.8	750
10	7.4	780	10	7.6	1000
14	7.8	950	13	8.0	1400
17	8.0	1300	11	7.8	2000
13	7.8	1950			



Motoring freely at 355-390 R.P.M. generator draws 4.7-5.2 amperes at 6 volts. Shunt field current is 6.1-6.8 amperes at 6 volts. Tested separately each coil draws 24.4-27.2 amperes at 6 volts. Generator brush tension should be 1.0-1.5 pounds.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Model CB-4014. Relay is mounted on the generator. Relay contacts close at 545-625 R.P.M. when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current must not exceed 5 amperes at closing of contacts. Contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Clum Switch Model 10643. Auto-Lite No. XA-319. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. instead of dimming. Stop lamp is 6-8 volt, 21 cp. S.C. Side, dash and tail lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Generator field fuse is 7.5 amperes. Lighting ruse on switch is 20 amperes.

HUDSON

'SUPER SIX' (1928)

AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—Prest-O-Lite, Type 6-15-JFK, 6 volt. Starting capacity (20 minute rate) is 120 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model CE-4001. Distributor Model IGA-4023 and IGA-4024. Breaker contacts separate .020-.024 inch when new. After 1000 miles of operation contact gap should be set at .018-.020 inch. Resurface contacts whenever necessary with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 25 degrees (engine). Automatic advance begins at 400 R.P.M. (engine). Maximum automatic advance is 50 degrees (engine) at 3200 R.P.M. Breaker arm spring tension is 18-20 ounces. Distributor is fitted with an Electrolock. When distributor is removed for servicing, the Electrolock must be removed with the distributor.

Oiling:—Put 6 or 8 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Put one drop of oil in the breaker arm pivot every week or each 250 miles. Place a small bit of vaseline on the face of the breaker cam under the fiber bumper every 5000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 1¼ inches (on the flywheel) before top dead center with the spark control lever in the fully advanced position. To set timing, crank engine until piston No. 1 reaches this position. The flywheel mark will then be opposite the indicator visible through crankcase opening.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are Metric standard. Gaps are .025 inch.

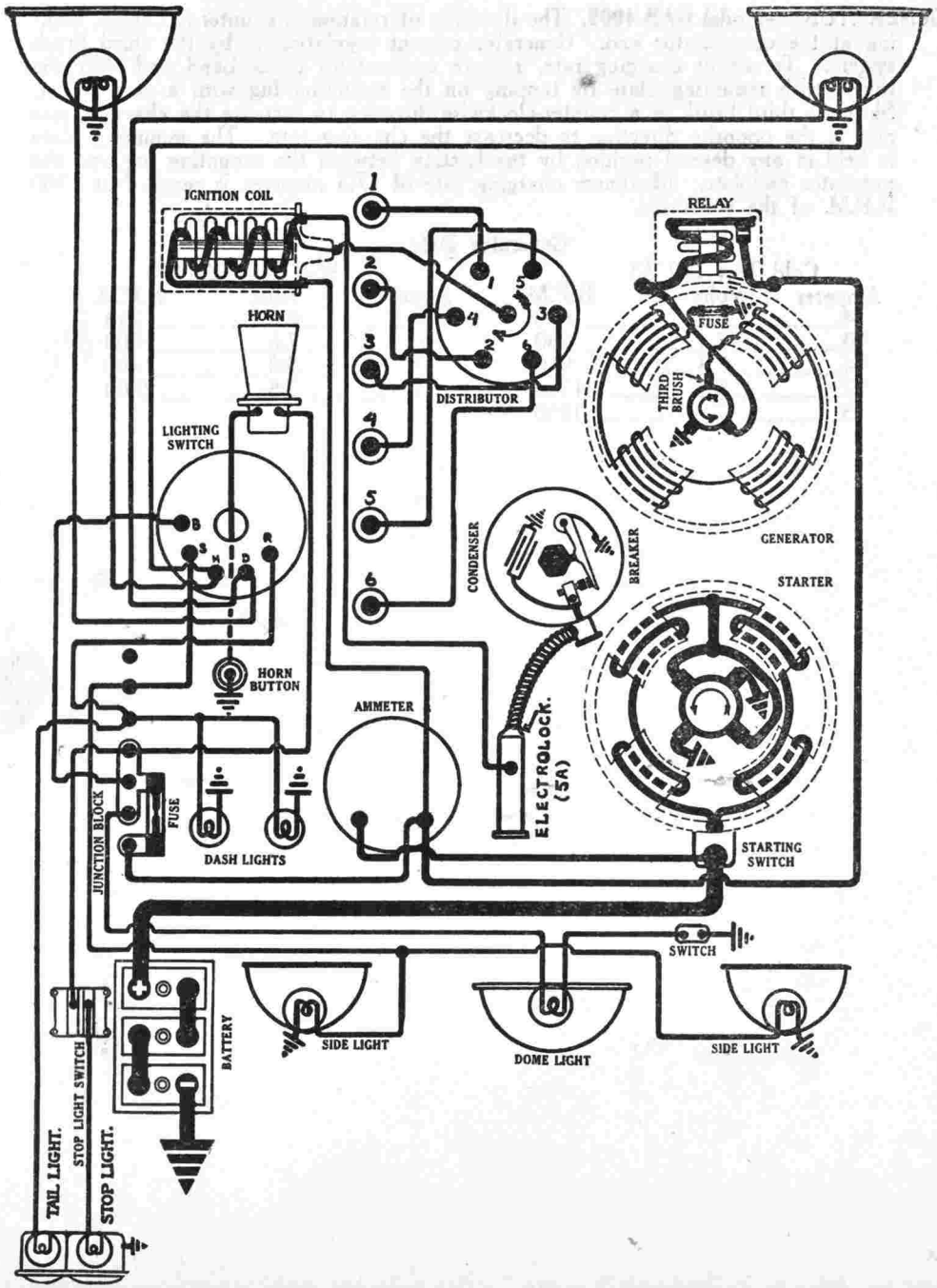
STARTER:—Model MUA-4002. Starter is connected to the engine through a sliding gear shift built in the starting switch. Pressing down on the starting pedal meshes the gears and closes the starting switch. When the pedal is released a spring reverses these operations. Starter brush tension should be 1¾-2¼ pounds each. Starter cranks the engine at 110 R.P.M. taking 250 amperes at 5.5 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4200	6	50
2 lb. ft.	1500	5.3	130
4 lb. ft.	1000	5.0	200
6 lb. ft.	600	4.6	275
8 lb. ft.	450	4.2	340
22 lb. ft.	Lock	3.5	500

Oiling:—Starter has oilless graphite-bronze bearings. They require no attention.

GENERATOR:—Model GAB-4008. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush system. To adjust charging rate, remove commutator cover band and shift the third brush mounting plate by tapping on the mounting lug with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The mounting plate is held in any desired position by the friction between the mounting lug and the generator endplate. Maximum charging rate of 17.5 amperes is reached at 1300 R.P.M. of the generator.



HUDSON

'SUPER SIX' (1928)

AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

Generator Data

Cold Test (72°F.)			Hot Test (206°F.)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
4	6.8	630	4	6.8	750
10	7.4	780	10	7.6	1000
14	7.8	950	13	8.0	1400
17	8.0	1300	11	7.8	2000
13	7.8	1950			

Motoring freely at 355-390 R.P.M. generator draws 4.7-5.2 amperes at 6 volts. Shunt field current is 6.1-6.8 amperes at 6 volts. Tested separately each coil draws 24.4-27.2 amperes at 6 volts. Generator brush tension should 1.0-1.5 pounds.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Model CB-4014. Relay is mounted on the generator. Relay contacts close at 545-625 R.P.M. when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current must not exceed 5 amperes at closing of contacts. Contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Clum Switch Model 10717. Soreng Manegold Model 2550-A. Switch is mounted at the base of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact), Mazda No. 1110. Stop light is 6-8 volt, 21 cp. S.C. Mazda No. 1129. Side, dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Generator field fuse is 7.5 amperes. Lighting fuse on junction block is 20 amperes.

HUFFMAN

MODEL R (1919-20-21-22-23)

DYNETO GENERATING, STARTING AND LIGHTING SYSTEM

CONNECTICUT IGNITION

BATTERY.—Willard, Type SJWN-3, 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .018 to .024 inch. They are made of tungsten. When the condition of the contacts affects the ignition, renew the inner breaker mechanism. For temporary service resurface contacts with fine emery cloth.

OILING.—Refill the grease cup under the breaker head and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model No. D-288. Starter is connected to the engine through a Bendix drive. When cranking engine, starter takes 130 amperes, armature revolving at 1500 R.P.M.

Starter Data

Torque	R.P.M.	Amperes	Volts
0.0 lb. ft.	5600	25	6.4
2.5 lb. ft.	1400	150	5.8
10.0 lb. ft.	250	420	4.6
5.0 lb. ft.	850	250	5.3
14.0 lb. ft.	Lock	530	4.0

OILING.—Put several drops of light engine oil in starter oilers every month.

GENERATOR.—Model No. C-288. Generator current regulation is by third brush system. Maximum current output is 12-15 amperes, reached at 1200 R.P.M. of the armature or 20-25 miles per hour.

Generator Data

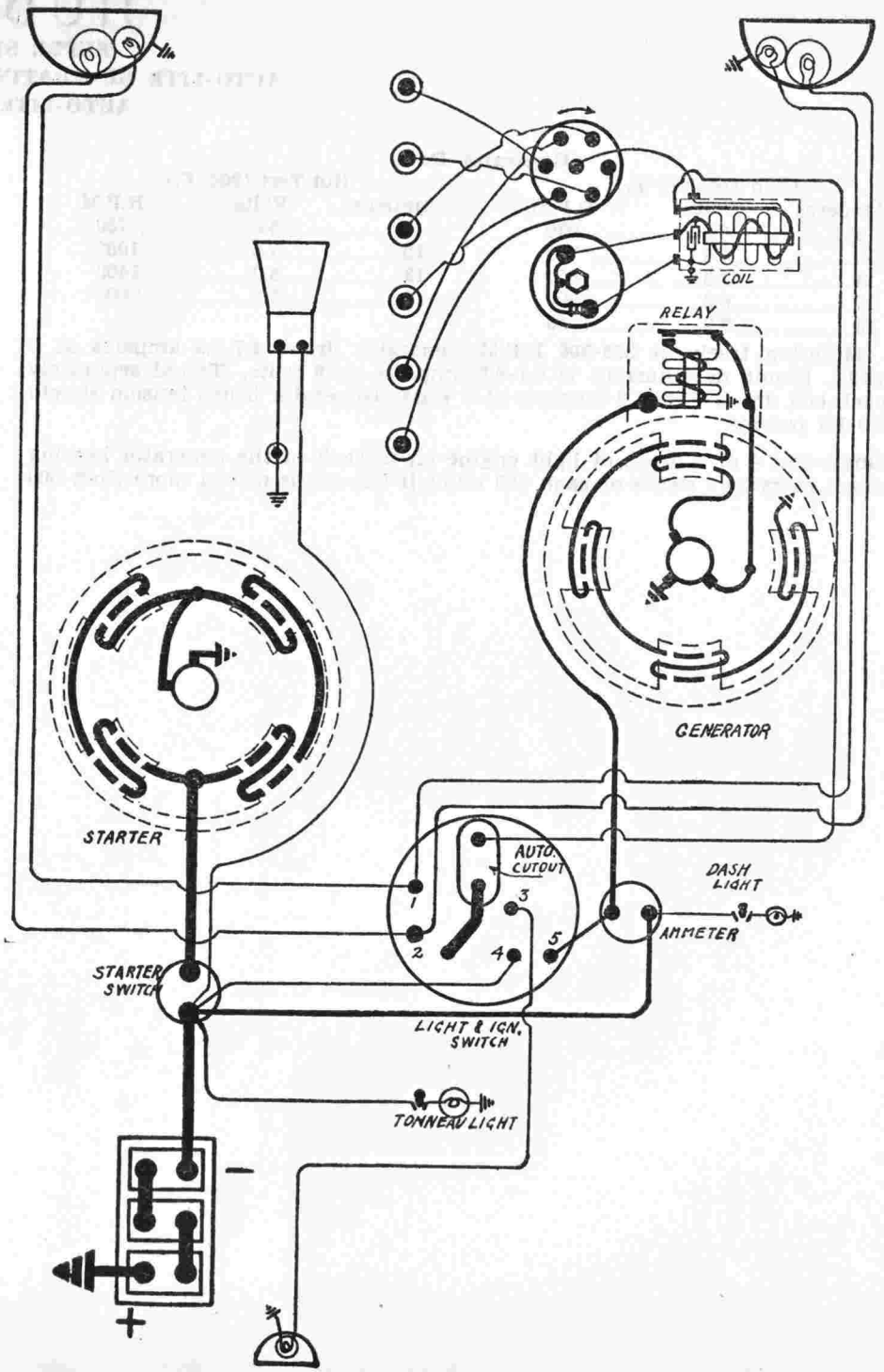
Amperes	Cold Test	R.P.M.	Amperes	Hot Test	R.P.M.
6		600	5		600
13		900	10		900
15		1200	12		1200
13.5		1600	11.5		1600
11.5		2000	10		2000

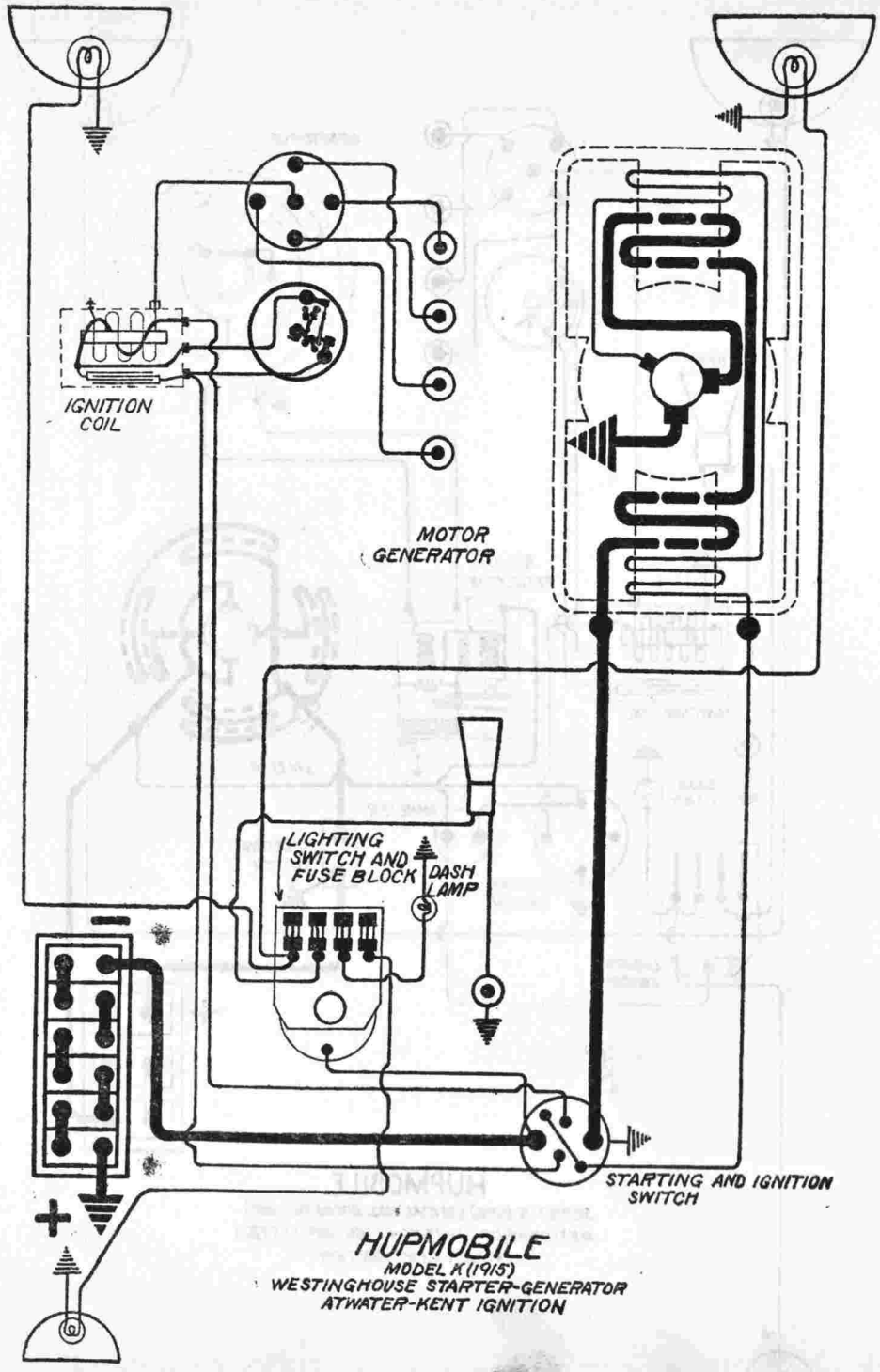
Shunt field current is 3.5 amperes at 6.5 volts. Charging rate is varied by adjustment of the third brush setting. Remove the leather plug in the commutator end of the generator, loosen the screw exposed and move in the direction of armature rotation to increase the charging rate. Move in the opposite direction to decrease the charging rate. Tighten the adjusting screw and replace the leather plug after adjustment is made.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 450-500 R.P.M. of armature, and opens at 6-8 miles per hour or 400-450 R.P.M. of armature. Relay contacts separate 3/32 inch. Air gap between relay armature and coil core is 1/8 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 4 cp. Tail lamp is 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 2 cp.





Hupmobile

Model K (1915) (Serial Nos. 52001-60000)

Westinghouse Generating, Starting and Lighting System

Atwater Kent Ignition

Battery.—Battery is 12 volt, 50 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts separate .010 to .012 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Put a drop of light machine oil on each of the rubbing parts of breaker and put 4 or 5 drops of light machine oil in the oil hole beside the notched shaft, every two weeks. Put a very small amount of vaseline on the notched shaft, applying with a toothpick. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Timing.—Breaker contacts separate when mark "1-4 CL" on flywheel is two inches past indicator, spark control in the fully retarded position. Spark control is entirely automatic or combined automatic and manual.

Firing Order.—The firing order is 1, 2, 4, 3.

Spark Plug Gaps.—Spark plug gaps are .027 to .031 inch.

Starter-Generator.—Frame No. 600. Starter and generator are combined into one unit. Armature is permanently chain connected to engine crank shaft.

Generator.—Generator current regulation is by third brush system. Generator begins to supply current at 9 miles per hour. Maximum charging current of 7-10 amperes is reached at 20-25 miles per hour.

Oiling.—Put several drops of light engine oil in each of starter-generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 12-16 volt, 15 cp. Dash lamp is 12-16 volt, 2 cp. Tail lamp is 12-16 volt, 4 cp.

Fuses.—Head lamp fuse is 15 ampere. Tail lamp fuse is 3 ampere. Spare circuit fuse is 15 ampere. Horn fuse is 15 ampere.

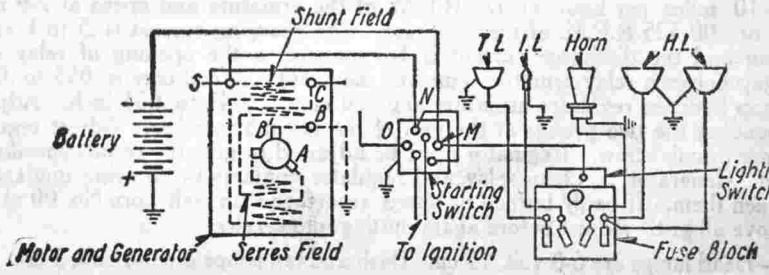


DIAGRAM OF CONNECTIONS

Westinghouse Motor-and-Generator System on the Hupmobile

HUPMOBILE

SERIES N (1916). (SERIAL NOS. 60,001 TO 75,000)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type K2. Breaker contacts separate .010 to .012 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put a drop of light engine oil on each of the wearing parts of the breaker and 4 or 5 drops in the oil hole beside the notched shaft every two weeks. Apply a small amount of vaseline to the cam with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts separate when the top dead center mark on the flywheel is 2 inches past the indicator, spark control lever and breaker assembly midway between the fully retarded and fully advanced positions.

FIRING ORDER.—The firing order is 1, 2, 4, 3.

SPARK PLUG GAPS.—Spark plug gaps are .022 inch.

STARTER.—Frame 700. Starter is connected to the flywheel through a pinion shifted by the operator. Lock torque is 12.5 pound-feet, current being 400 amperes. Torque at 1200 R.P.M. is 2.5 pound-feet.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Frame 400-R. Generator voltage regulation is by vibrating regulator. Maximum charging rate is 16-20 amperes, decreasing to 5-6 amperes as battery becomes fully charged.

Generator Data

Battery Charging Current Without Lamp Load			Battery Charging Current With 7 Ampere Lamp Load		
Amperes	Volts	M.P.H.	Amperes	Volts	M.P.H.
2	6.5	10	0	6.3	12.5
8	6.5	15	4	6.5	15.0
12	7.0	20	6	6.6	20.0
12	7.0	25	7	6.7	25.0

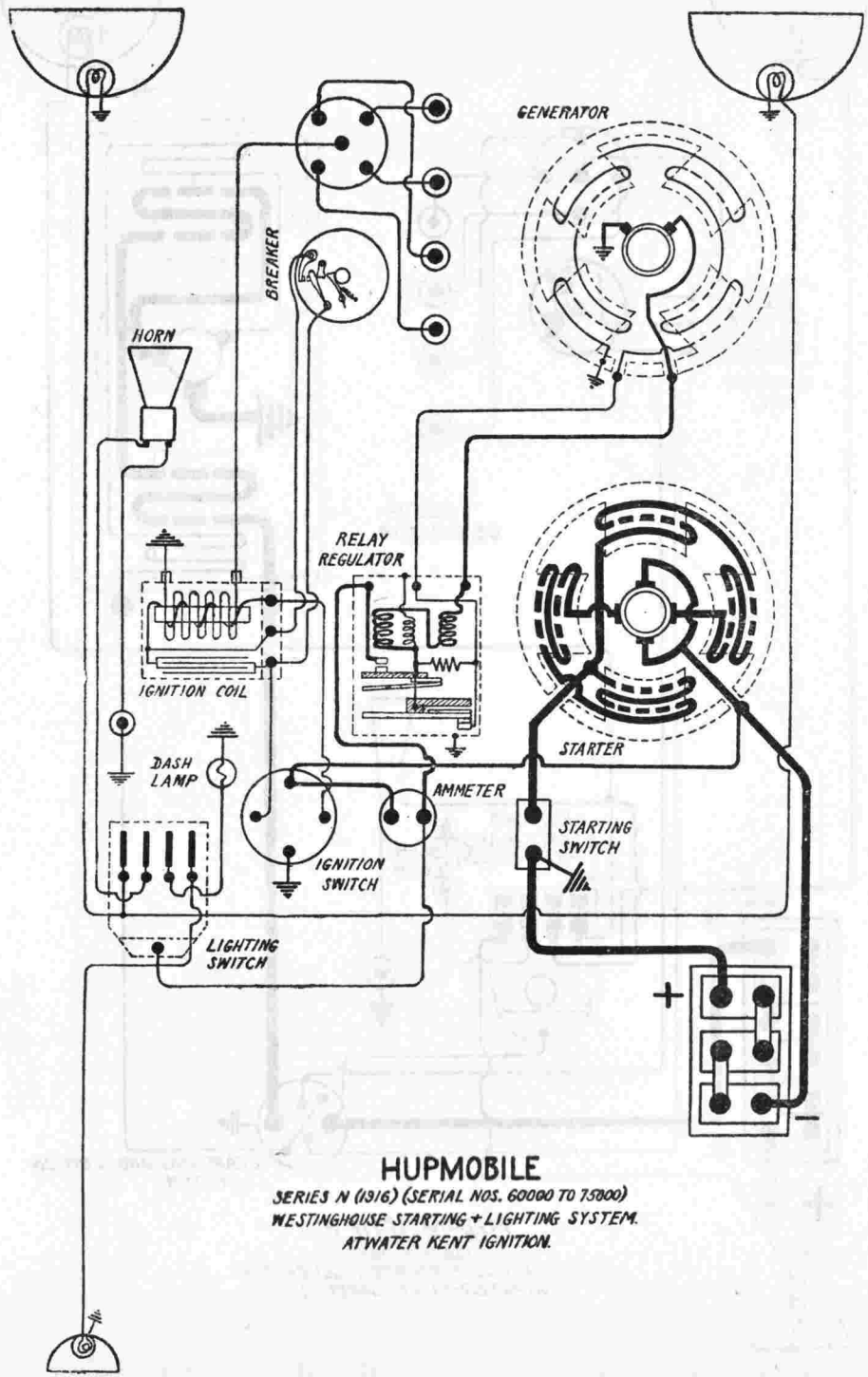
Above tests are obtained with the generator charging a battery of 1.250 solution. The diifference between the voltage of the generator at 1200 R.P.M. with a 15 ampere load and at 1200 R.P.M. with no load must not be less than .7 volt or greater than 1 volt. If a greater variation is obtained the regulator air gaps are incorrect or clogged.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

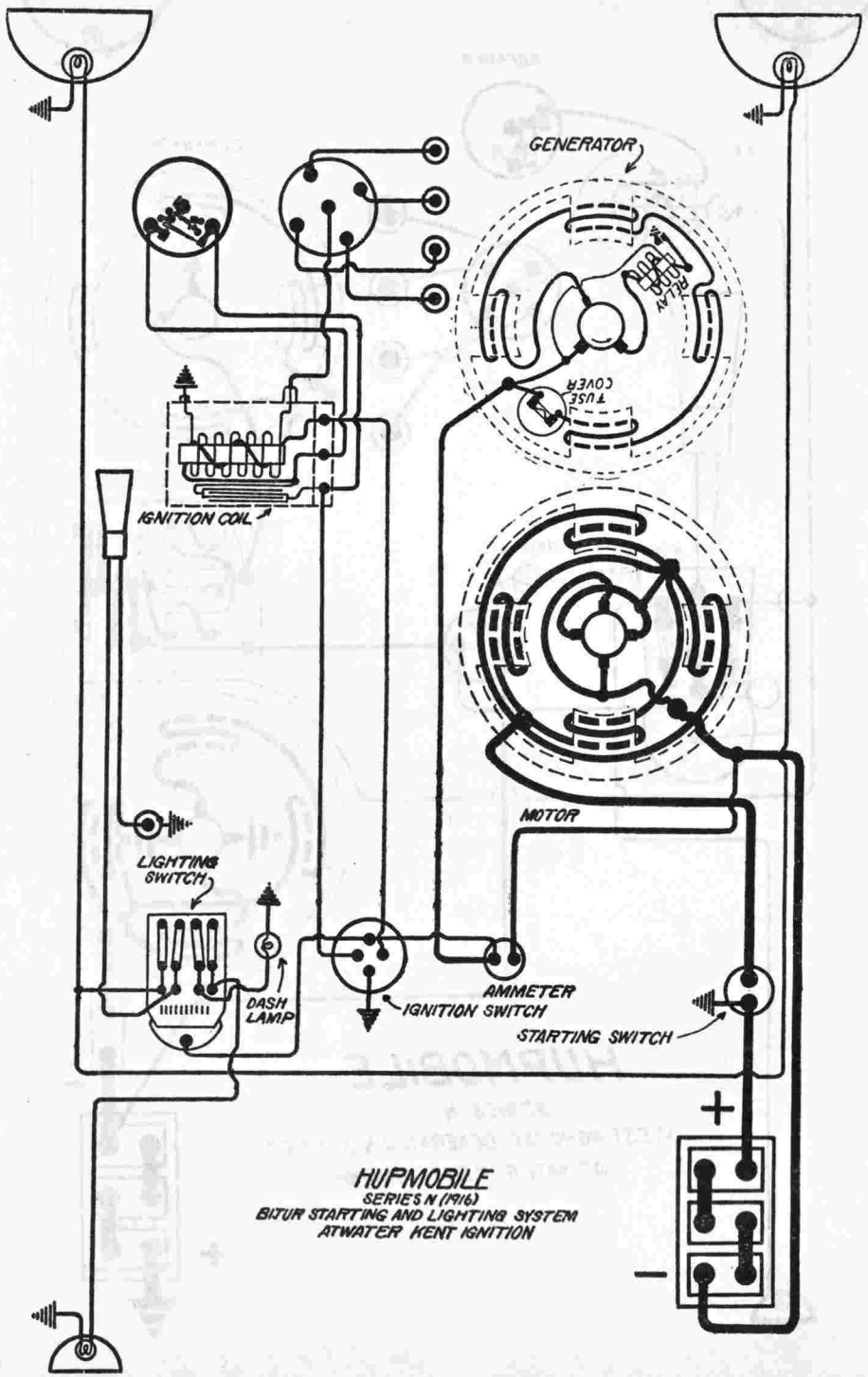
RELAY-REGULATOR.—Relay and regulator are combined into one unit. Relay closes at 8-10 miles per hour or 575 R.P.M. of the armature and opens at 7-9 miles per hour or 500-525 R.P.M. of the armature. The charging current is .5 to 1 ampere at closing and the discharge current is 1-3 amperes a the opening of relay contacts. Air gap between relay armature (moving member) and coil core is .055 to .060 inch. Air gap between regulator armature and coil core is .045 to .055 inch. Adjust relay by bending the two prongs at the end of the moving member. Adjust regulator by turning thumb screw. Regulator must be adjusted to give the results specified above under "Generator". Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lemps are 6-8 volt, 2 cp.

FUSES.—Fuses are 10 ampere.



HUPMOBILE
SERIES N (1916) (SERIAL NOS. 60000 TO 75800)
WESTINGHOUSE STARTING + LIGHTING SYSTEM.
ATWATER KENT IGNITION.



HUPMOBILE

SERIES N (1916) SERIAL NOS. 60,001 TO 75,000
BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER-KENT IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. The positive (+) terminal is grounded at the starting switch.

IGNITION.—Breaker contacts separate .010 to .012 inch. They are made of tungsten. When the condition of the points affects the ignition remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put a drop of light machine oil on each of wearing parts of breaker and 4 or 5 drops in oil hole beside notched shaft every 2 weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

TIMING.—Breaker contacts separate when the top dead center mark on flywheel is 2 inches past indicator, spark control advanced one-half.

FIRING ORDER.—The firing order is 1, 2, 4, 3.

STARTER.—Type E 68, M 250. Anti-clockwise rotation, commutator end. Starter is connected to engine through a pinion shifted by operator.

OILING.—Put several drops of light engine oil in starter bearing oilers every month.

GENERATOR.—Type L 61, M 251. Anti-clockwise rotation, commutator end. Generator regulation is by third brush system. Maximum generator output is 12-16 amperes, reached at 20-25 miles per hour, or 1200-1600 R.P.M. of armature. Output may be varied by shifting third brush. Third brush is secured to generator by two stud bolts, the nuts of which appear in a recess in the front head of generator. Loosen these nuts with a socket wrench and shift the brush by gently tapping the shank of the wrench. Shifting brush in the direction of armature rotation will increase the output. Shifting brush in the opposite direction will decrease the output. Shifting the brush 1/16 inch will vary the output from 2 to 3 amperes. Tighten nuts after adjusting brush. Brush adjustment should be made to give the desired rate with generator hot and charging a 3 cell battery of 1.250 solution or higher. There is a 10 ampere fuse in the small aluminum cap on generator housing to protect generator windings, should excessively high resistance occur in the charging circuit. Pressure of brushes on commutator is 14 ounces.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. Refill grease cup on end of fan shaft with soft cup grease and turn down at the same time. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

RELAY.—Relay closes at 600-650 R.P.M. of armature or 8-9 miles per hour and opens at 550-600 R.P.M. or 6-7 miles per hour. Charging current is 1-3 amperes at closing and the discharge current 0-1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service. Relay contacts separate .045 inch. Air gap between relay armature (moving member) and coil core is .035 inch.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

FUSES.—Fuses are 10 ampere.

HUPMOBILE

SERIES N (1917) SERIAL NOS. 75,001 TO 87,519
SERIES R (1918) FIRST CARS
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type K2. Breaker contacts separate .010 to .012 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put a drop of light engine oil on each of the wearing parts of the breaker and 4 or 5 drops in the oil hole beside the notched shaft every two weeks. Apply a small amount of vaseline to the cam, with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts separate when the top dead center mark on the flywheel is 2 inches past the indicator, spark control lever and breaker assembly midway between the fully retarded and fully advanced positions.

FIRING ORDER.—The firing order is 1, 2, 4, 3.

SPARK PLUG GAPS.—Spark plug gaps are .022 inch.

STARTER.—Frame 700. Starter is connected to the flywheel through a pinion shifted by the operator. Lock torque is 12.5 pound-feet, current being 400 amperes. Torque at 1200 R.P.M. is 2.5 pound-feet.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Frame 400-R. Generator voltage regulation is by vibrating regulator. Maximum charging rate is 16-20 amperes, decreasing to 5-6 amperes as battery becomes fully charged.

Generator Data

Battery Charging Current without Lamp Load			Battery Charging Current with 7 ampere lamp load		
Amperes	Volts	M.P.H.	Amperes	Volts	M.P.H.
2	6.5	10	0	6.3	12.5
8	6.5	15	4	6.5	15.0
12	7.0	20	6	6.6	20.0
12	7.0	25	7	6.7	25.0

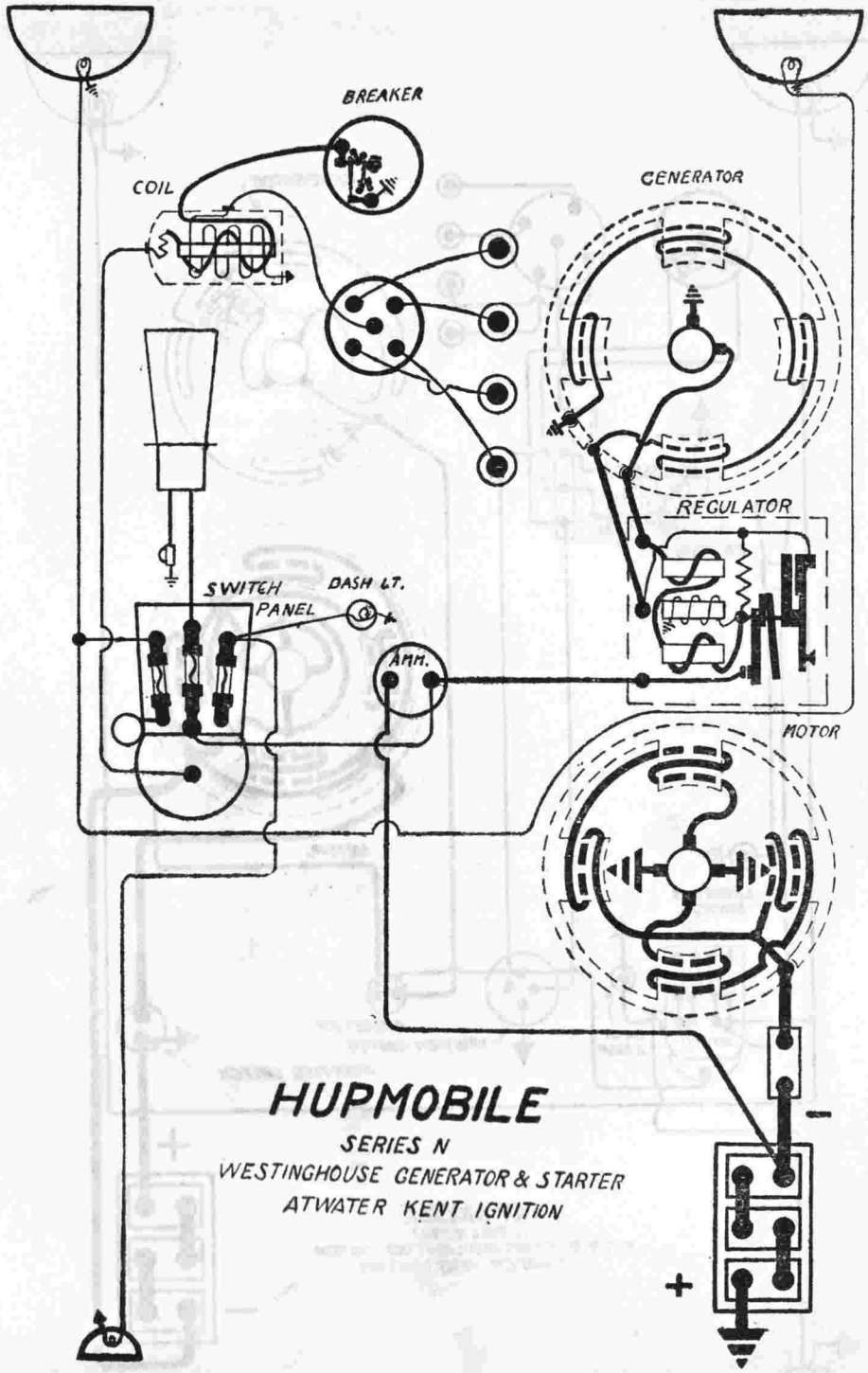
Above tests are obtained with the generator charging a battery of 1.250 solution. The difference between the voltage of the generator at 1200 R.P.M. with a 15 ampere load, and at 1200 R.P.M. with no load, must be not less than .7 volt or greater than 1 volt. If a greater variation is obtained the regulator air gaps are incorrect or clogged.

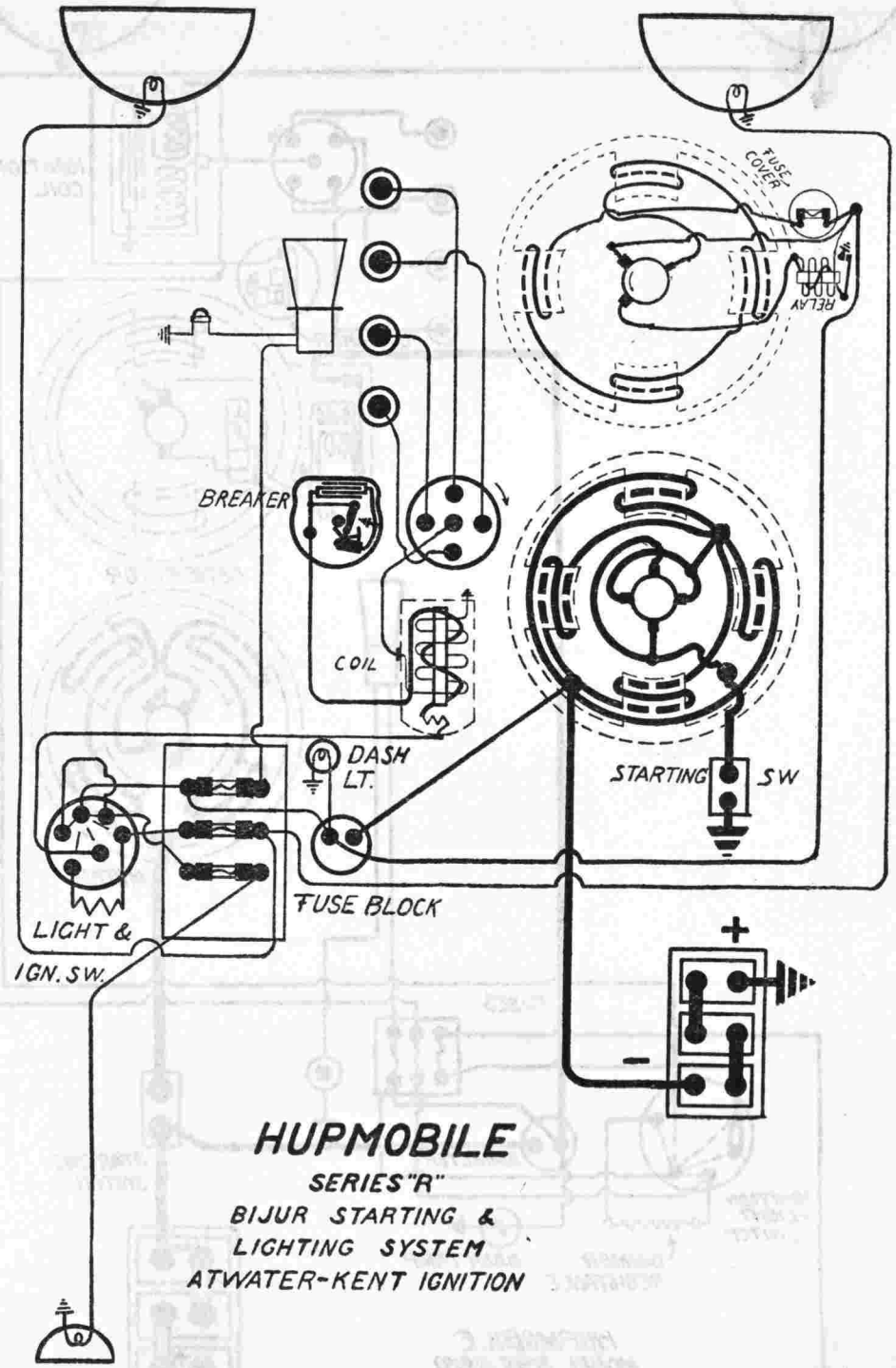
OILING.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY-REGULATOR.—Relay and regulator are combined into one unit. Relay closes at 8-10 miles per hour or 575 R.P.M. of the armature and opens at 7-9 miles per hour or 500-525 R.P.M. of the armature. The charging current is .5 to 1 ampere at closing and the discharge current is 1-3 amperes at the opening of relay contacts. Air gap between relay armature (moving member) and coil core is .055 to .060 inch. Air gap between regulator armature and coil core is .045 to .055 inch. Adjust relay by bending the two prongs at the end of the moving member. Adjust regulator by turning thumb screw. Regulator must be adjusted to give the results specified above under "Generator". Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Fuses are 10 ampere.





HUPMOBILE
SERIES "R"
BIJUR STARTING & LIGHTING SYSTEM
ATWATER-KENT IGNITION

HUPMOBILE

MODEL R-1 (1917-18) R-2 (1918-19)
BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY.—Battery is 6 volt, 85 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type CC. Breaker contacts separate .006 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Every two weeks, remove the distributor head and put 4 or 5 drops of light engine oil in the oil hole exposed. Put a small amount of vaseline on the cam, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 2 inches past the indicator, spark control lever and breaker assembly midway between the fully retarded and fully advanced positions.

FIRING ORDER.—The firing order is 1, 2, 4, 3.

SPARK PLUG GAPS.—Spark plug gaps are .022 inch.

STARTER.—Type FD-140, M-993 or M-1197. Starter is connected to the engine through a Bijur automatic pinion shift. Rotation is counter-clockwise, looking at commutator end.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Type P-210, M-863 or M-1196. Rotation is counter-clockwise, looking at commutator end. Generator current regulation is by third brush system. Maximum current output is 12-15 amperes, reached at 20-25 miles per hour or 1800 R.P.M. of the armature. Charging rate is varied by inserting a special toothed wrench in the adjusting hole in the commutator end plate and moving the third brush assembly through a ratchet engagement. Turn the wrench in a clockwise direction to increase the charging rate, and in a counter-clockwise direction to decrease the charging rate.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TO REMOVE GENERATOR.—Remove the hexagonal-headed plug which extends from the front, right-hand, top side of the chain case, viewed from the front of the car. Then screw a 3/8 by 16 U.S.S. bolt or cap screw into the hole until it bears firmly against the chain in order to prevent any movement of the chain or cam shaft gear. Next remove the circular cover plate at rear of generator on the front side of the chain case. The bolts holding this plate in place extend beyond the chain case and can be reached from above and removed without taking off the dust pan. Loosen the three bolts holding the generator to the crank case. Gently pull the generator away from the crank case but not far enough to allow the driving chain to slip off the pinion on the rear of the shaft. Then run a wire through the opening of the chain and over the top of the case to prevent the chain falling to the bottom of the case. Generator may then be removed. Make sure that the set screw is removed and the plug replaced after the generator is again installed.

RELAY.—Relay closes at 8-10 and opens at 6-8 miles per hour. To adjust relay connect a voltmeter across the main brushes of the generator, and slowly speed up the engine. Insert the special socket wrench in the adjusting hole in the top of the relay cover and vary the spring tension until the relay closes when the voltmeter indicates 6.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Lighting circuit fuses are 10 ampere. Generator fuse is 10 ampere.

HUPMOBILE

SERIES R-2 (1919)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY:—Battery is 6 volt, 94-ampere-hour. The positive (+) terminal is grounded.

IGNITION:—Contacts separate .005 inch to .008 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Timing:—Contacts begin to separate when the top dead center mark on flywheel is 2 inches past indicator, spark control lever and breaker assembly midway between the fully advanced and fully retarded position.

Firing Order.—The firing order is 1, 2, 4, 3.

Spark Plug Gaps.—Spark plug gaps are .023 inch.

Oiling.—Put several drops of light engine oil in the oil hole, exposed when distributor cap is removed, every two weeks. At the same time put a very small amount of vaseline on the cam, applying with a toothpick. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Starter.—Starter is connected to engine through a Bendix drive.

STARTER DATA, MODEL 305-E

Torque	R. P. M.	Amperes	Volts
1 lb. ft	2500	110-130	5.4-5.6
2 lb. ft	1900	165-175	5.1-5.4
3 lb. ft	1500	215-225	4.8-5.2
4 lb. ft	1000	265-275	4.6-4.9
5 lb. ft	650	325-335	4.3-4.5
9 lb. ft	Lock	540-560	3.5-3.65

Oiling.—Put several drops of light engine oil in each of starter oilers every month.

Generator.—Generator current regulation is by third brush system. A thermostat located in the brush rigging of the generator, cuts in a resistance at a temperature of 175° F., reducing the maximum charging rate 6 amperes. Resistance also acts as a shunt field fuse. The thermostat is intended to change the charging rate as demand of seasons or car operation requires. Never touch the thermostat points.

GENERATOR DATA, MODEL 234-C

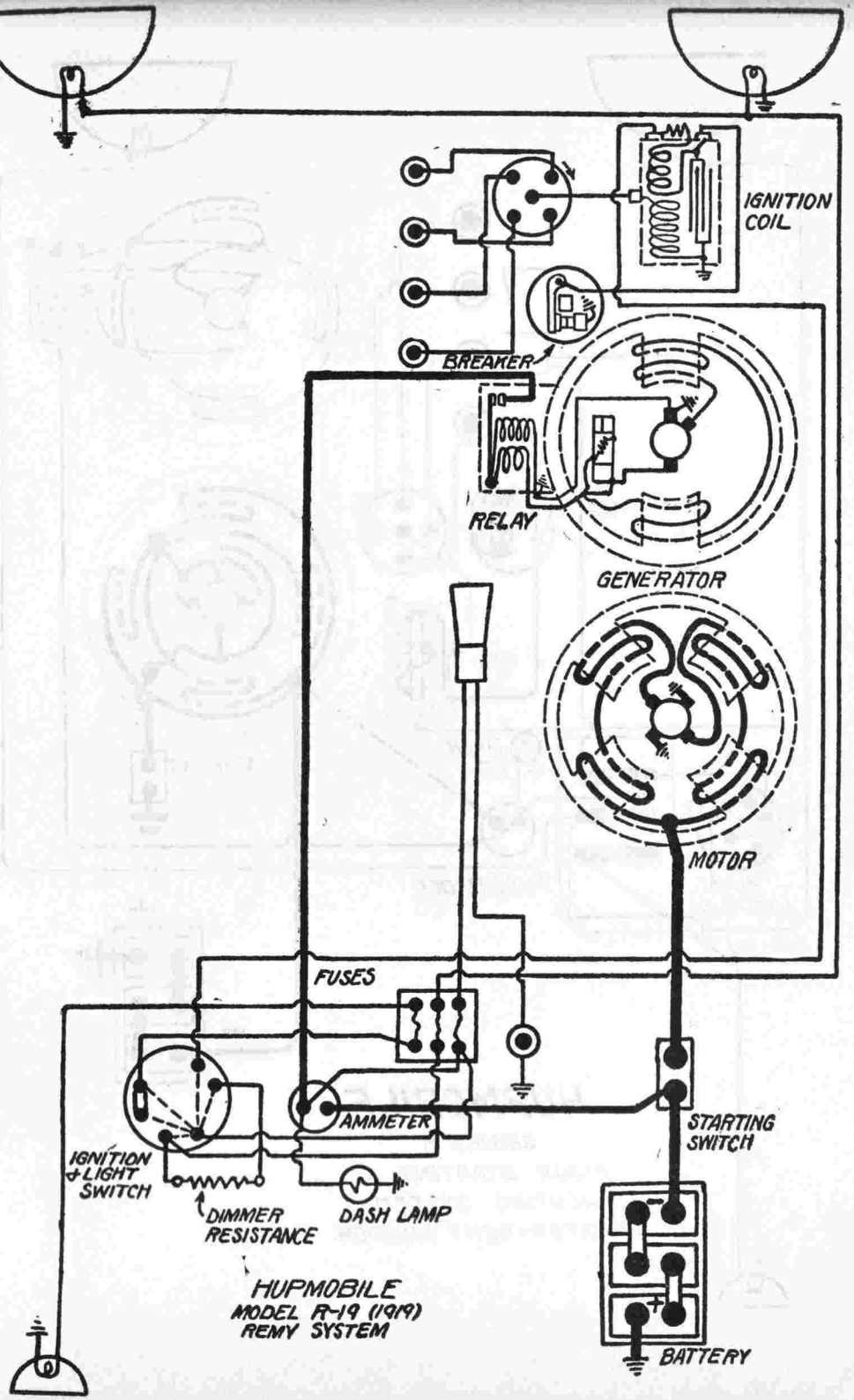
Amperes	R. P. M.	Volts
0	525	6.4
7	780	7.1-7.2
14	1100	7.8
19.5-20.5	1680	8.6
19.0-20	2000	8.6
13.0-15	3000	8.0

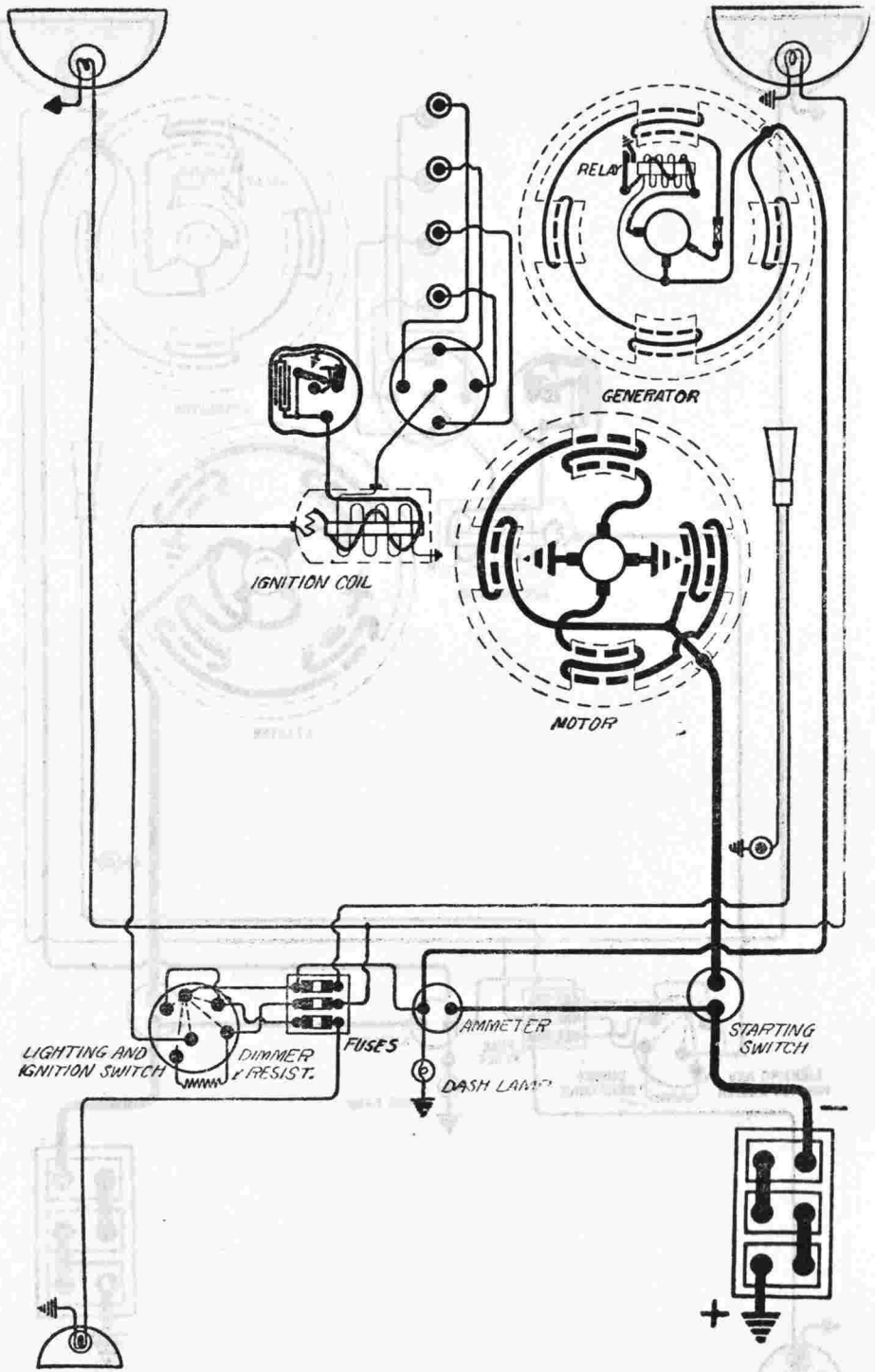
Above tests must be made without ignition, relay in circuit and thermostat contacts closed. Ampere output may be varied by moving third brush. Moving third brush in direction of armature rotation increases the output. Moving it in the opposite direction decreases the output. Pressure of main brushes on commutator is 17 to 20 ounces. Pressure of third brush on commutator is 13 to 17 ounces. Shunt field takes 5 amperes at 6.4 volts.

Oiling.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—Relay closes at 8-10 miles per hour, or 550-600 R. P. M., of armature. Charging current is 1-3 amperes at closing and the discharge current 0-1 ampere at opening of relay contacts. The air gap between relay armature (moving member) and coil core is .012 inch to .015 inch. Contacts separate .012 inch to .015 inch. Clean relay contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a strip of well worn No. 00 sand paper, and then draw a piece of unglazed paper between them to remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.





HUPMOBILE

SERIES R-2 (1919) SERIAL NOS. 15000 TO 20000
SERIES R-3 (1920) SERIAL NOS. 20000 TO 30000
SERIES R-4 (1920) SERIAL NOS. 30001 TO 40000
SERIES R-5 (1921) SERIAL NOS. 40,001 TO 55,000
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNTION

BATTERY:—Willard (1919-20) Type SJRN-3, 6 volt, 90 ampere hour. **(1921) Type SJRN-4,** 6 volt, 120 ampere hour. The positive (+) terminal is grounded.

IGNITION.—Type CC. Breaker contacts separate .006 inch. They are made of tungsten. When the condition of the contacts affects the ignition remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone. Ignition current is 3.5-4 amperes, engine idle, breaker contacts and ignition switch closed.

OILING.—Remove the distributor cap every two weeks, and put 4 or 5 drops of light engine oil in the oil hole exposed. Apply a small amount of vaseline to the cam, with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 2 inches past the indicator, spark control lever and breaker assembly midway between the fully retarded and fully advanced positions.

FIRING ORDER.—The firing order is 1, 2, 4, 3.

SPARK PLUG GAPS.—Spark plug gaps are .022 inch.

STARTER.—Frame 100. Starter is connected to the engine through a Bendix drive. Lock torque is 12 pound-feet, current being 475 amperes at 4 volts. Torque at 1600 R.P.M. is 1.75 pound-feet. Running freely, armature revolves at 4000 R.P.M., current being 50 amperes. Starter cranks the engine at 125 R.P.M., taking 140 amperes.

OILING.—Put 5 or 6 drops of light engine oil in each of starter bearing oilers every month.

GENERATOR.—Frame 760. Generator current regulation is by third brush system. Maximum current output is 15-17 amperes at 1250 R.P.M., of the armature or 20 miles per hour.

Generator Data

Cold Test Amperes	Cold Test R.P.M.	Hot Test Amperes	Hot Test R.P.M.
0	450	0	500
8	675	6	725
12	840	9	850
15-17	1250	11-13	1250
10	2000	7- 8	2000

The cold test readings are obtained with a generator temperature under 95°F. The hot test readings are obtained after generator has been operated one hour at 1800 R.P.M., charging a half-charged battery. Shunt field current is 2.8 to 3.25 amperes at 6-6.6 volts.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in generator frame. Relay closes at 450-500 R.P.M. of the armature or 7-9 miles per hour and opens at 400-450 R.P.M. of the armature or 5-7 miles per hour. Charging current is 1-2 amperes at closing, and the discharge current 0-2 amperes at the opening of relay. Contacts separate .013 to 018 inch. Air gap between relay armature (moving member) and coil core is .031 inch, contacts separated. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No.00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

FUSES.—Generator field fuse is 5 ampere, short length. Horn and lighting circuit fuses are 10 ampere.

HUPMOBILE

SERIE R-3 (1920) SERIAL NOS. 20000 TO 30000
SERIES R-4 (1920) SERIAL NOS. 30001 TO 40000
SERIES R-5 (1921) SERIAL NOS. 40001 TO 55000
SERIES R-5 (1922) SERIAL NOS. 55001 UP
SERIES R-6, 7, 8, 9, 10, 11 (1922)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY:—Willard. Type SJRG-4. 6 volt, 117½ ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type CC. Breaker contacts separate .006 to .008 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oilstone. Ignition current is 3.5-4 amperes, engine idle, breaker contacts and ignition switch closed.

Oiling.—Remove the distributor cap every two weeks, and put 4 or 5 drops of light engine oil in the oil hole exposed. Apply a small amount of vaseline to the cam with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing:—Breaker contacts begin to separate when the top dead center mark on the fiywheel is 2 inches past the indicator, spark control lever and breaker assembly midway between the fully retarded and fully advanced positions.

Firing Order:—The firing order is 1-2-4-3.

Spark Plug Gaps:—Spark plug gaps are .020 to .022 inch.

STARTER:—Frame No. 33A.B. Style 298,808. The direction of rotation is counterclockwise, looking at the commutator end. Running free the starter armature revolves at 3700-4100 R.P.M., taking 70 amperes at 5.5 volts. The torque at 1600 R.P.M. is 1.75 pound-feet, the current being 150 amperes at 5.5 volts. The lock torque is 12 pound-feet at 4 volts, the current being 500 amperes. The pressure of the brushes on the commutator is 1 to 1½ pounds.

Oiling:—Put 5 or 6 drops of light engine oil in each of the starter bearing oilers every month.

GENERATOR:—Frame 760. Style 275,601. Generator current regulation is by the third brush system. Maximum current output is 10-12 amperes (hot) at 1250 R.P.M. of the armature, or 20-25 miles per hour.

Generator Data

Amperes	Cold Test	R.P.M.	Amperes	Hot Test	R.P.M.
0		450	0		500
8		675	6		725
15-17		1250	10-12		1250
12		840	9		850
10		2000	7- 8		2000

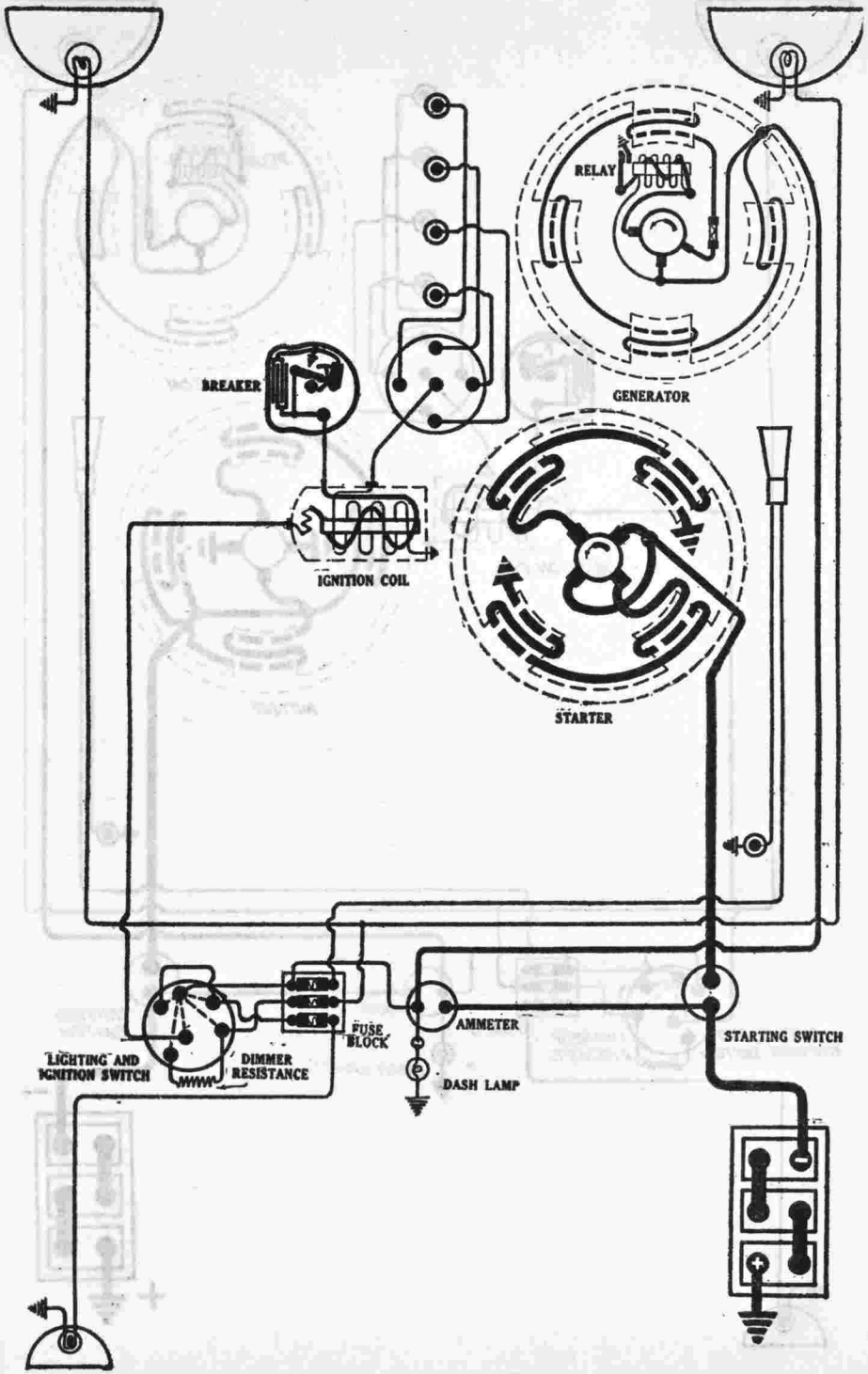
The cold test readings are obtained with a generator temperature under 95° F. The hot test readings are obtained after generator has been operated one hour at 1800 R.P.M., charging a half-chargd battery. Shunt field current is 2.8 to 3.25 amperes at 6.0 to 6.6 volts. Operating as a motor the generator takes 5.0 amperes at 6.0 to 6.3 volts.

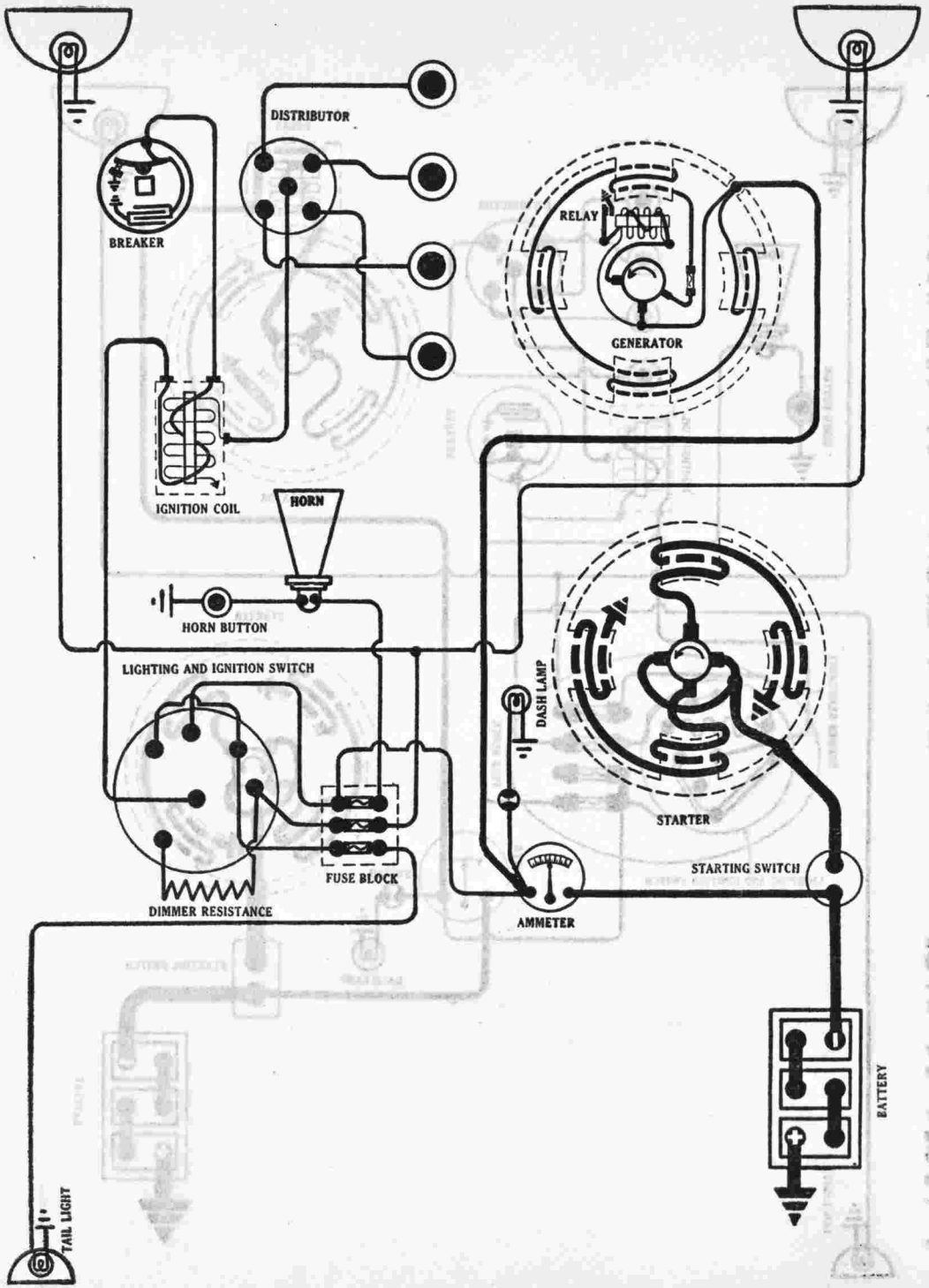
Oiling:—Put 5 or 6 drops of light engine oil in the commutator end bearing oiler every two weeks. If the car is driven more than 500 miles in two weeks the oiling must be done every 500 miles.

RELAY.—Style 262,982. Relay is mounted in the generator frame. Relay closes at 10 miles per hour or 500 R.P.M. of the armature, or at a voltage of the generator of 6.5 volts, and opens when there is a discharge of from 0 to 3 amperes. The contacts separate .030 to .035 inch. The air gap between the relay armature and the coil core is .005 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS:—Head lamps are 6-8 volt, 21 cp. Dash and tail lamps are 6-8 volts, 2 cp.

FUSES:—Lighting circuit fuses are 10 amperes. Generator field fuse is 5 amperes.





HUPMOBILE

SERIES R-12, R-13 (1923-24)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WESTINGHOUSE IGNITION

BATTERY.—Willard, Type XR-15, 6 volt, 105 ampere-hour. The positive (+) terminal is grounded.

IGNITION:—Coil Model Nos. 288,761C and 395,271. Distributor Model No. 395,209. The breaker contacts separate .013-.015 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone. The surface of the contacts must be parallel. The ignition current is approximately 3 amperes.

Oiling:—Place 4 or 5 drops of light engine oil in the oil cup and apply a small amount of vaseline to the cam with a toothpick once in every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

Timing:—Breaker contacts begin to separate when the top dead center mark on the flywheel is 2 inches past the indicator, spark control lever and breaker assembly midway between the fully retarded and fully advanced positions.

Firing Order:—The firing order is 1-2-4-3.

Spark Plug Gaps:—Spark plug gaps are .020 to .022 inch.

STARTER:—Frame No. 33AB. Style 298,808. The direction of rotation is counter-clockwise, looking at the commutator end. Running free the starter armature revolves at 3700-4100 R.P.M., taking 70 amperes at 5.5 volts. The torque at 1600 R.P.M. is 1.75 pound feet, the current being 150 amperes at 5.5 volts. The lock torque is 12 pound-feet at 4 volts, the current being 500 amperes. The pressure of the brushes on the commutator is 1 to 1½ pounds.

Oiling:—Put 5 or 6 drops of light engine oil in each of the starter bearing oilers every month.

GENERATOR:—Frame Nos. 35-AT and 36-DT. Generator current regulation is by the third brush system. The maximum charging rate is 10-12 amperes (generator hot), reached at 1250 R.P.M. of the armature or 20-25 miles per hour. The direction of rotation is counter-clockwise, looking at the commutator end.

Generator Data

Amperes	Cold Test	R.P.M.	Amperes	Hot Test	R.P.M.
0		450	0		500
8		675	6		725
15-17		1250	10-12		1250
12		840	9		850
10		2000	7- 8		2000

The cold test readings are obtained with a generator temperature under 95° F. The hot test readings are obtained after generator has been operated one hour at 1800 R.P.M., charging a half-charged battery. Shunt field current is 2.8 to 3.25 amperes at 6.0 to 6.6 volts. Operating as a motor the generator takes 5.0 amperes at 6.0 to 6.3 volts.

Oiling:—Put 5 or 6 drops of light engine oil in the commutator end bearing oiler every two weeks. If the car is driven more than 500 miles in two weeks the oiling must be done every 500 miles.

RELAY:—Style No. 301210B. Relay closes at 10 M.P.H. or 500 R.P.M. of armature or at 6.5 volts, and opens when there is a discharge of from 0-3 amperes. The contacts separate .030-.035 inch. The air gap between armature of relay and coil core is .005 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS:—Head lamps are 6-8 volt, 21 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES:—Lighting circuit fuses are 10 amperes. Generator field fuse is 5 amperes.

HUPMOBILE

MODEL R-14 (1925) SERIAL NOS. R-160397 UP.
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WESTINGHOUSE IGNITION

BATTERY:—Willard Type, CRR-15. 6 volt, 105 ampere hour. The positive (+) terminal is grounded.

IGNITION: — Coil Model Nos. 288,761C and 395,271. Distributor Model No. 395,209. The breaker contacts separate .013-.015 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone. The surface of the contacts must be parallel. The ignition current is approximately 3 amperes.

Oiling.—Place 4 or 5 drops of light engine oil in the oil cup and apply a small amount of vaseline to the cam with a toothpick once to every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given to every 500 miles.

Timing.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 2 inches past the indicator, spark control lever and breaker assembly midway between the fully retarded and fully advanced positions.

Firing Order.—The firing order is 1, 2, 4, 3.

Spark Plug Gaps.—Spark plug gaps are .020 to .022 inch.

STARTER.—Frame No. 33A.B. Style 298,808. The direction of rotation is counter-clockwise, looking at the commutator end. Running free the starter armature revolves at 3700-4100 R.P.M., taking 70 amperes at 5.5 volts. The torque at 1600 R.P.M. is 1.75 pound-feet, the current being 150 amperes at 5.5 volts. The lock torque is 12 pound-feet at 4 volts, the current being 500 amperes. The pressure of the brushes on the commutator is 1 to 1½ pounds.

Oiling.—Put 5 or 6 drops of light engine oil in each of the starter bearing oilers every month.

GENERATOR:—Frame No. 36-DT. Generator current regulation is by the third brush system. The maximum charging rate is 10-12 amperes (generator hot), reached at 1250 R.P.M. of the armature or 20-25 miles per hour. The direction of rotation is counter-clockwise, looking at the commutator end.

Generator Data

Amperes	Cold Test	R.P.M.	Amperes	Hot Test	R.P.M.
0		450	0		500
8		675	6		725
15-17		1250	10-12		1250
12		840	9		850
10		2000	7- 8		2000

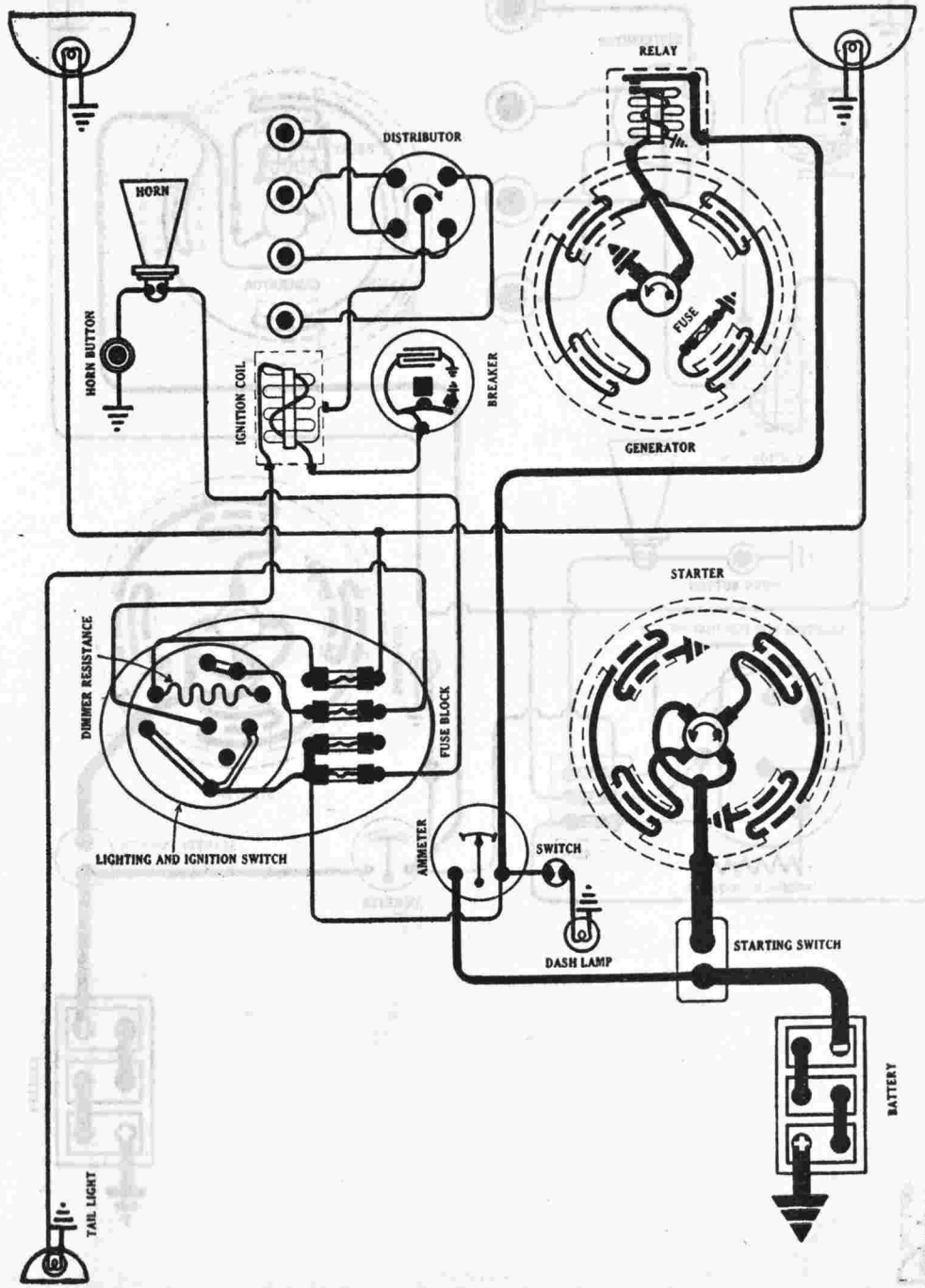
The cold test readings are obtained with a generator temperature under 95°F. The hot test readings are obtained after generator has been operated one hour at 1800 R.P.M., charging a half-charged battery. Shunt field current is 2.8 to 3.25 amperes at 6.0 to 6.6 volts. Operating as a motor the generator takes 5.0 amperes at 6.0 to 6.3 volts.

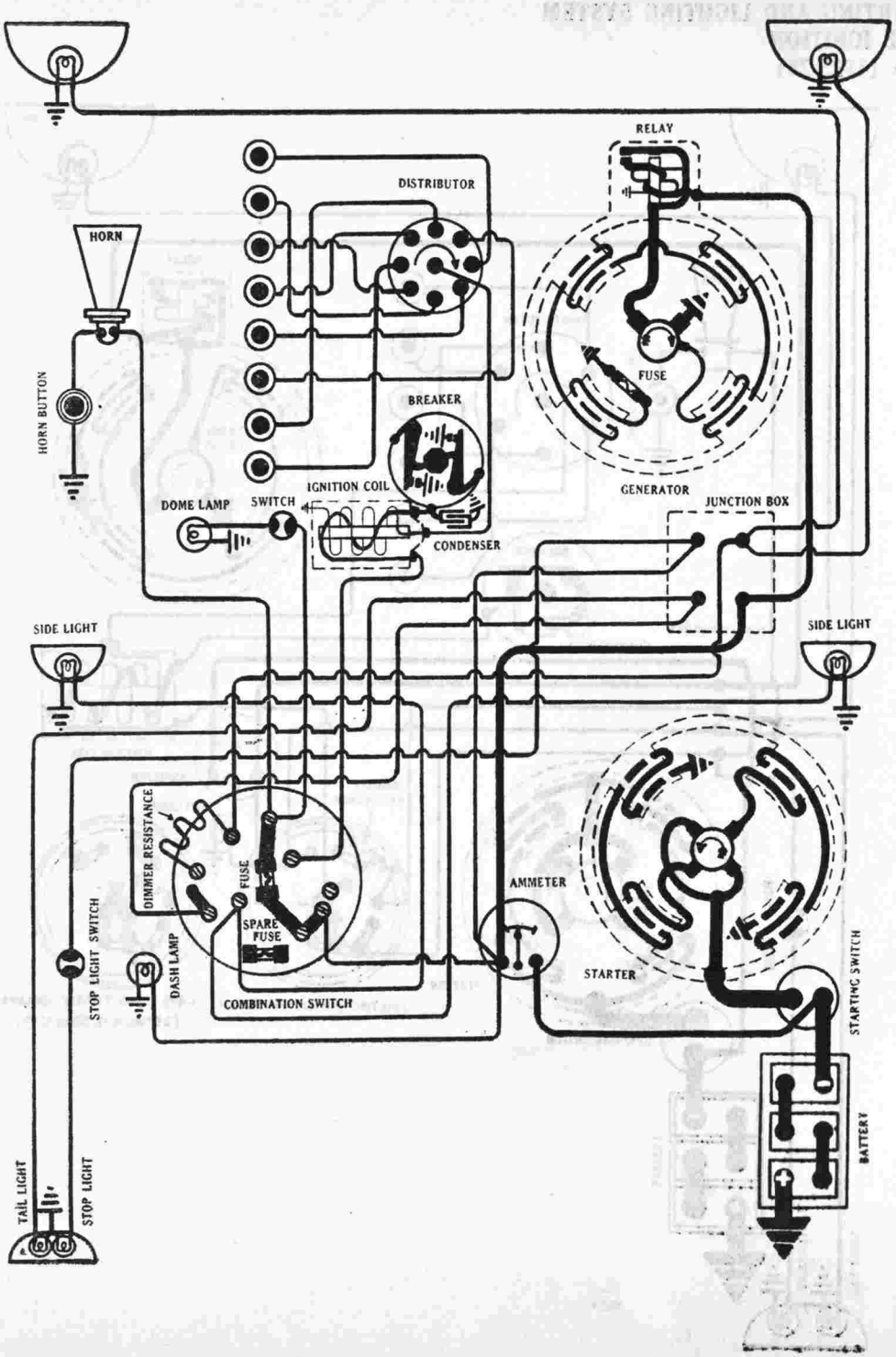
Oiling.—Put 5 or 6 drops of light engine oil in the commutator end bearing oiler every two weeks. If the car is driven more than 500 miles in two wees the oiling must be done every 500 miles.

RELAY:—Style No. 301210B. Relay closes at 10 M. P. H. or 500 R. P. M. of armature or at 6.5 volts, and opens when there is a discharge of from 0-3 amperes. The contacts separate .030-.035 inch. The air gap between armature of relay and coil core is .005 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS:—Head lamps are 6-8 volt, 21 cp.S.C. Dash, tail, side and dome lamps are each 6-8 volt, 3 cp.S.C.

FUSES.—Lighting circuit fuses are 10 ampere. Generator field fuse is 5 ampere.





HUPMOBILE

MODEL E-1 (1925) SERIAL NOS. E-1 UP.
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION.

BATTERY:—Willard, Type SJR-6. 6 volt, 155 ampere hour. The positive (+) terminal is grounded.

IGNITION:—Coil Model N. Distributor Model RA. Breaker contacts separate .010-.012 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file or on a medium hard oilstone.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Place a small bit of vaseline on the face of the breaker cam, applying with a toothpick, every 1000 miles.

Timing:—Breaker contacts begin to separate when the top dead center mark on the flywheel is 8° past the indicator on the flywheel housing with the spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-2-3-8-4-7-6.

Spark Plugs:—Spark plug diameters are 7/8 inch Gaps are .022-.025 inch.

STARTER:—Frame No. 59AO. ..Type S-416662. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, looking at the commutator end.

Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2500-3500	5.5	45
34 "	Lock	3.5	675

Oiling:—Put 4 or 5 drops of light engine oil in each of the starter oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

GENERATOR:—Frame No. 36-GT. ..Type S-416706. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the charging rate shift the third brush. Shifting the brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate.

Generator Data.

Amperes	Volts	R.P.M.
0	—	500
8	—	800
16-17	8	1400-1450
10	8	2500

Running freely as a motor, generator draws 5 amperes at 6.2 volts. Shunt field current is 2.35 amperes at 6 volts.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Relay contacts close when the voltage of the generator reaches 6.75 to 7.5 volts and open with a discharge current of 0 to 3 amperes. Contacts separate .030 to .035 inch. The air gap between the relay armature and coil core is .015 inch. contacts closed.

LIGHTING:—Head lamps and stop lamp are each 6-8 volt, 21 cp.S.C. Dash, dome, tail and side lamps are each 6-8 volt, 3 cp.S.C.

FUSES:—Generator field fuse is 5 ampere. Lighting fuses are 20 ampere.

HUPMOBILE

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION
MODEL A (1925-26)

BATTERY.—Willard, Type CRR-15. 6 volt, 105 ampere hour. Starting capacity is 125 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model IG-4061 and IG-4065. Distributor Model IG-4117-A. Breaker contacts separate .020-.024 inch. Resurface contacts with a fine flat jeweler's file or on a medium hard oilstone. Distributor is of the semi-automatic type. Manual advance is 30°. Automatic advance begins at 1500 R.P.M. and reaches a maximum of 19-21° at 3600 R.P.M.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every week or each 250 miles. Put a small bit of vaseline on the face of the breaker cam under the fiber bumper of the contact arm every month.

Timing.—Breaker contacts begin to separate when Piston No. 1 on compression stroke (with both valves closed) reaches top dead center with the manual spark control lever advanced one-half or midway between the fully retarded and fully advanced position.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are 7/8 in. Gaps are .025 inch.

STARTER.—Model MN-4109. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 160 R.P.M., taking 130 amperes at 4.8 volts. Starter brush tension should be 1¼-1½ pounds each. Starter switch is Model SW-4002.

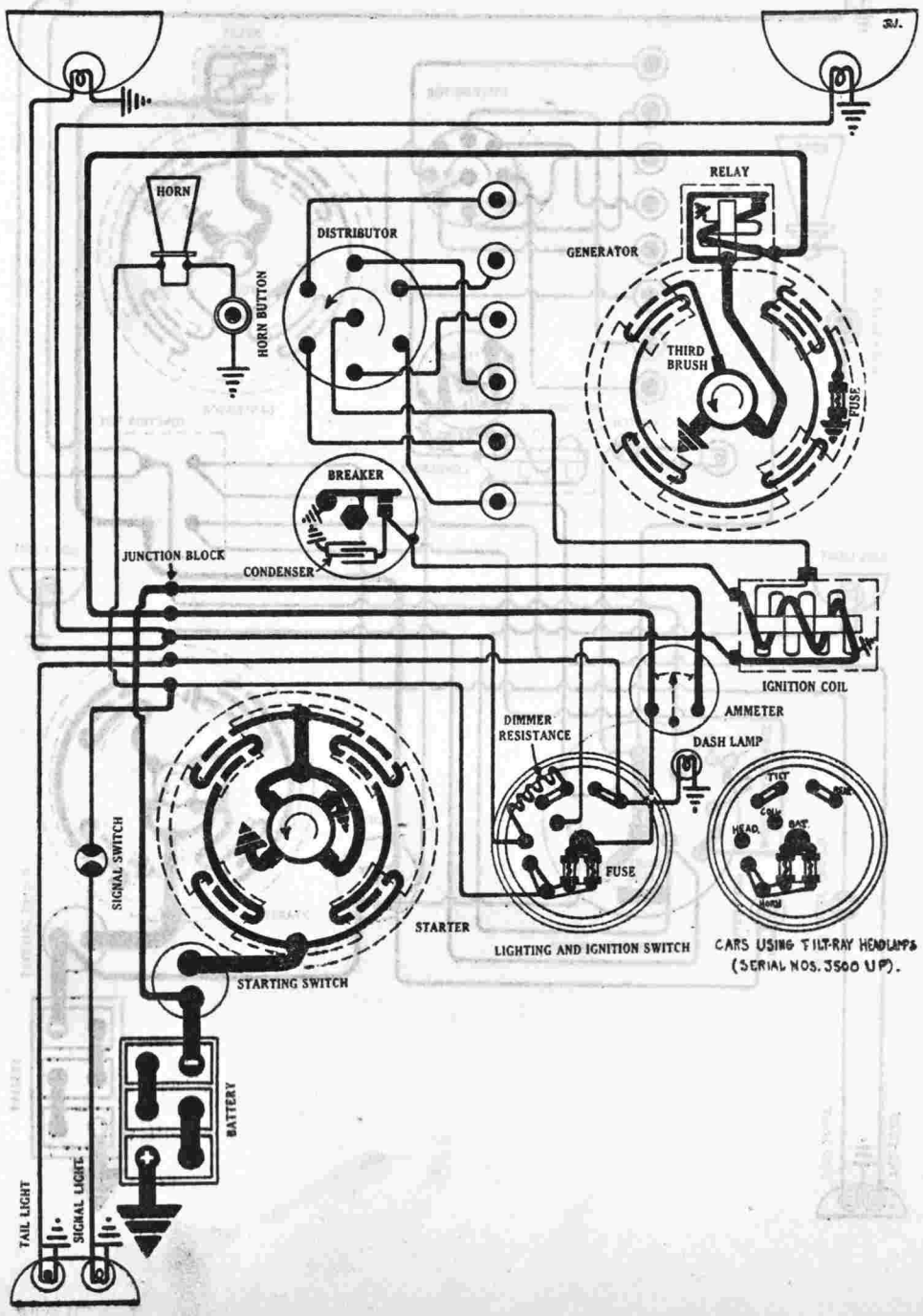
Starter Data

Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	Free	5	45	(Without Bendix)
0 "	Free	5	50	(With Bendix)
0.5 "	2800	5.5	100	
2.4 "	1450	5	200	
4.8 "	950	4.5	300	
7.2 "	650	4	400	
13.6 "	Lock	3	620	

Mounting.—Starter is flange mounted at left of engine. To remove starter, remove three flange mounting screws and slide starter forward from position.

Oiling.—Put 5 to 10 drops of light engine oil in the oiler on the drive end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month. The commutator end bearing is oilless and requires no attention.

GENERATOR.—Model GJ-4112. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the generator output, remove the commutator cover band and shift the third brush mounting plate by tapping with a screwdriver. Shifting the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. The mounting plate is held in any desired position by friction between the holder stud and the generator end plate caused by the tempered steel spring in the end of the plate. Maximum charging rate is 16 amperes, reached at 1600 R.P.M.



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HUPMOBILE

MODEL A (1925-26)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

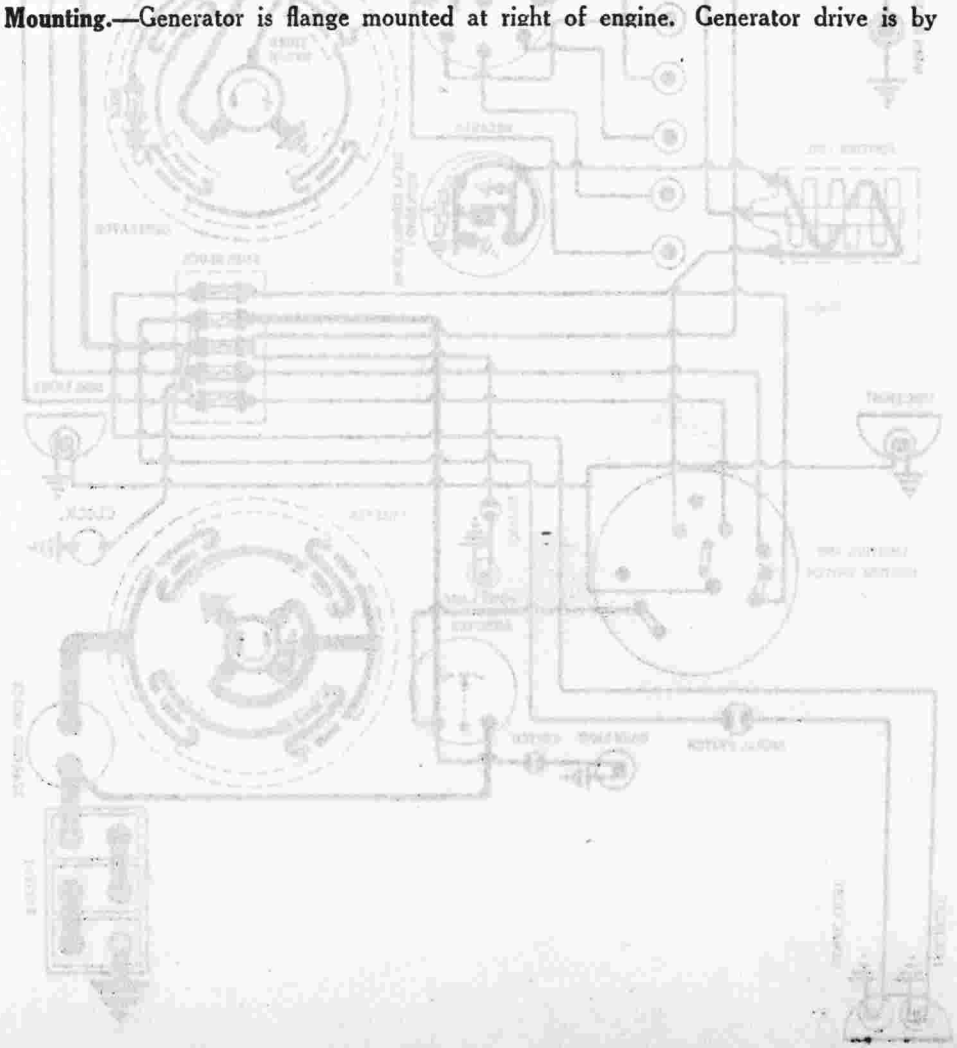
AUTO-LITE IGNITION

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	600	0	6.5	600
2	6.6	675	2	7.2	750
5	7	780	5	7.4	900
10	7.3	940	10	7.7	1200
14	7.7	1300	12.5		1600
16	8	1600	11.5		2400
15		2400			

Motoring freely, generator draws 5 amperes at 6 volts. Shunt field test current is 2 amperes at 6 volts. Generator brush spring tension should be 1¼-1½ pounds each.

Mounting.—Generator is flange mounted at right of engine. Generator drive is by timing chain at forward end of engine.



Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles if the car is driven more than 1000 miles in a month. The drive end bearing is oiled by splash from the gear case.

RELAY.—Model CB-4009. Relay is mounted on top of the generator. Relay closes when the voltage of the generator reaches 6.5-7 volts and opens with a discharge current of .5-2.5 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING.—Head and stop lamps are each 6-8 volt, 21 cp. S. C. Dash and tail lamps are each 6-8 volt, 2 cp. S. C.

FUSES.—Generator field fuse is 5 amperes.

HUPMOBILE

MODEL E-2 (1925-26)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY.—Willard, Type SJR-6. 6 volt. 155 ampere hour. Starting capacity is 165 amperes for 20 minutes. Lighting capacity is 5 amperes for 31 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model 2182. Distributor Model 5295. Breaker contacts separate .0225-.0275 inch. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Breaker uses double contacts with a four-sided cam, contact arms being set at an angle of 45° and opening alternately. Distributor is of the semi-automatic type. Manual advance is 38°. Automatic advance begins at 1600 R.P.M. and reaches a maximum of 21-26° at 3600 R.P.M. The tension of the breaker arm spring is 16-20 ounces.

Oiling.—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles. Wipe out the distributor head with heavy grease, removing all excess and polishing with a soft clean cloth every 5000 miles. Put a small bit of heavy grease on the face of the breaker cam under the fiber bumper of the contact arm every 1000 miles.

Timing.—Breaker contacts begin to separate when No. 8 piston on compression stroke (with both valves closed) reaches top dead center with the manual spark control lever in the half advanced position or midway between the fully retarded and fully advanced position.

Firing Order.—The firing order is 1-5-2-3-8-4-7-6.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .022-.025 inch.

STARTER.—Model MR-4101. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 140 R.P.M. drawing 100 amperes at 6 volts. Starter brush tension should be 1¼-1½ pounds each. Starter switch is Model SW-4001.

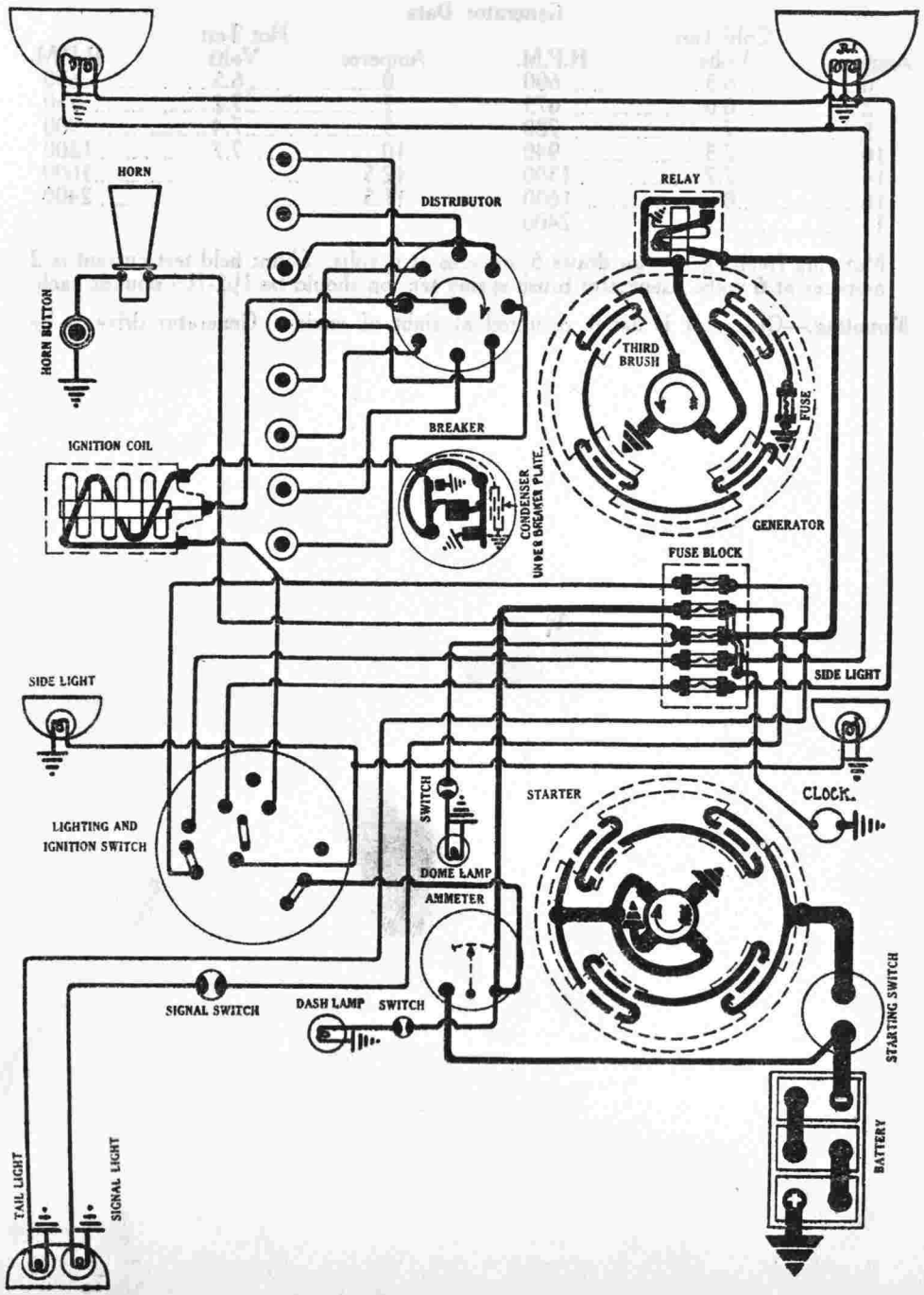
Starter Data

Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	Free	5.9	60	(Without Bendix)
0 "	Free	5.8	70	(With Bendix)
1.5 "	1225	5.7	100	
6 "	700	5.4	200	
12.5 "	450	4.95	300	
18.5 "	300	4.5	400	
44 "	Lock	4	820	

Mounting.—Starter is barrel mounted at rear of flywheel housing at right of engine. To remove starter, remove large taper pointed pilot cap screw and locknut. Then slide starter from place.

Oiling.—Starter bearings are of the oilless type. They require no attention.

GENERATOR.—Model GXB-4101. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the generator output, remove the commutator cover band and shift the third brush mounting plate by tapping on the third brush mounting stud with a screw driver. Moving the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. The mounting plate is held in any desired position by friction between the third brush mounting stud and the generator end plate. Maximum charging rate is 17 amperes at 8 volts.



HUPMOBILE

MODEL E-2 (1925-26)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

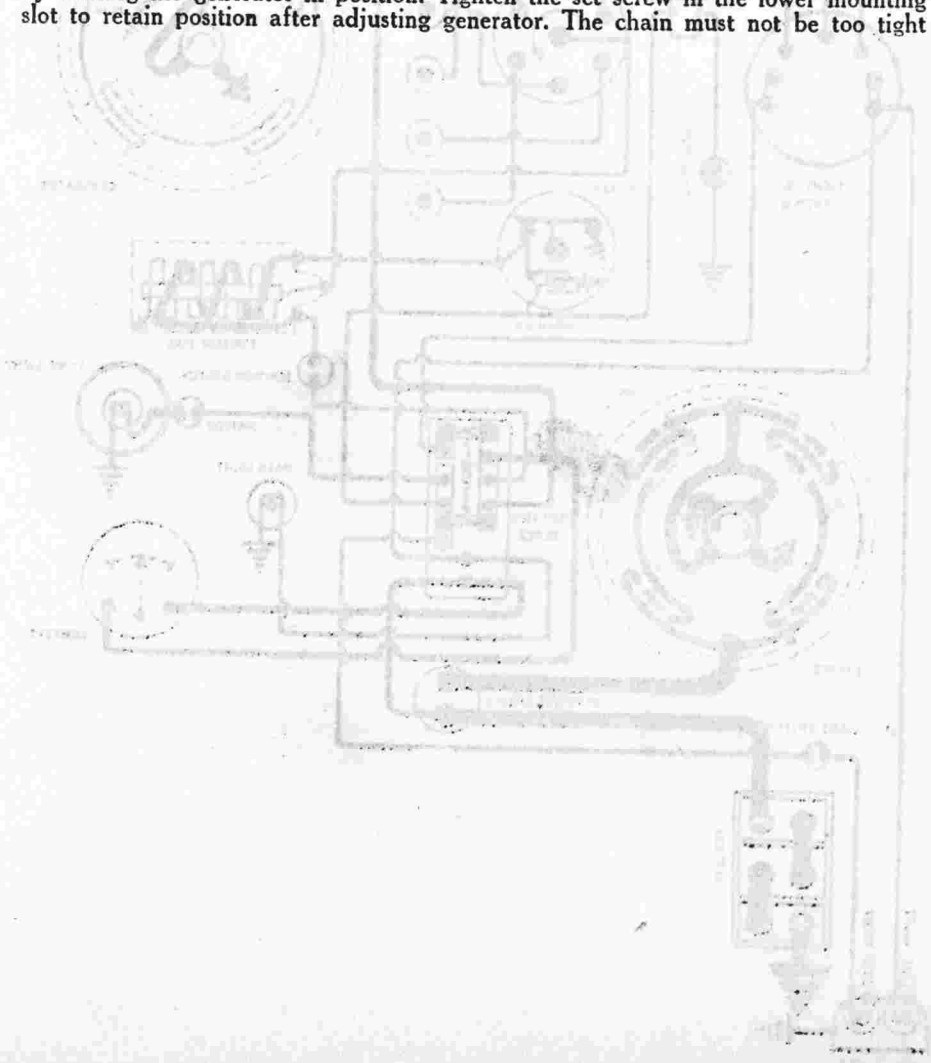
DELCO IGNITION

Generator Data

Cold Test				Hot Test			
Amperes	Volts	R.P.M.	M.P.H.	Amperes	Volts	R.P.M.	M.P.H.
2	6.6	550	9.7	2	7.2	620	11
5	7	650	11.4	5	7.4	700	12.4
10	7.3	780	13.1	10	7.7	900	15.9
16	7.7	1200	21.2	14	8.2	1600	28

Motoring freely generator draws 5.3 amperes at 6 volts. Shunt field draws 2.5 amperes at 6.2 volts. Generator brush tension is 1¼-1½ pounds each.

Mounting.—Generator is flange mounted at right of engine. Slotted holes are provided for the three mounting screws. Adjustment of the drive chain tension is made by shifting the generator in position. Tighten the set screw in the lower mounting slot to retain position after adjusting generator. The chain must not be too tight or it will crowd the generator bearings causing wear.



Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every two weeks or each 500 miles. The drive end bearing is oiled by splash from the gear case.

RELAY.—Model CB-4009. Relay is mounted on top of the generator. Relay contacts close when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of .5-2.5 amperes. Contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING.—Head and stop lamps are each 6-8 volt, 21 cp. S. C. Dash, dome, side and tail lamps are each 6-8 volt, 2 cp. S. C.

FUSES.—Generator field fuse is 5 amperes. Lighting fuses are 20 amperes.

HUPMOBILE

SERIES A-1 (1927)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—Willard, Type CRR-15, 6 volt. Starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The positive (+) terminal is grounded. Battery is mounted under the front seat.

IGNITION:—Coil Model IG-4065. Distributor Model IG-4117-A. Breaker contacts separate .020-.024 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 30° (crankshaft). Automatic advance begins at 1500 R.P.M. and reaches a maximum of 19-21° at 3600 R.P.M. Breaker arm spring tension is 18-20 ounces.

Mounting:—Ignition coil is mounted on the engine side of the dash. Distributor is mounted on the left side of the engine. To remove distributor, disconnect primary lead and manual advance control rod. Then remove distributor head with high tension cables intact and remove set screw on side of distributor mounting. Then lift distributor from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every week or each 250 miles. Put a small amount of vaseline on the face of the breaker cam every month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever one half advanced. To check timing, crank engine until piston No. 1 begins compression stroke (the upstroke with both valves closed). Then advance spark control lever one half placing it midway between the fully advanced and fully retarded positions. Continue to crank engine until piston No. 1 reaches top dead center when the dead center mark for cylinders 1 and 6 will be opposite the indicator on the flywheel case. If breaker contacts do not separate at this point, loosen distributor clamp screw and rotate distributor housing until breaker contacts begin to separate. Tighten the clamp and make certain that the rotor is under the segment connected to spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Gaps are .025 inch.

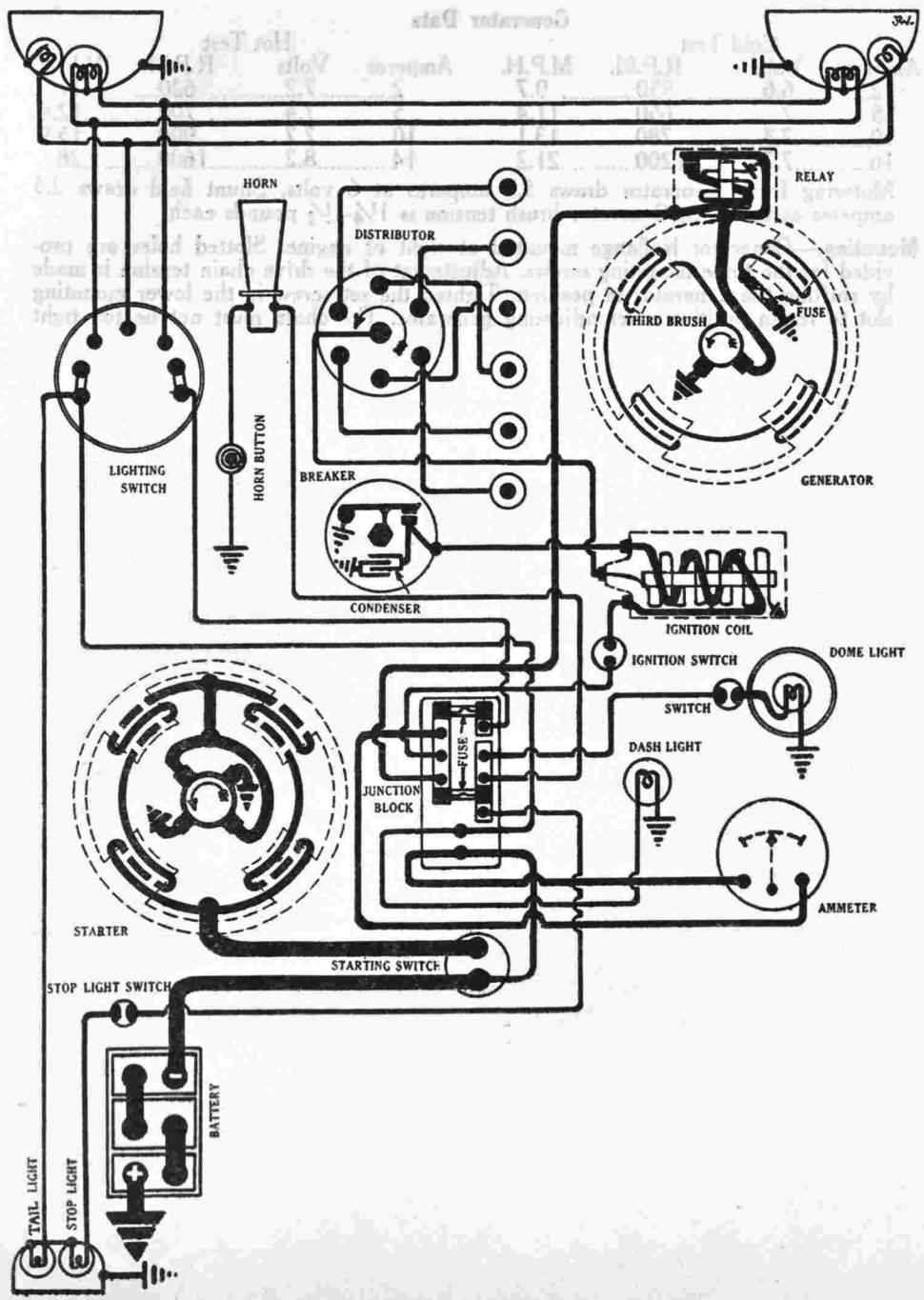
STARTER:—Model MN-4109. Starter is connected to the engine through a Bendix inboard drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter switch is Model SW-4002. Brush spring tension is 1¼-1½ pounds. Starter cranks the engine at 160 R.P.M. drawing 130 amperes at 4.8 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	Free	5.0	45	(Without Bendix)
0 "	Free	5.0	50	(With Bendix)
.5 "	2800	5.5	100	
2.4 "	1450	5.0	200	
4.8 "	950	4.5	300	
7.2 "	650	4.0	400	
13.6 "	Lock	3.0	620	

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect starter cable and remove three flange mounting cap screws. Then slide starter forward and lift from place.

Oiling:—Put 5 to 10 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles.



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HUPMOBILE

SERIES A-1 (1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

GENERATOR:—Model GJ-4201. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove commutator cover band and shift third brush by tapping on third brush mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any position by friction between the third brush mounting stud and the generator endplate. The maximum charging rate is 16 amperes reached at 1600 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	600	0	6.5	600
2	6.6	675	2	7.2	750
5	7.0	780	5	7.4	900
10	7.3	940	10	7.7	1200
14	7.7	1300	12.5	8.0	1600
16	8.0	1600	11.5	..	2400
15	..	2400			

Generator motoring draws 5 amperes at 6 volts. Shunt field test current is 2 amperes at 6 volts directly across field terminals. Each coil tested separately draws 8.8 amperes at 6 volts. Brush spring tension is 1¼-1½ pounds each.

Mounting:—Generator is flange mounted at right of engine on rear side of timing chain case. To remove generator, disconnect generator lead and loosen timing chain adjustment set screw. Then remove three flange mounting cap screws and slide generator to the rear, being careful not to disturb timing chain adjustment. Generator is driven by timing chain. The chain may be adjusted by loosening three flange cap screws on generator and shifting generator around lower mounting screw as a pivot. A set screw is provided in the upper mounting slot to secure adjustment. Tighten the mounting cap screws after making the adjustment. Be careful not to get the chain too tight. A chain that operates noiselessly has the proper tension.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles. The drive end bearing is oiled by splash from the chain case.

RELAY:—Model CB-4009. Relay is mounted on the generator. Relay contacts close at 675 R.P.M. of the generator when the voltage reaches 6.5-7 volts and open with a discharge current of .5-2.5 amperes. Charging current at closing of contacts is 2 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING:—Clum Switch Model 10626. Lighting switch is mounted on base of steering column. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Stop lamp is 6-8 volt, 15 cp. S.C. Dash, tail and dome lamps are each 6-8 volt, 3 cp. S.C. Parking lamps in head lamps are 6-8 volt, 3 cp. S.C.

FUSES:—Lighting fuses in junction block are 15 amperes.

HUPMOBILE

SERIES E-3 (1927)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—Willard, Type SJRR-6, 6 volt. Starting capacity is 160 amperes for 20 minutes. Lighting capacity is 5 amperes for 30 hours. The positive (+) terminal is grounded. Battery is mounted under the driver's seat.

IGNITION:—Coil Model 2195. Distributor Model 4027. Breaker contacts separate .0225-.0275 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 38° (crankshaft). Automatic advance begins at 1000 R.P.M. and reaches a maximum of 21-25° at 3600 R.P.M. Breaker arm spring tension is 16-20 ounces. Distributor uses two sets of breaker contacts operating on a four sided cam and opening alternately at intervals of 45° corresponding to 90° of crankshaft rotation. This firing interval must be accurately set for correct ignition (see Timing).

Mounting:—Ignition coil is mounted on the engine side of the dash. The distributor is mounted at the right of the engine. To remove distributor, disconnect primary lead at ignition switch and remove manual advance control rod and stop screw. Then lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles. Put a small bit of vaseline on the face of the breaker cam every month.

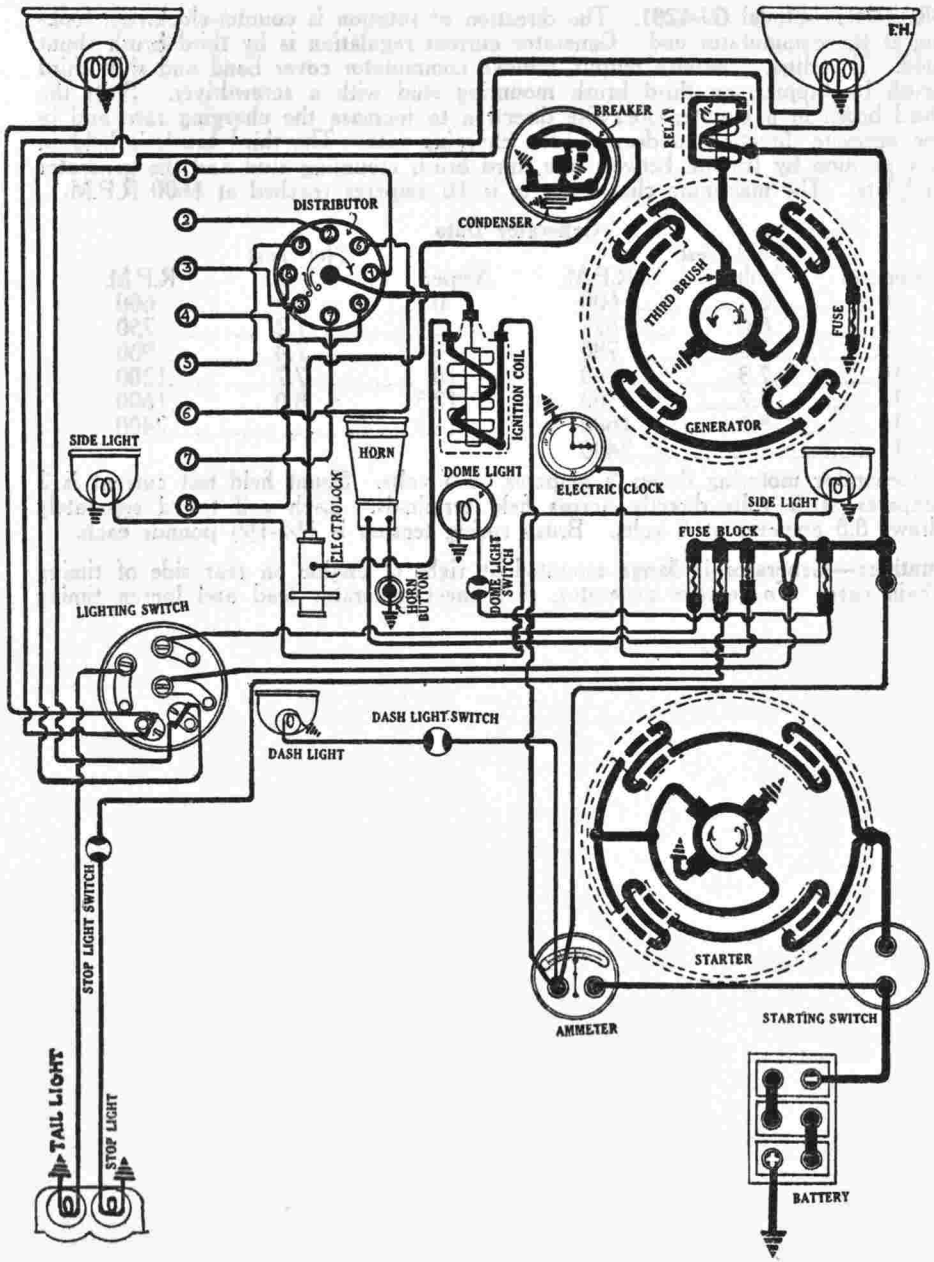
Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches position 15° before top dead center with spark lever fully advanced. To check timing, crank engine until piston No. 1 enters compression stroke (the up stroke with both valves closed). Then advance manual spark control lever and continue to crank engine until piston No. 1 reaches firing position when the mark on the flywheel will be opposite the indicator on the flywheel case. The set of breaker contacts mounted on the stationary plate should begin to separate at this point. If they do not, loosen the lockscrew in the center of the breaker cam and rotate the cam until contacts begin to separate. Tighten the lockscrew. The second set of contacts should separate 45° after this point when piston No. 4 entering power stroke reaches firing position. Check firing interval with synchronizing tool which is Delco-Remy Part No. 822572. Remove regular firing cam and replace with tool placing tool on shaft so that fiber bumper of contact arm mounted on stationary plate rests in notch. If fiber bumper of second contact arm does not rest in the other notch, loosen the lockscrews and turn the eccentric adjusting screw until the fiber bumper is in the notch. Then tighten the lockscrews.

Valve Timing:—INLET VALVES open 4° past top dead center and close 51° past lower dead center. EXHAUST VALVES open 47° before lower dead center and close at top dead center.

Firing Order:—The firing order is 1-4-7-3-8-5-2-6.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Gaps are .025-.028 inch.

STARTER:—Model MR-4101. Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter switch is Model SW-4001. Brush spring tension is 1¼-1½ pounds each. Starter cranks the engine at 140 R.P.M. drawing 100 amperes at 6 volts.



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HUPMOBILE

SERIES E-3 (1927)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

Starter Data

Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	Free	5.9	60	(Without Bendix)
0 "	Free	5.8	70	(With Bendix)
1.5 "	1225	5.7	100	
6 "	700	5.4	200	
12.5 "	450	4.95	300	
18.5 "	300	4.5	400	
44 "	Lock	4.0	820	

Mounting:—Starter is barrel mounted at right of engine on rear of flywheel housing. To remove starter, disconnect starter cable and remove large taper pilot mounting screw and locknut. Then slide starter to rear and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GXB-4201. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen commutator cover band and shift third brush by tapping on third brush mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any desired position by friction between the mounting stud and the generator endplate. Maximum charging rate is 18 amperes (cold) at 8 volts reached at 1200 R.P.M. or 21.2 M.P.H.

Generator Data (Car Setting)

	Cold Test			Hot Test	
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
2	6.6	550	2	7.2	620
5	7.0	650	5	7.4	700
10	7.3	780	10	7.7	900
16-18	7.7	1200	14	8.2	1600

Generator motoring draws 5.3 amperes at 6 volts. Shunt field draws 2.5 amperes at 6.2 volts directly across field terminals. Each coil draws 10 amperes at 6.2 volts when tested separately. Brush spring tension is 1¼-1½ pounds each.

Mounting:—Generator is flange mounted at right of engine on rear side of timing chain case. Generator drive is from timing chain which is adjusted by shifting generator in mounting slots. To adjust chain loosen the three flange mounting cap screws and shift generator around screw nearest engine block as a pivot until proper adjustment is secured. A set screw is provided to hold adjustment. The timing chain must not be too tight. To remove generator, disconnect generator lead and water pump coupling. Then loosen timing chain adjustment set screw and remove three flange mounting cap screws. Slide generator to rear and lift from place.

RELAY:—Model CB-4009. Relay is mounted on the generator. Relay closes at 550 R.P.M. of the generator when the voltage reaches 7-7.5 volts and opens with a discharge current of .5-2.5 amperes. Charging current at closing of contacts is 2 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING:—Clum Switch Model 10612. Switch is mounted at base of steering column. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Stop lamp is 6-8 volt, 15 cp. S.C. Side lamps are 6-8 volt, 3 cp. S.C. Dash, tail, dome and corner lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuses are 10 amperes.

HUPMOBILE

MODEL A-6 'NEW CENTURY SIX' (1928)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—Willard, Type CRR-15, 6 volt. Starting capacity (20 ampere rate) is 114 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery has 15 plates each 4¾ inches high, 5¾ inches wide and 3/32 inch thick. The positive (+) terminal is grounded. Battery is mounted under the front seat on the left side.

IGNITION:—Coil Model IG-4065. Ignition coil is mounted on the dash. Ignition current is 1-3 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped.

Distributor Model IGC-4001. Breaker contacts separate .020-.024 inch. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension should be 16 ounces. Distributor is semi-automatic. Maximum manual advance is 15° (distributor). Automatic advance begins at 500 R.P.M. (distributor). Maximum automatic advance is 8° reached at 1800 R.P.M.

Mounting:—Distributor is mounted at left of engine by special flange. To remove distributor, disconnect manual advance rod and primary lead and remove distributor head with high tension cables intact. Then remove set screw on side of distributor mounting and lift distributor from place.

Oiling:—Put 4 or 5 drops of light oil in the oiler on the side of the distributor ever 500 miles. Put a small amount of vaseline on the face of the breaker cam every 1000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with manual spark lever fully retarded. To set timing, crank engine until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Fully retard spark lever and continue to crank engine until piston reaches top dead center. Loosen advance arm clamp screw and rotate distributor until contacts begin to separate. Tighten the clamp screw. Make certain that the rotor is opposite the segment connected to spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Gaps are .022-.025 inch.

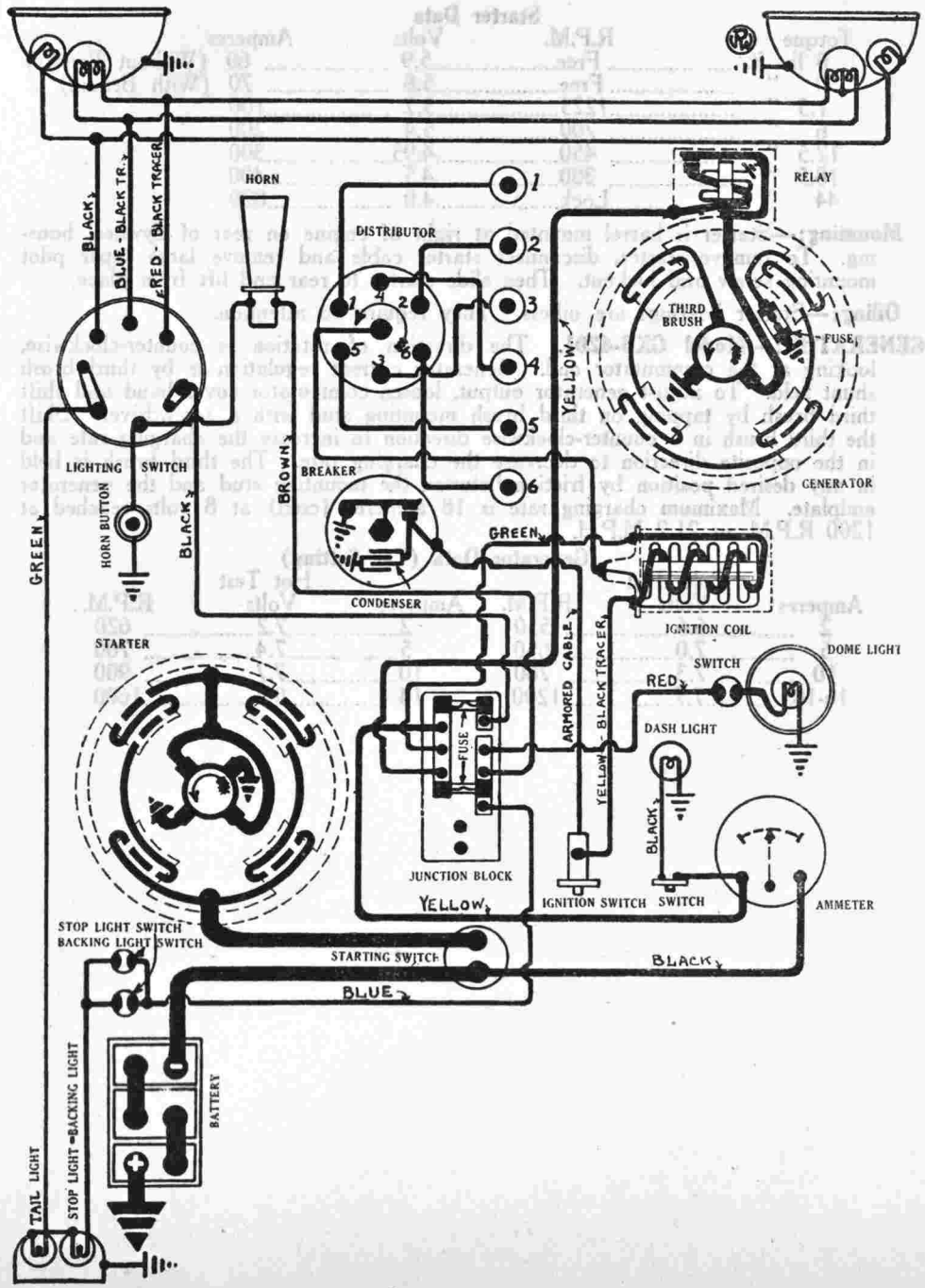
VALVE TIMING:—Specifications:—Head diameter, 1½ inches. Valve lift, 5/16 inch. Tappet clearance, .005 inch (inlet) and .006 inch (exhaust).

Timing:—Inlet valves open 4 degrees after top dead center and close 51 degrees after lower dead center. Exhaust valves open 47 degrees before lower dead center and close at top dead center.

STARTER:—Model MN-4109. Starter is connected to the engine through an inboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 1¼-1½ pounds. Starter switch is Model SW-4002.

Starter Data

Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	Free	5.5	45	(No Bendix)
0 "	Free	5.5	50	(With Bendix)
.5 "	2800	5.5	100	
2.4 "	1450	5.0	200	
4.8 "	950	4.5	300	
7.2 "	650	4.0	400	
13.6 "	Lock	3.0	620	



HUPMOBILE

MODEL A-6 'NEW CENTURY SIX' (1928)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

Mounting:—Starter is mounted at left of engine on forward side of flywheel housing by standard S.A.E. No. 1 flange mounting. To remove starter, disconnect cable and remove three flange mounting cap screws. Then pull starter forward and lift from place.

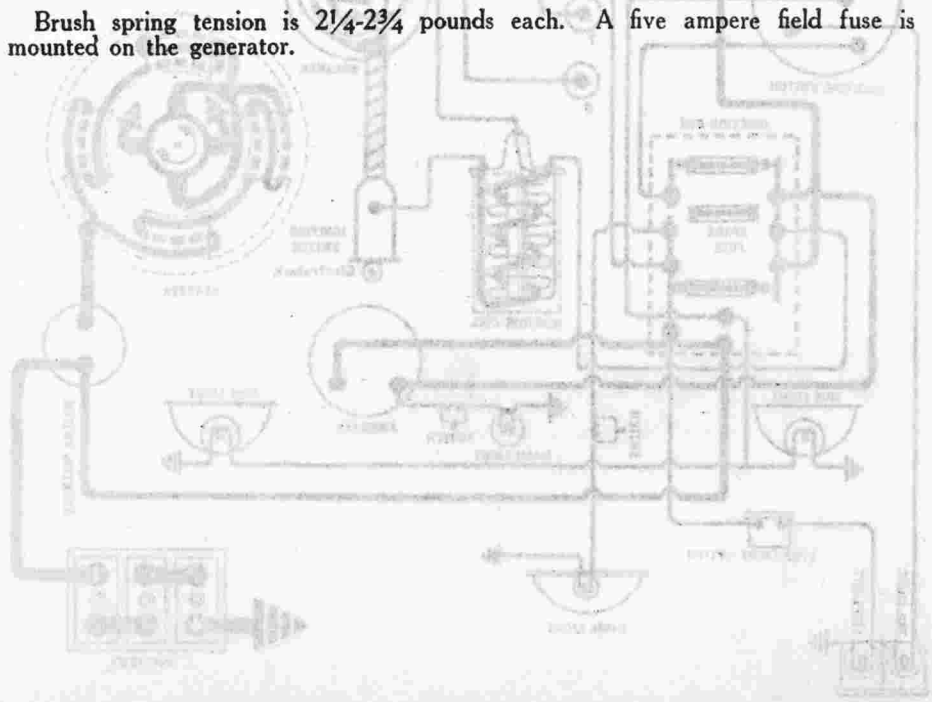
Oiling:—Put 4 or 5 drops of light oil in the oiler on the commutator end of the starter every 1000 miles.

GENERATOR:—Model GAJ-4101. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove cover band and shift third brush by pressure on mounting bracket. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in position by friction between the mounting bracket and the end plate. Maximum charging rate is 15 amperes (cold) reached at 1600 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
4	6.8	600			
12.8	7.6	1200			
15	8.0	1600	11.9	8.0	1900
13.4	7.8	2000			
11.7	7.5	2400			

Brush spring tension is 2¼-2¾ pounds each. A five ampere field fuse is mounted on the generator.



Mounting:—Generator is mounted at right of engine on rear of timing chain case by standard S.A.E. flange mounting. To remove generator, disconnect generator wire and back off timing chain adjusting set screw. Then remove three flange mounting cap screws and pull generator to rear being careful not to disturb the timing chain.

Timing Chain Adjustment:—The tension of the timing chain is adjusted by shifting the generator around the lower flange mounting cap screw as a pivot. Loosen the flange cap screws and turn up the chain adjusting set screw until the chain begins to hum with the engine running. Then back off the set screw until the chain runs noiselessly. This will give the proper tension. Be careful not to get the chain too tight.

Oiling:—Put 4 or 5 drops of light oil in the generator oiler every 1000 miles.

RELAY:—Model CB-4012. Relay is mounted on the generator. Contacts close at 650 R.P.M. when the generator voltage reaches 7-7.5 volts and open wtih a discharge current of .5-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Clum Switch Model 10612. Switch is mounted at lower end of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base) Mazda No. 1110. Stop and backing light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Parking lights (in head lamps) and side lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63. Dash, tail and dome lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Generator field fuse is 5 amperes. Lighting fuses on junction block are 15 amperes.

HUPMOBILE

CENTURY "8" (1928)
AUTO-LITE GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type SJRR-6, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 160 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 30 hours. The battery is mounted under the driver's seat.

IGNITION:—Coil Model 2195. Distributor Model 657-C. Breaker contacts separate .022 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 38 degrees (crankshaft). Automatic advance begins at 800 R.P.M. and reaches a maximum of 24-25 degrees at 3400 R.P.M. Breaker arm spring tension is 17-21 ounces on each. Distributor uses two sets of breaker contacts operating on a four sided cam and opening alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This firing interval must be accurately set for correct ignition. See Timing.

Mounting:—Ignition coil is mounted on the engine side of the dash. The distributor is mounted at the right of the engine. To remove distributor, disconnect manual advance rod and remove advance stop screw, then remove Electrolock and distributor as a unit.

Oiling:—Fill the grease cup under the distributor head and turn down two turns every 1000 miles. Every 1000 miles remove head and rotor and saturate the wick oiler in the center of the shaft with light engine oil. Put a small amount of heavy grease on the face of the breaker cam.

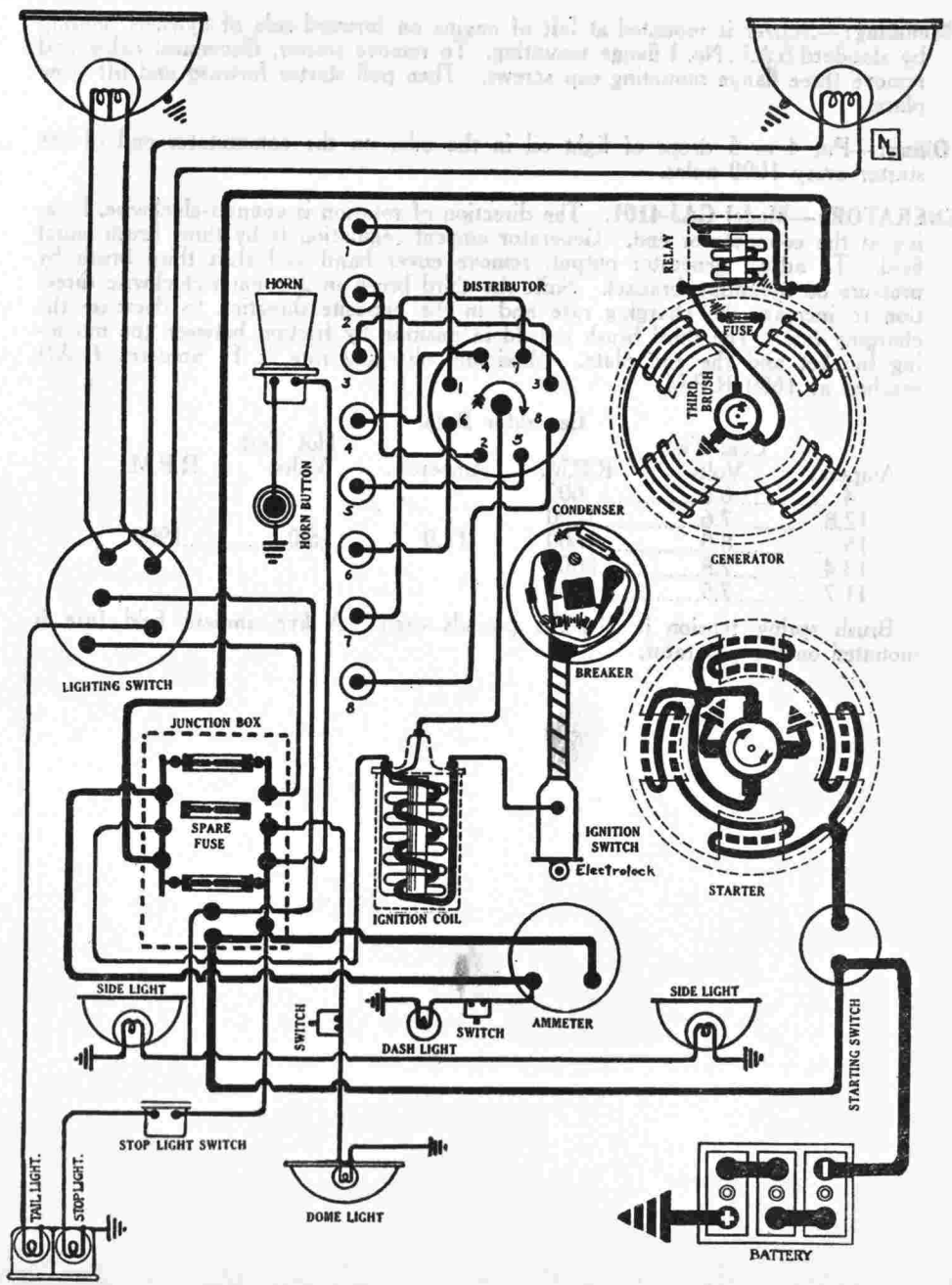
Timing:—Synchronization of Contacts:—To synchronize contacts, use Delco-Remy Tool, Part No. 820738, and follow directions given on Page S-30. Contacts can be synchronized without tool after distributor has been timed to engine, by turning over engine 90 degrees from firing position of piston No. 1 when piston No. 6 will reach 15 degrees before top dead center entering firing stroke. Make certain manual spark control is fully advanced. If one set of breaker contacts are not separating, loosen lock screws on breaker plate and turn eccentric adjusting screw until contacts begin to separate. Tighten lock screws and check contact gaps. If breaker gaps are outside the limits of .018-.024 inch, reset at .022 inch and repeat synchronizing operation.

Timing Distributor to Engine:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 15 degrees before top dead center with the spark control lever in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance spark lever. Continue to crank engine until piston reaches 15 degrees before top dead center when the flywheel mark will be opposite the indicator on the flywheel housing. If one set of contacts is not opening, loosen advance arm clamp screw and rotate distributor until contacts open. Tighten the clamp screw. Connect the segment opposite the rotor to the spark plug in cylinder No. 1 and connect the remaining spark plugs in order 4-7-3-8-5-2-6 clockwise around the distributor head.

VALVE TIMING:—INLET VALVES:—Inlet valves open 4 degrees after top dead center and close 51 degrees after lower dead center.
EXHAUST VALVES:—Exhaust valves open 47 degrees before lower dead center and close at top dead center.

Firing Order:—The firing order is 1-4-7-3-8-5-2-6.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are .025 inch.



HUPMOBILE

CENTURY "8" (1928)

AUTO-LITE GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

STARTER:Model ML-4139. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, looking at the commutator end. Brush spring tension is 1¼-1½ pounds each. Starter cranks the engine at 145 R.P.M. drawing 125 amperes at 5.4 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0	Free	5.8	70
19 lb. ft.	Lock	2.5	425

Mounting:—Starter is sleeve mounted at the right of the engine on rear of flywheel case. To remove starter, take floor boards in front compartment out. Disconnect starter cable and remove large pilot mounting screw directly above starter sleeve. Then pull starter to rear and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GAG-4106. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen commutator cover band and shift third brush by tapping on third brush mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any position by friction between the mounting stud and the generator endplate.

Generator Data

Amperes	Volts	R.P.M.
0	6.5	525
5	7	650
10	7.3	780
17	8	1250

Generator, motoring draws 5-5.5 amperes at 6 volts. Shunt field current is 4.3 amperes at 6 volts. Brush spring tension is 1¼ to 1½ pounds each.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove, take off oil filler and cover plate on front of chain case. Disconnect drive shaft at rear of generator. Back off chain adjustment nut and remove 3 flange mounting cap screws. Pull generator to rear and tie up chain to prevent it slipping on cam shaft sprocket.

Adjustment of Timing Chain:—To adjust timing chain, loosen generator flange mounting cap screw and take up on the adjustment screw until chain begins to hum with engine running. Then back off set screw until chain runs noislessly and tighten flange cap screws. The chain must not be run tight. There should be ½ inch up and down play with correct adjustment.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator oilers every 500 miles.

RELAY:—Model CB-4009. Relay is mounted on the generator. Relay closes at 550 R.P.M. of the generator when the voltage reaches 7-7.5 volts and opens with a discharge current of .5-2.5 amperes. Charging current at closing of contacts is 2 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch with contacts closed.

LIGHTING:—Clum Switch Model 10612. Switch is mounted at the base of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact) Mazda 1110. Side, dash, dome and tail lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop and backing lights are 6-8 volt, 15 cp. S.C. Mazda 87.

FUSES:—Lighting fuses are 15 amperes capacity. Generator field fuse is 5 amperes.

Interstate

MODEL TF (1916-17) (SERIAL NOS. 11504 TO 19108)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
MEA MAGNETO IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .014 to .016 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put two or three drops of light machine oil in each of magneto oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 2, 4, 3.

SPARK PLUG GAPS.—Spark plug gaps are .015 to .020 inch.

STARTER.—Starter is connected to the engine through a Bendix drive.

Starter Data. Model No. 184A

Torque, Lb. Ft.	R. P. M.	Amperes	Volts
1	800-1000	55- 65	5.9-6.1
2	650- 900	65- 80	5.8-5.9
4	550- 675	95-115	5.6-5.8
6	450- 550	120-150	5.5-5.7
10	350- 400	175-200	5.3-5.5
13-16	Lock	580-620	4.0-4.2

GENERATOR.—Generator current regulation is by vibrating regulator.

Generator Data. Model 16A

Amperes	R. P. M.	Volts
0.0	370	6.0
7.0	490	6.5
14.2	2200	6.9

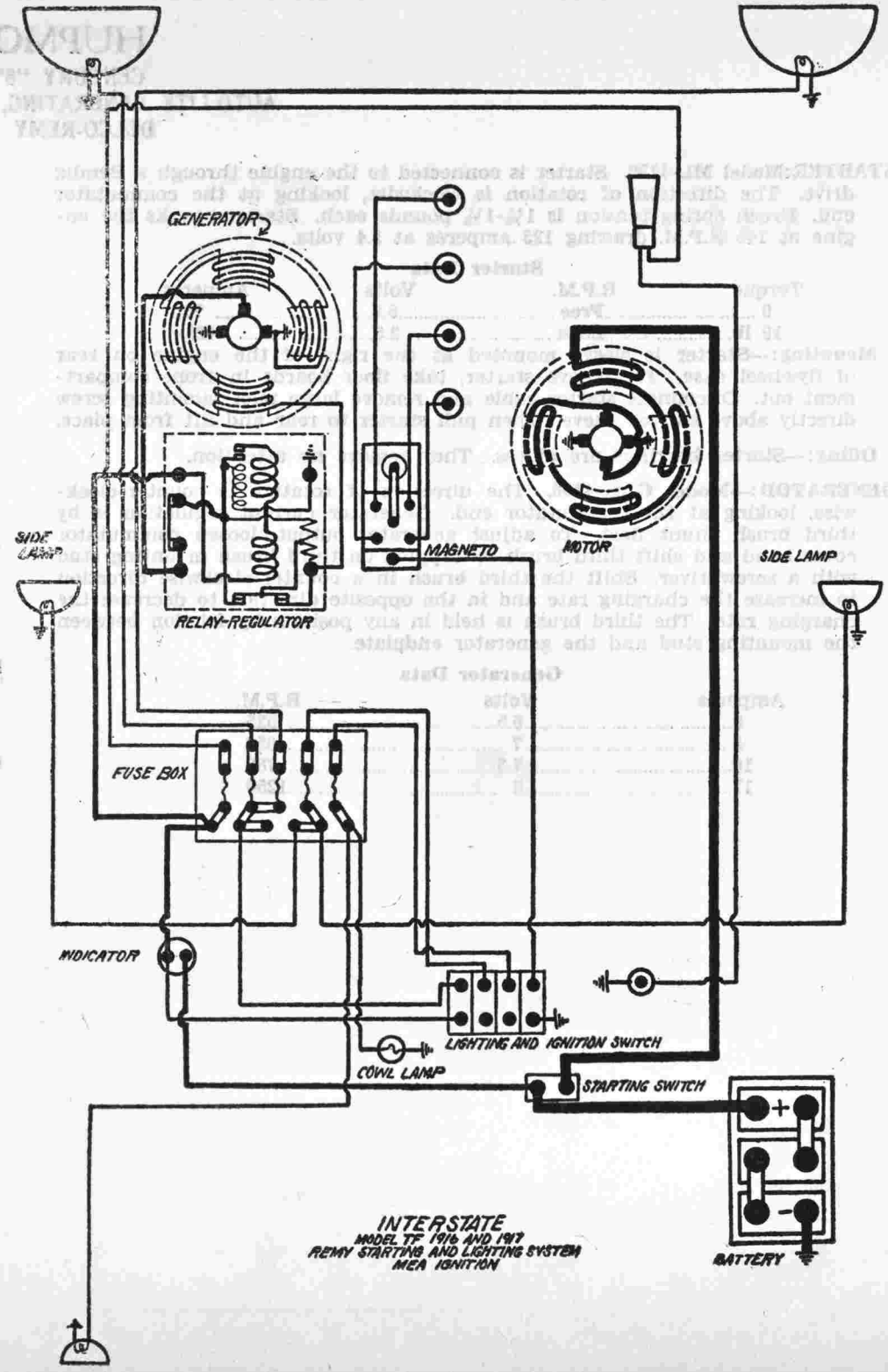
Maximum output is reached at 25 miles per hour. Operating freely as a motor, generator takes 4 to 4.5 amperes at 5.8 volts and runs at 430 R. P. M. Shunt field takes 3 to 3.5 amperes at 5.9 volts.

OILING.—Put 4 or 5 drops of light engine oil in generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY-REGULATOR.—Model No. 60A. Relay closes at 6-8 miles per hour and opens at 4 to 6 miles per hour. The air gap between relay armature (moving member) and coil core is .012 to .015 inch, contacts closed. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service. Increase spring tension on regulator armature to increase output, and decrease spring tension to decrease output.

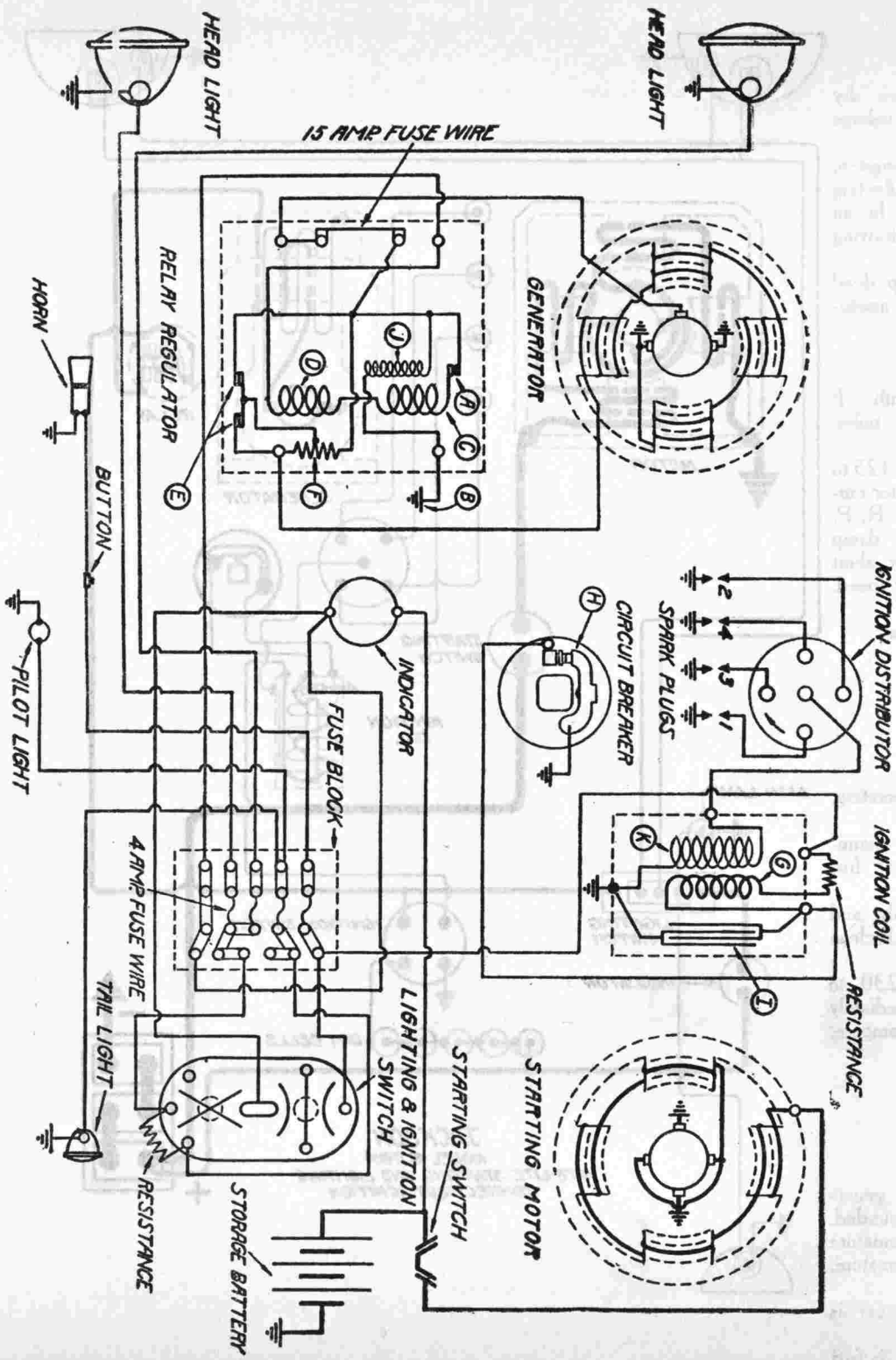
LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are each 6-8 volt, 2 cp.

FUSES.—There is a 15 ampere fuse on relay-regulator base. Use commercial 15 ampere fuse in replacing it. Other fuses are 4 ampere.



INTERSTATE

MODELS T AND TR (1916-17-18-19)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION



Battery.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded at the starting motor.

Ignition.—Breaker contacts separate .025 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper.

Oiling.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when the dead center mark on flywheel is at indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 2, 4, 3.

Spark Plug Gaps.—Spark plug gaps are .030 to .032 inch.

Starter.—Model No. 117-A or 184-A. Starter is connected to the engine through a Bendix drive.

STARTER DATA

Model No. 117-A				Model No. 184-A			
Torque	R. P. M.	Amperes	Volts	Torque	R. P. M.	Amperes	Volts
0 lb. ft.	4000-4500	35- 40	6.0	0 lb. ft.	3600-4200	56- 64	6.0
1 lb. ft.	2000-2300	80- 95	5.2-5.6	4 lb. ft.	1150-1250	200-230	4.7-4.8
2 lb. ft.	1450-1600	120-140	4.9-5.2	6 lb. ft.	850- 950	290-310	4.5-4.6
5 lb. ft.	750- 900	225-250	4.6-4.9	14 lb. ft.	Lock	570-600	3.0

Oiling.—Put 5 or 6 drops of light engine oil in each of starter bearing oilers every month.

Generator.—Generator current regulation is by vibrating regulator.

GENERATOR DATA

Model No. 18-A			Model No. 18-C-D		
Amperes	R. P. M.	Volts	Amperes	R. P. M.	Volts
0	370	6.0	0	365	6.0
7	490	6.5	7	510	6.3
14.2	2200	6.9	14.5	1450	6.8

Operating freely as a motor, current is 4 to 4.5 amperes at 5.8 volts. Speed is 420 R. P. M. Shunt field current is 3 to 3.5 amperes at 5.9 volts. Maximum output is reached at 22-26 miles per hour.

Oiling.—Put 5 or 6 drops of light engine oil in each of generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay-Regulator.—Relay closes at 6-8 miles per hour and opens at 4-6 miles per hour. The air gap between relay armature (moving member) and coil core is .012 to .015 inch, contacts closed. Contacts separate .012 to .015 inch. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service. Increase spring tension on regulator armature to increase output, and decrease spring tension to decrease output.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are each 6-8 volt, 2 cp.

Fuses.—Fuse on relay-regulator base is 15 ampere. Other fuses are 4 ampere.

Jackson

Model 46 (1915)

Auto-Lite Starting and Lighting System
Conneticut Ignition

Battery—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded. Five dry cells are connetced so that they can be switched into the ignition circuit should other voltage sources fail.

Ignition.—Breaker contacts should separate .018 inch to .020 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever within one inch of the fully retarded position. See that breaker assembly is fully retarded when lever is in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps should be about .027 inch.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles. Do not put grease or oil in the cup.

Starter.—Starter is connected to engine through a Bendix drive. It should crank the engine at 125 to 150 R.P.M. Cold engine, tight bearings, heavy oil or other obstructions will cause a greater current flow and reduce the speed. When running free, armature should turn at about 4200 R. P. M., taking 50 to 55 amperes. Much greater speed indicates grounded, short circuited or damp field windings. Greater current or vibrating of the ammeter needle indicates grounded or short circuited armature coils or commutator. Damp armature windings will cause high current or slow speed.

STARTER DATA, MODEL MC

Torque	R. P. M.	Amperes
1 lb. ft	100	2650
2 lb. ft	145-150	1960
3 lb. ft	185-190	1600
4 lb. ft	225	1400
5 lb. ft	250-255	1250
6 lb. ft	290-300	1000

Starter should develop 16 pound-feet lock torque, taking about 450 amperes when so operating, voltage being about 4.2 volts, current flowing.

Brushes.—Use only the special copper-carbon composition type brushes as furnished by the manufacturer, as ordinary carbon brushes will cause trouble, their use on either motor or generator forfeiting the guarantee.

Oiling.—Motor bearings are packed with grease. Bearings should be cleaned out thoroughly and repacked with grease twice a season. Do not oil the Bendix drive. Should the pinion stick, clean shaft with gasoline.

Generator.—Generator current regulation is by reverse series field. Relay should close at 230 to 270 R. P. M., of generator armature. Charging current should be .5 to 1.0 ampere immediately after contacts close. Contacts should separate when the discharge current reaches 0 to .5 ampere.

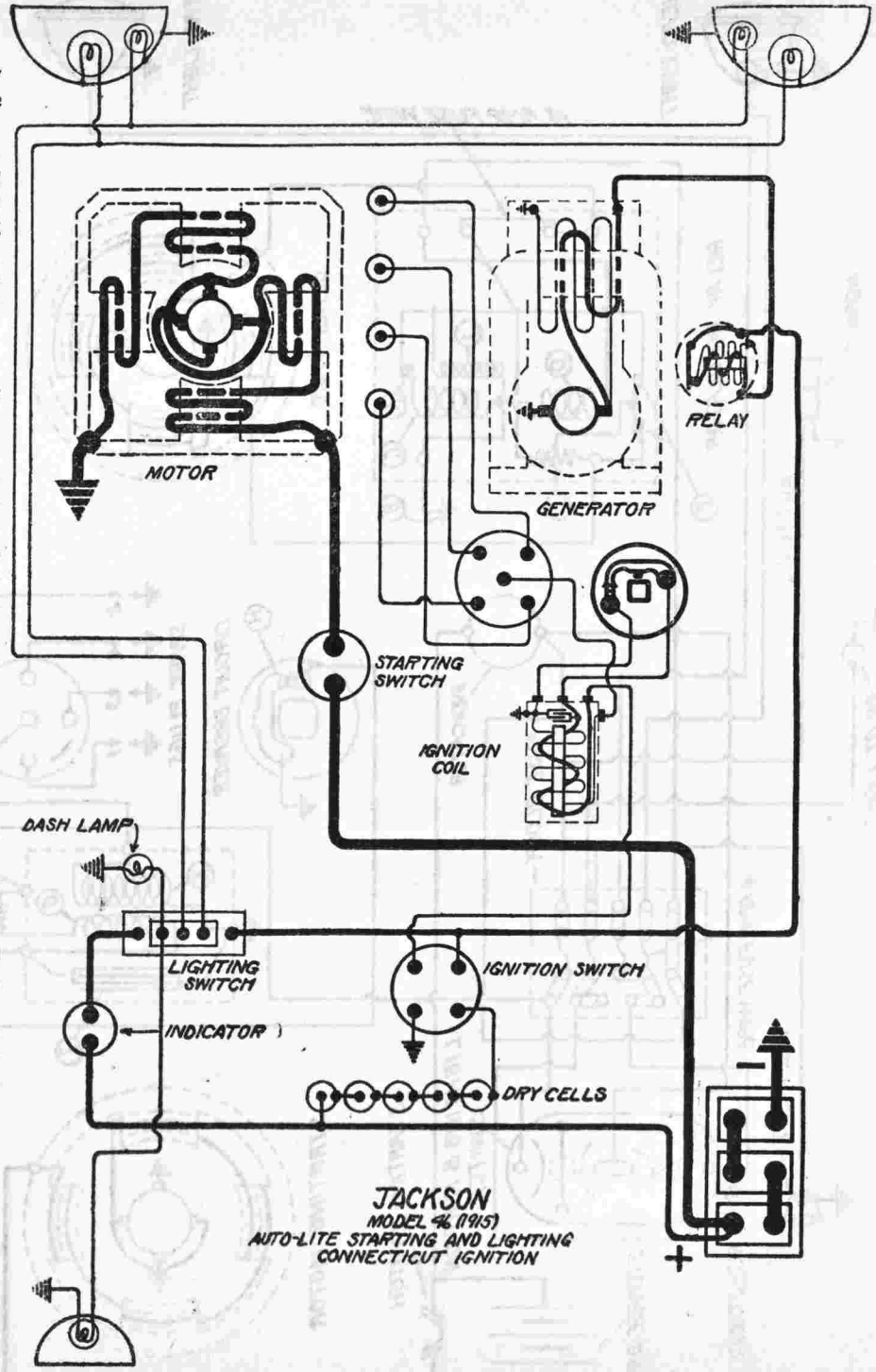
GENERATOR DATA, MODEL GF

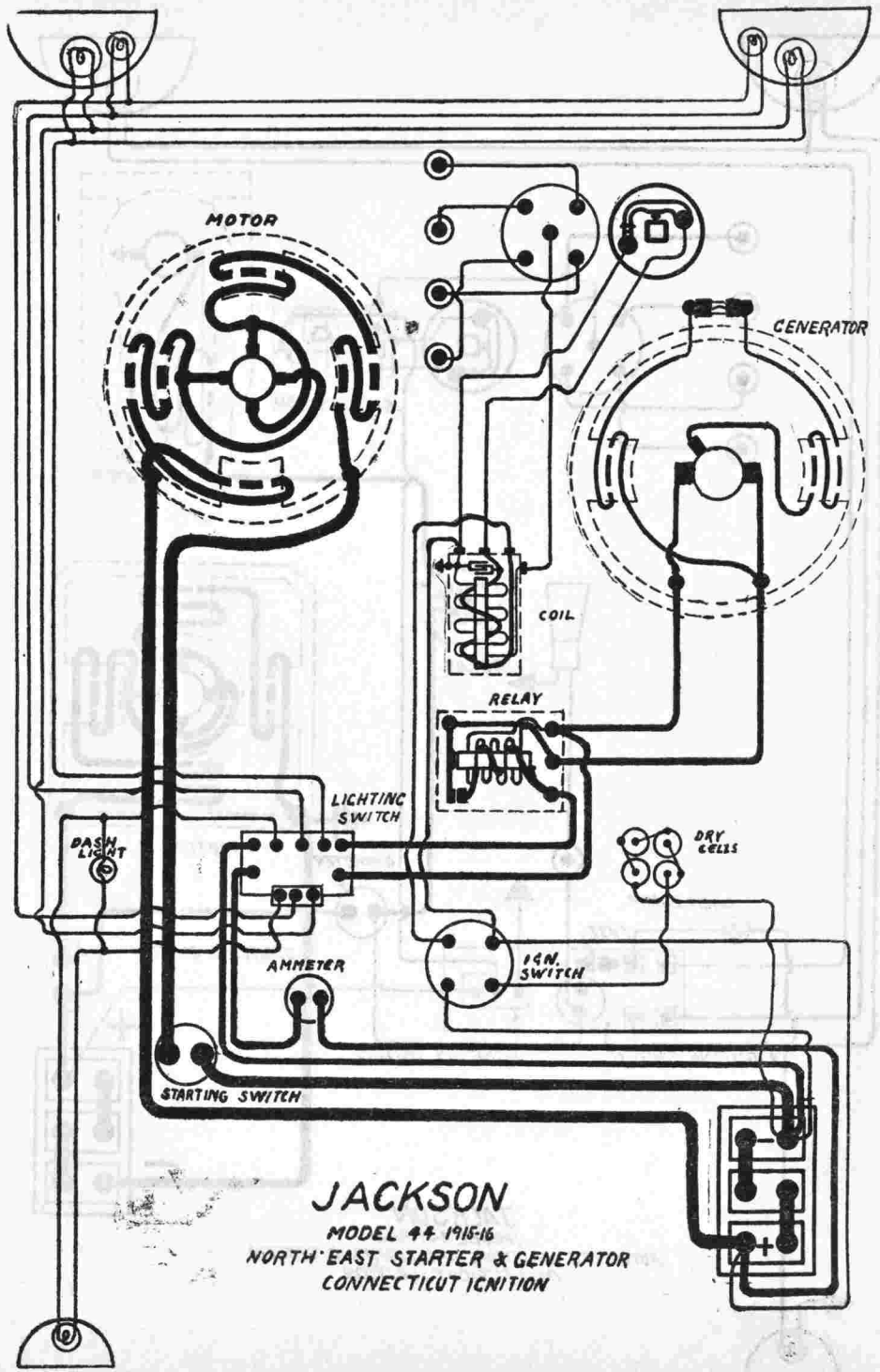
Amperes	R. P. M.
5	430- 490
10	730- 870
12	945-1180
15	1225-1560
16-19	2200-2800

Shunt field should take approximately one ampere. When operated freely as a motor, generator should run at about 200 R. P. M., taking 1.8 amperes. Higher speeds indicates grounded, wet or short circuited field windings. A greater current, lower speed or vibrating of armature needle indicates grounded or short circuited armature coils or commutator bars or damp armature, providing bearings are not tight.

Oiling.—Put 4 or 5 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 8 cp. Dimmer lamps are 6-8 volts, 4 cp. Dash lamp is 6-8 volts, 4 cp. Tail lamp is 6-8 volts, 4 cp.





Jackson

Model 44 (1915-16)

North-East Starting and Lighting System
Connecticut Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The two wire system is used. There is a set of four dry cells connected so that they may be connected into the ignition circuit should the other sources fail.

Ignition.—Breaker contacts should separate about .020 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps should be .025 inch to .030 inch.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles. Do not put grease or oil in the cup.

Starter.—Starter is connected to the engine through a Bendix drive. Cold engine, heavy oil, tight bearings or other obstructions or damp, grounded or short circuited motor windings or commutator bars will cause low speed and excessive current during the cranking operation.

STARTER DATA, MODELS H AND K

	Frame 8550		Frame 8306	
Torque	R. P. M.	Amperes	R. P. M.	Amperes
1 lb. ft.	2300	95	2100	80
2 lb. ft.	1700	130	1600	135
3 lb. ft.	1400	180	1400	160
4 lb. ft.	1100	225	1200	200
5 lb. ft.	900	260	1000	235
6 lb. ft.	625	300	900	250
7 lb. ft.	525	320	750	300
8 lb. ft.	400	340	600	340

Oiling.—Put several drops of light engine oil in each of the starter oilers every month.

Generator.—Generator voltage regulation is by third brush system. Relay should close at about 450 R. P. M., of generator armature, or 6-8 miles per hour. Third brush will vary the maximum generator output between 6 and 20 amperes. Normal outputs are shown in the table.

GENERATOR DATA, MODEL L

R. P. M.	Amperes, Frame 8401	Amperes, Frame 8500
500	5	2
750	13	11
1000	17	16
1250	16	16.5
1500	13	16
2000	9	12

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 15 cp. Dimmer lamps are 6-8 volts, 5 cp. Dash lamp is 6-8 volts, 2-4 cp. Tail lamp is 6-8 volts, 2-4 cp.

Jackson

Model 34 (1916)

Auto-Lite Starting and Lighting System
Connecticut Ignition

Battery.—Battery is 6 volt, 85 ampere-hour. The negative (–) terminal is grounded at the starting motor.

Ignition.—Breaker contacts should open .018 inch to .020 inch. The tungsten contacts cannot be properly resurfaced by filing or sand papering. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced sufficiently to operate 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, or a trifle past, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4. 2.

Spark Plug Gaps.—Spark plug gaps should be .027 inch to .030 inch.

Oiling.—The cup under the breaker head should be filled with pure vaseline and turned down every month. If car is driven more than 1000 miles in a month, this should be done every 1000 miles. Never put in grease or oil.

Starter.—Starter is connected to the engine through a Bendix drive. It should crank the engine at 125 to 150 R. P. M., taking about 250 amperes.

Oiling.—The starter bearings are packed with grease. Bearings should be cleaned out thoroughly and repacked with grease twice a season.

Generator.—Generator current regulation is by reverse series field. Relay should close at about 10 and open at about 8 miles per hour. Clean contacts by drawing a piece of soft paper between them. If they are burned or pitted, resurface with a piece of worn No. 00 sand paper.

Output.—Generator output should be 12½ amperes at 1120 to 1370 R. P. M., 15 amperes at 1875 to 1800 R. P. M., and 17–19 amperes at 2400 to 2800 R. P. M. Relay should close at 230 to 270 R. P. M., the charging current being about .5 ampere immediately after. Relay should open when the discharge current reaches .0 to .5 amperes.

Testing.—When operating freely as a motor, generator should run at about 200 R. P. M., taking about 1.8 amperes. Shunt field should take approximately 1 ampere.

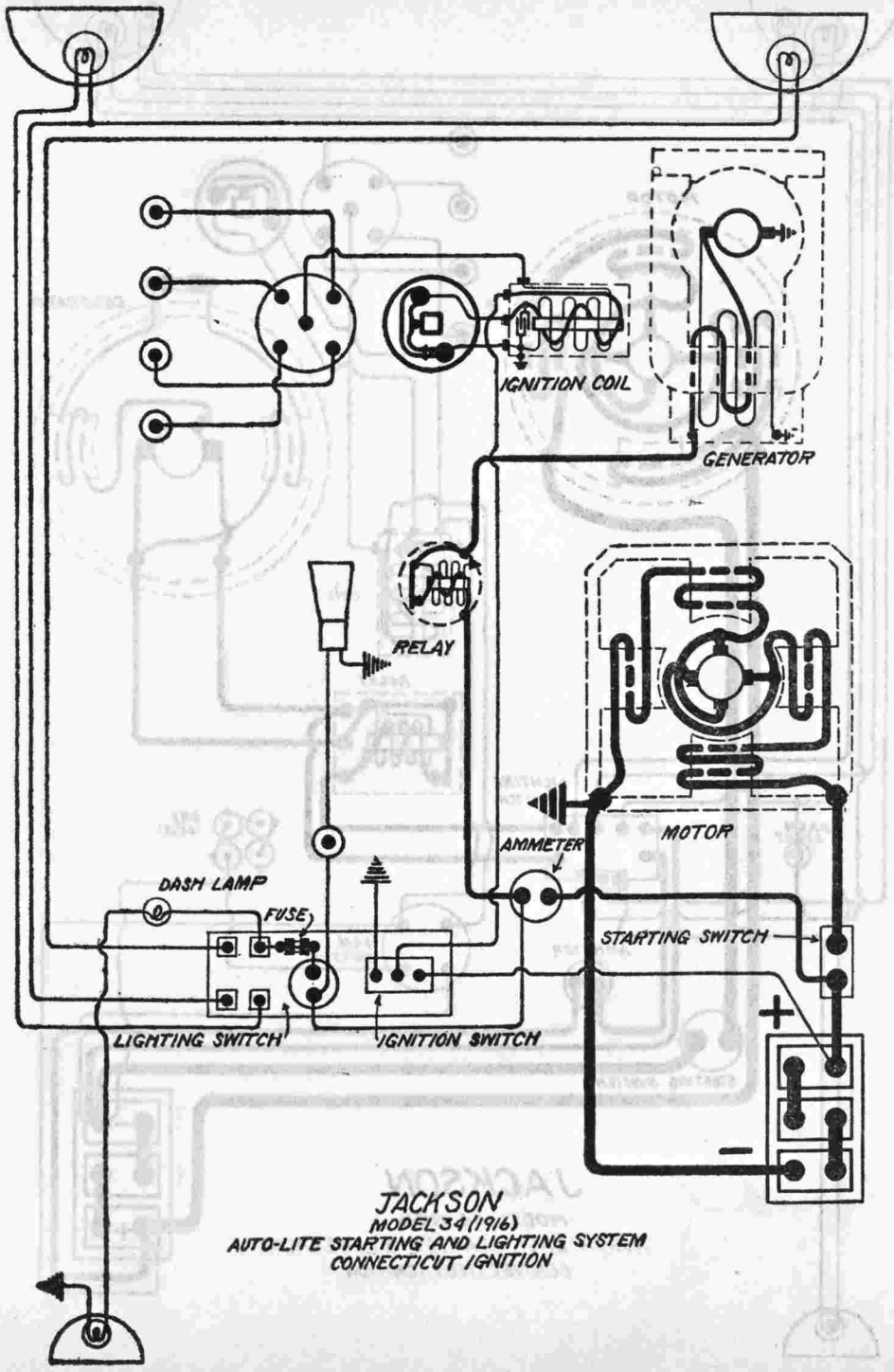
Brushes.—Use only the special copper-carbon composition brushes as furnished by the manufacturers. Ordinary carbor brushes will only cause trouble.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

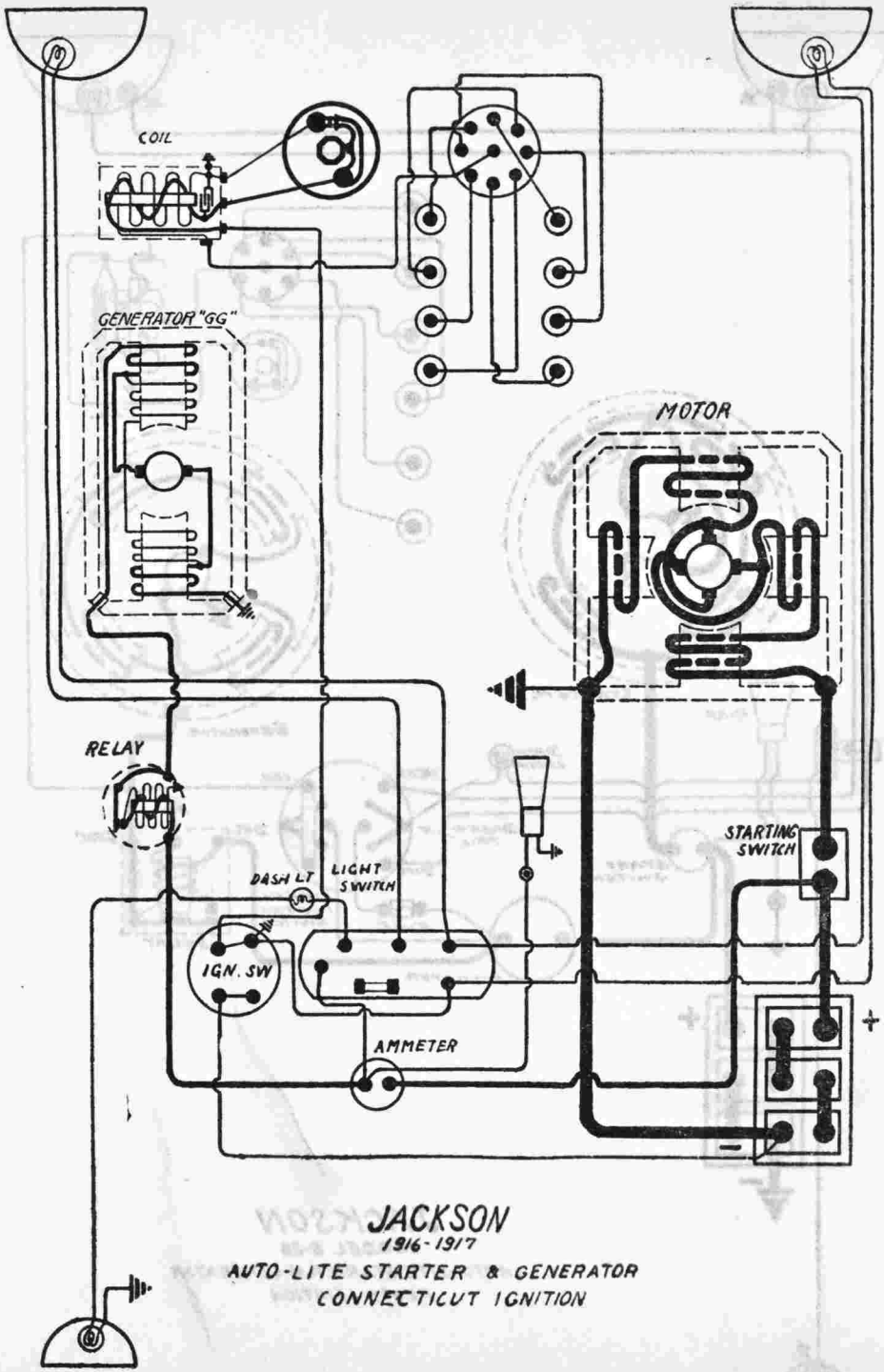
Lamps.—Head lamps are 6-8 volts, 15 cp. Dash and tail lamps are in series. They are each 3-4 volts, 2 cp.

Fuses.—Lighting fuse is 20 ampere.

Model Numbers.—Starter Model is MF. Generator is Model GA.



JACKSON
MODEL 34 (1916)
AUTO-LITE STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION



JACKSON
1916-1917
AUTO-LITE STARTER & GENERATOR
CONNECTICUT IGNITION

MODELS 68 AND 348 (1916), 349, 350 (1917)
AUTO-LITE GENERATING, STARTING SYSTEM. CONNECTICUT IGNITION

Battery.—Battery is 6 volt, 100 ampere-hour on the Model 68 cars and 6 volt, 80 ampere-hour on the other models. The negative (—) terminal is grounded at the starting motor.

Ignition.—Breaker contacts should separate .018 inch to .020 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever within one inch of the fully retarded position. See that breaker assembly is fully retarded when lever is in fully retarded position.

Firing Order.—The firing order is 1R, 1L, 3R, 3L, 4R, 4L, 2R. 2L.

Spark Plug Gaps.—The spark plug gaps should be about .027 inch.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in this cup.

Starter.—Starter is connected to engine through a Bendix drive. It should crank the engine at about 125 R. P. M., taking 200 to 250 amperes. Cold engine, tight bearings, heavy oil or other obstructions will cause a greater current flow and reduce the speed. When running free, armature should turn at about 4200 R. P. M., taking 50 to 55 amperes. Much greater speed indicates grounded, short circuited or damp field windings. Greater current or vibrating of the ammeter needle indicates grounded or short circuited armature coils or commutator. Damp armature windings will cause high current or slow speed.

STARTER DATA, MODEL MC

Torque	R.P.M.	Amperes
1 lbs. ft.	2650	100
2 lbs. ft.	1900	145-150
3 lbs. ft.	1600	185-190
4 lbs. ft.	1400	225
5 lbs. ft.	1250	250-255
6 lbs. ft.	1000	290-300

Motor should develop 16 pound-feet lock torque, taking 450-460 amperes at 3.8-4.2 volts.

Brushes.—Use only the special copper-carbon composition brushes as furnished by the manufacturer, as ordinary carbon brushes will cause trouble and their use on motor or generator forfeits the guarantee.

Oiling.—Starter bearings are packed with grease. Bearings should be thoroughly cleaned and repacked with grease twice a season. Do not oil the Bendix drive. Should pinion stick, clean shaft with gasoline.

Generator.—Generator current regulation is by reverse series field. Relay should close at 500-575 R. P. M., of generator armature, charging current being .5 to 1.5 ampere at closing. Relay should open when the discharge current reaches 0 to 1 ampere.

GENERATOR DATA, MODEL GG

Amperes	R. P. M.
5	750- 860
10	1225-1400
12.5	1600-1825
15	2175-2450
17-19	3200-3700

A variation of 1 to 1.5 amperes from this amount is allowable. The output may be varied slightly by varying brush pressure on commutator, The pressure should be 1 to 1¼ pounds. If operated freely as a motor, armature should revolve at 350 R. P. M., taking 2.8 amperes. Much higher speed indicates damp, grounded or short circuited field coils. Greater current or lower speed indicates tight bearings or damp, grounded or short circuited armature windings or commutator. Periodic swinging of armature needle indicates grounded or short circuited armature coils or commutator bars. Shunt field should take 1.1 amperes.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks If the car is driven more than 500 miles in two weeks, the oil every 500 miles.

Lamps.—Head lamps are 6-8 volts, 15 cp. On Models 68 and 348, dash and tail lamps are in series. They are each 3-4 volts, 2 cp. On Model 349, dash lamp is 6-8 volts,

JACKSON

MODEL 6-38 (1920-21-22-23)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY:—(1920-21) Willard, Type SJW-3 (1922) Exide, Type 3-XC-131, 6 volt 90 ampere hour. The negative (—) terminal is grounded.

IGNITION.—Remy. Coil Model No. 284-B. Breaker contacts separate .020 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler s file or well worn No. 00 sandpaper.

Oiling.—Refill the grease cup under the distributor head with soft cup grease and turn down every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark contol lever and breaker assembly one-third advanced.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—The spark plug gaps are .025 inch

STARTER.—Model M.H.-1025. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 150 R.P.M., taking 250-300 amperes.

Starter Data

Torque	R.P.M.	Amperes
2.0 lb. ft.	1160	110
6 lb. ft.	700	225
10 lb. ft.	460	325
12 lb. ft.	375	365
17.5 lb. ft.	Lock	600

Oiling.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR.—Model GJ-1025-E. Generator current regulation is by the third brush system. Maximum current output is 12-16 amperes reached at 1700 R.P.M. of the armature, or 22 miles per hour.

Generator Data

Amperes	Cold Test R.P.M.	Amperes	Hot Test R.P.M.
0	500	0	580
8	750	6	840
12	960	9	1050
16	1400	12	1360
16.5	1700	12.7	1700
12	3400	10	3400

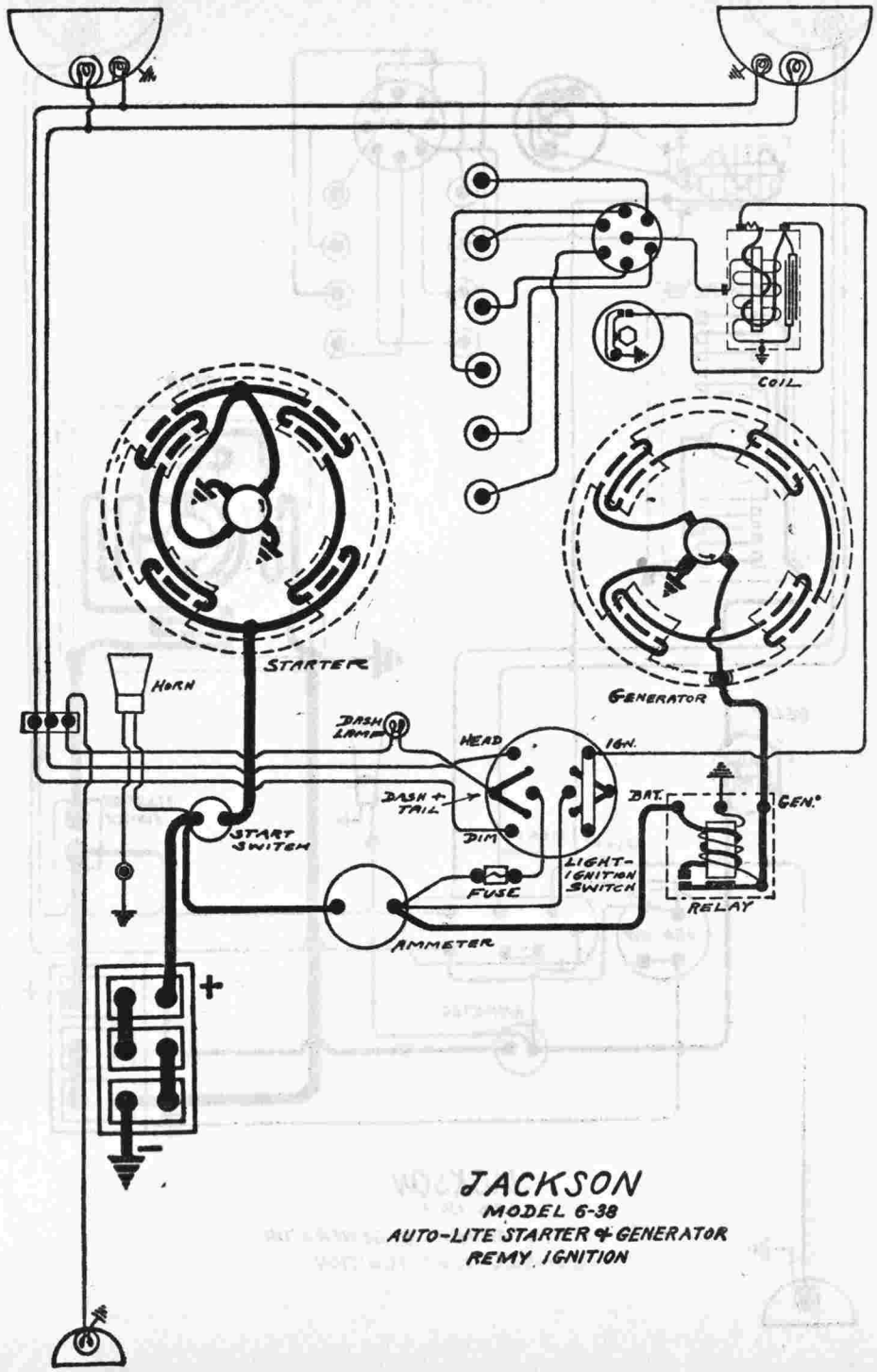
Above readings are obtained with generator charging a battery of 1.300 solution.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

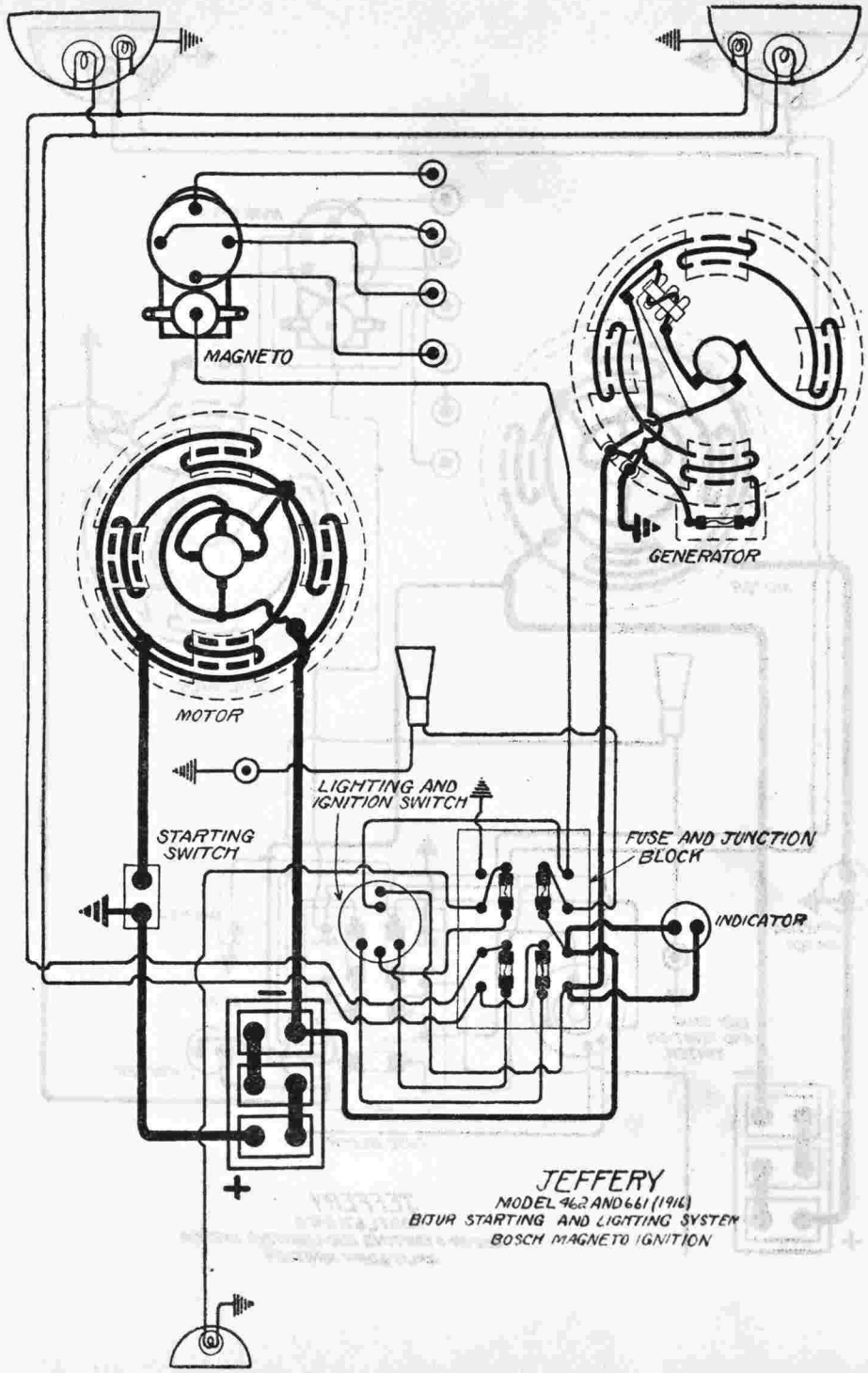
RELAY.—Relay closes at 6-10 miles per hour or 500-600 R. P. M. of the generator armature and opens at 300-400 R.P. M. of the armature or 6-8 miles per hour. Relay contacts separate .030 to .045 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 2 cp. Dash and tail lamps are 6-8 volt, 2 cp. On the 1920-21 cars, head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 4 cp.

FUSE.—Lighting circuit fuse is 20 ampere.



JACKSON
MODEL 6-38
AUTO-LITE STARTER & GENERATOR
REMY IGNITION



Jeffery

Models 462 and 661 (1916)
Bijur Starting and Lighting System
Bosch Magneto Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded at the starting switch.

Ignition.—Breaker contacts should open .014 inch to .016 inch. Clean contacts with gasoline frequently. If they are burned or pitted, resurface them with a fine flat jeweler's file or a strip of worn No. 00 sand paper.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order of Model 462 is 1, 3, 4, 2. The firing order of Model 661 is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be .018 inch to .020 inch.

Oiling.—Put 3 or 4 drops of light machine oil in each of the magneto oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Starter.—Starter is connected to the engine by a pinion shifted by the operator. When the starting pedal is depressed part way, the motor is connected to the battery, in series with a resistance. This action causes it to rotate slowly to facilitate meshing of the gears. Further depressing the switch opens the circuit and meshes the pinion with the flywheel gear finally connecting the motor winding direct to the battery, causing it to operate at full power, cranking the engine.

Oiling.—Put several drops of light engine oil in each of the motor oilers every two weeks.

Generator.—Generator current regulation is by third brush system. Relay is in the generator frame. Relay should close at about 10 and open at about 8 miles per hour.

Fuse.—There is a 10 ampere fuse in the small aluminum cap mounted on the generator head. This fuse is in the shunt field circuit. It will burn out, rendering generator inoperative, if generator is run with excessive resistance in the charging circuit. Remove this fuse if it is necessary to operate generator with battery disconnected.

Output.—The normal generator output should be about 14 amperes at 20-25 miles per hour car speed or about 1400 R. P. M., of generator, specific gravity of the battery reading 1.250 or above.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 7.5 volts, 18 cp. Dimmer lamps are 7.5 volts, 4 cp. Tail lamp is 7.5-8 volts, 3 cp. Dash lamp is 7.5-8 volts, 3 cp.

Fuses—Lighting fuses are 20 ampere.

JEFFERY

MODEL 671 (1917-18)

BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
SPLITDORF IGNITION

BATTERY.—Battery is 6 volt, 85 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Dixie Magneto. Breaker contacts separate .020 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Fill magneto oil cups with light engine oil every month. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .020 to .025 inch.

STARTER.—Type F-65, M-664. Rotation is clockwise, looking at the commutator end. Starter is connected to the engine through a Bijur automatic pinion shift.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Type L-61, M-399, 467, 677, 767. Rotation is counter-clockwise, looking at commutator end. Generator current regulation is by third brush system. Maximum current output of generator is 12-15 amperes at 1400-1600 R.P.M. of the armature or 25 miles per hour. Output is varied by shifting third brush. The third brush is secured to the generator by two stud bolts, the nuts of which appear in a recess in the front head of the generator. Loosen these nuts with a socket wrench and shift the brush by gently tapping the shank of the wrench. Moving the brush in a counter-clockwise direction will increase the output. Moving the brush in a clockwise direction will decrease the output. A movement of 1/16 inch will vary the current output 2-3 amperes. Tighten the nuts after adjusting the brush position. Brush adjustment is made to give the desired rate with the generator hot, charging a battery of 1250 solution, or higher. There is a 10 ampere fuse mounted on generator to protect the field windings should excessively high resistance occur in the charging circuit.

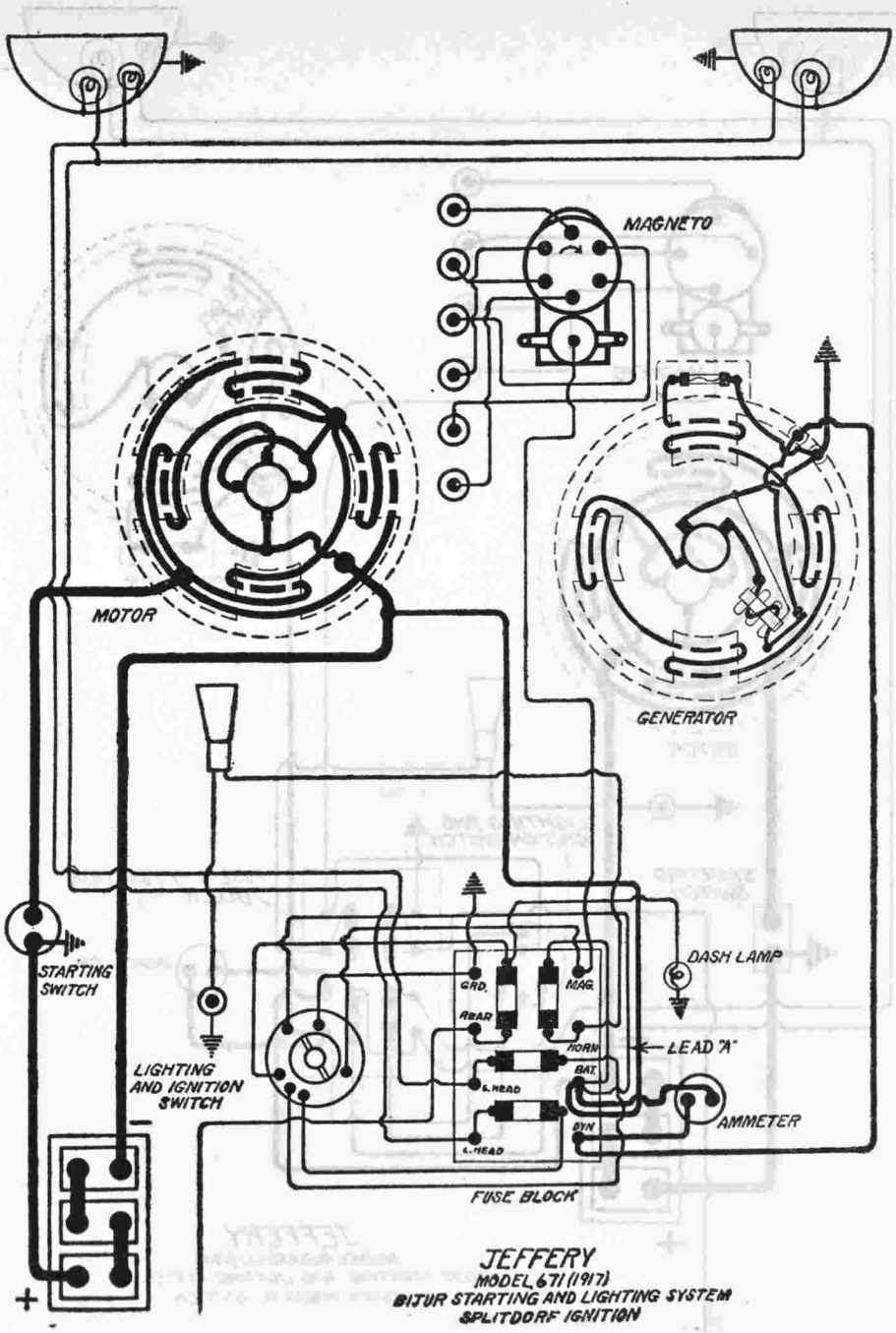
OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

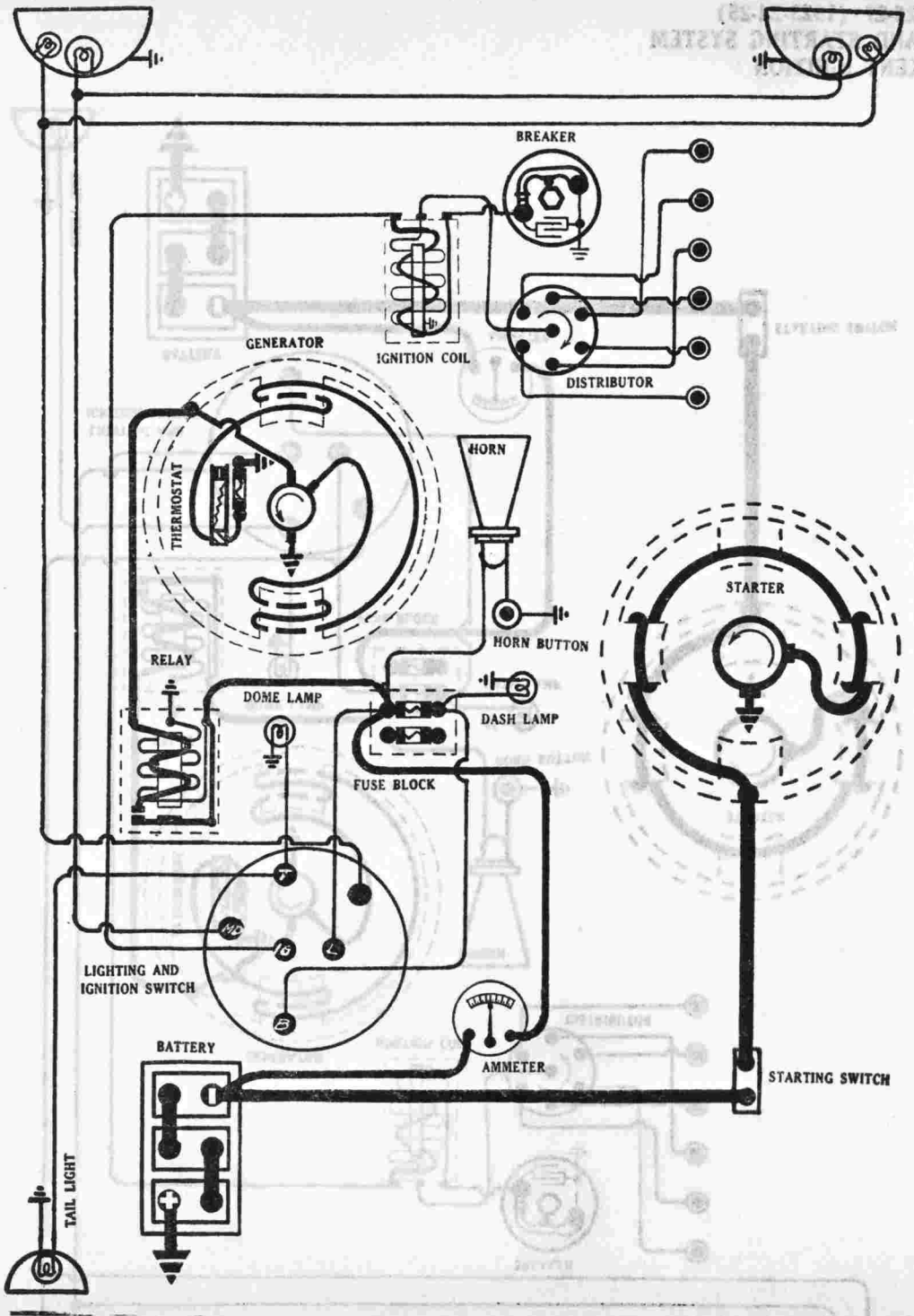
RELAY.—Relay is mounted in the generator frame. Relay closes at 8-10 miles per hour or 500-600 R.P.M. of the armature and opens at 6-8 miles per hour or 450-500 R.P.M. of the armature. The charging current is 1-3 amperes at closing, and the discharge current is 0-2 amperes at the opening of the relay contacts. Clean contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 20 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp. Trouble lamp is 6-8 volt, 2 cp. Dome lamp is 6-8 volt, 5 cp.

FUSES.—Fuses are 20 ampere.

NOTE.—Plate 235 applies to cars having Serial Nos. 1 to 87686. On cars numbered above 87687 the lead "A" is connected to post marked "Dyn" instead of post marked "Bat" and the ammeter indicates charge and discharge instead of indicating the generator's output only.





JEWETT

1922

REMY GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER-KENT IGNITION

BATTERY.—Willard, Type SW-4, 6 volt,. The positive (+) terminal is grounded.

IGNITION.—Coil Type N-3. Distributor Type 2-A. Breaker contacts separate .015 inch. They are made of tungsten. When the condition of the contacts affects the ignition, gently scrape with a penknife or resurface on a hard oilstone.

Oiling.—Refill the distributor oiler with medium cylinder oil every 100 miles. Also place a small amount of vaseline on the breaker cam at the same time.

Timing.—Breaker contacts begin to separate when piston No. 1 entering firing stroke, and mark I.O.-1-6 is 1½ inches past indicator, spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—The spark plug gaps are .020-.025 inch.

STARTER:—Model No. 721-A, 713-E. Starter is connected to the engine by a Bendix drive. The direction of rotation, looking at commutator end, is counter-clockwise. Brush tension is 24-28 ounces.

Starter Test Data

R.P.M.	Torque	Amperes	Volts
5000	0 lbs. ft.	65	5.0
Lock	12 lbs. ft.	475	3.6

Oiling.—Fill oil cup on each end of starting motor with light cylinder oil every 500 miles.

GENERATOR.—Model No. 913-E. The direction of rotation, looking at commutator end, is counter-clockwise. Generator current regulation is by the third brush system and thermostat control. Maximum charging rate is 20 amperes, at 8.5 volts, at 1800 R.P.M. The field draws 5 amperes at 6 volts.

Generator Test Data

Hot Test			Cold Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
11	8.2	1900	0	—	675
			7	7.1	825
			20	8.5	1800

To adjust the charging rate, shift the third brush. Moving the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. The brush tension should be 16 ounces on each brush.

Oiling.—Fill oil cup at each end of generator with light engine oil every two weeks. If car is driven more than 500 miles in two weeks this care must be given every 500 miles.

RELAY.—Model No. 266-A or 266-B. Relay closes at 6.9 volts or 675 R.P.M. of armature, and opens at 6 volts. Relay contacts separate .014 inch. Air gap between armature and coil core is .014 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface on a hard oilstone.

LAMPS.—Head lamps are 6-8 volt, 21 cp., S.C. Dimmer lamps are 6-8 volt, 4 cp., S.C. Tail lamp is 6-8 volt, 2 cp., S.C. Dash lamp is 6-8 volt, 2 cp., D.C. Dome lamp is 6-8 volt, 4 cp., D.C.

FUSES.—Generator field fuse is 5 ampere. Lighting circuit fuse is 20 ampere.

JEWETT

MODEL 23-25, 26-27 (1923-24-25)
REMY GENERATING AND STARTING SYSTEM
ATWATER KENT IGNITION

BATTERY:—Westinghouse (1923-24). Type SWB-15. 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 126 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 25 hours. **(1925) Type 6-OB-13.** 6 volt. The positive (+) terminal is grounded. Battery capacity is 115 ampere hours.

IGNITION:—Coil Model N-3. Ignition current is 3.5 amperes at 6 volts with the engine running and 1-2 amperes at 6 volts with engine stopped.

Distributor Model LA. Breaker contacts separate .015 inch with breaker arm on lobe of cam. When the condition of the contacts affects the ignition, resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 30 degrees. Automatic advance is 24 degrees.

Mounting:—Distributor is mounted at right of engine and is driven by the extension of the oil pump shaft. To remove distributor, remove head with cables attached and loosen advance arm clamp screw. Then lift distributor from place.

Oiling:—Fill the oil cup under the distributor head with light cylinder oil every two weeks or each 500 miles. Put a small bit of vaseline on the face of the breaker cam under the fiber block on the breaker arm every month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 11½ degrees after top dead center with the manual spark control lever and breaker assembly in the fully retarded position. This position is approximately 1½ inches on the flywheel past top dead center. To set timing, crank engine over until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Fully retard the spark control lever and continue to crank engine until the flywheel mark I.O.1-6 is 1½ inches past the indicator on the flywheel case (visible through the inspection hole in the right front of the flywheel case directly above the starter). The piston will be approximately 3/64 inch down on power stroke. Loosen advance arm clamp, place advance yoke over stop and rotate distributor in a counter-clockwise direction until contacts begin to separate. Then hold distributor in place and rotate advance arm in a clockwise direction until the yoke rests against the stop. Then tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining plugs in order 5-3-6-2-4 clockwise around the distributor head.

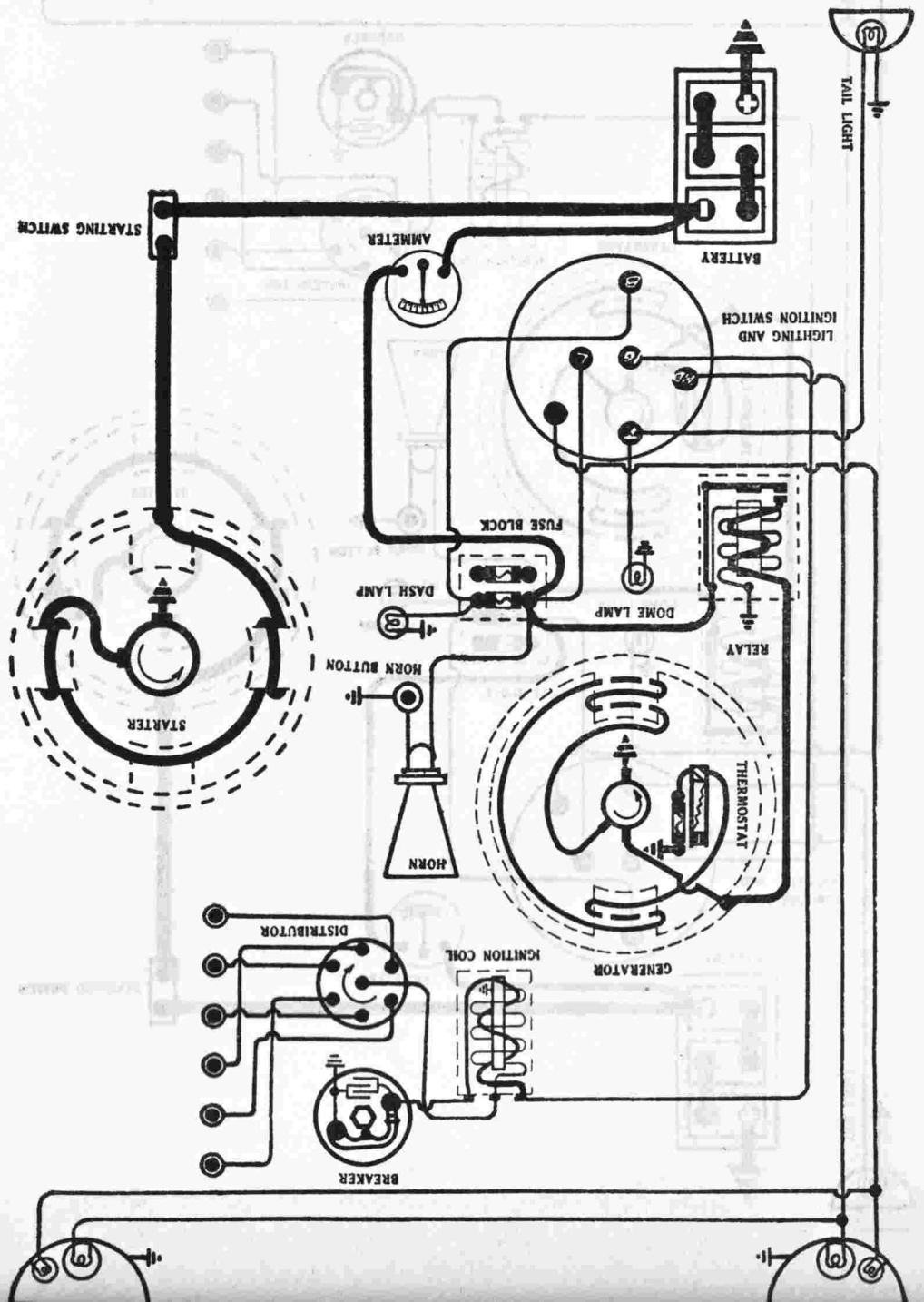
Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are AC ⅞ regular. Gaps are .020-.025 inch.

VALVE TIMING:—Inlet Valves:—Head diameter is 1 9/16 inches; stem diameter is ⅜ inch; stem length is 6⅜ inches. Tappet clearance is .006 inch (hot). Spring pressure is 50 pounds. Inlet valves open at top dead center and close at 40 degrees after lower dead center.

Exhaust Valves:—Head diameter is 1 9/16 inches; stem diameter is ⅜ inch; stem length is 6⅜ inches. Tappet clearance is .010 inch (hot). Spring pressure is 50 pounds. Exhaust valves open at 40 degrees before lower dead center and close at 10 degrees after top dead center.

STARTER:—Model 713-A, -C 713-AC and 713-F. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 1650 R.P.M. drawing 100 amperes. Starter brush spring tension is 24-28 ounces. **Starter 713-AC** is wound as shown but has four brushes, two positive and two negative, connected in parallel.



JEWETT

MODEL 23-25, 26-27 (1923-24-25)
REMY GENERATING AND STARTING SYSTEM
ATWATER KENT IGNITION

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
12 lb. ft.	Lock	3.6	475

Mounting:—Starter is flange mounted on forward side of flywheel housing at right of engine. To remove starter, disconnect cable and remove nuts from three flange mounting studs. Then pull starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the starter bearing oilers every two weeks or each 500 miles.

GENERATOR:—Model 913-E and 917-U, Z, ZA. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. To adjust the generator output, remove the cover band and loosen the small screw on the generator end plate holding the third brush mounting plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Thermostat contacts open at approximately 165 degrees F. and reduce the output 40-50%.

Generator Data—Model 913-E

	Cold Test			Hot Test	
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0		675	11	8.2	1900
7	7.1	825			
20	8.5	1800			

Generator Data—Model 917-ZA

	Cold Test			Hot Test	
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7-7.3	850	12	7.65	2000
20	8.4	1900			

Generator motoring draws 5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension on **Model 913-E** is 16 ounces. On **Model 917-ZA** the brush tension is 22-28 ounces.

Mounting:—Generator is base mounted at right of engine and is driven by extension of the water pump shaft. To remove generator, disconnect drive coupling and take out base mounting bolts. Then lift the generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in the generator bearing oilers every two weeks or each 500 miles if the car is driven over 500 miles in two weeks.

RELAY:—Model 266-A, B, F. Relay closes at 6.9-7.25 volts or 675 R.P.M. of armature, and opens at 6 volts. Relay contacts separate .014 inch. Air gap between armature and coil core is .014 inch with contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface on a hard oilstone.

LIGHTING:—Briggs and Stratton Swtich. Head lights are 6-8 volt, 21 cp. S.C. Mazda 1129. Dimmer lights are 6-8 volt, 6 cp. S.C. Mazda 81. Dash and dome lights are 6-8 volt, 3 cp. D.C. Mazda 64. Tail light is 6-8 volt, 3 cp. S.C.

FUSES:—Generator field fuse is 5 amperes. Lighting circuit fuse is 20 amperes.

JEWETT

"NEW DAY" MODEL 6-40 (1925), 6-45 (1926-27)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Westinghouse, Type 6-OB-13. 6 volt, 115 ampere hour. Starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 19 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model 525-A. Distributor Model 637-A. Breaker contacts separate .025 inch. They are made of tungsten. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 30°. Automatic advance is 20°. The tension of the breaker arm spring is 15-20 ounces. The stationary contact is mounted on a special crescent-shaped arm which moves in same arc as the breaker arm. To adjust contacts, loosen the screw holding the contact mounting arm and turn eccentric adjusting screw until desired contact opening is secured. Then tighten the mounting screw to hold adjustment.

Oiling.—Refill the grease cup under the distributor head and turn down two turns each month or each 1000 miles. Put a small bit of vaseline on the face of the breaker cam under the fiber bumper every month.

Timing.—Breaker contacts begin to separate when piston No. 1 entering power stroke reaches a position at which the marking "10-1-6" on the flywheel is 1½ inches past the indicator on the flywheel housing. This position is 11° 21′ after top dead center. The manual spark control lever and breaker assembly must be in the fully retarded position.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plugs are ⅞ S.A.E. Standard. Gaps are .030 inch.

STARTER.—Model 711-E. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 120 R.P.M. drawing 175 amperes. Starter brush tension is 20-28 ounces. Starter switch is Model 404-U.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4500	5	70
10 "	Lock	3.7	450

Mounting.—Starter is mounted at right of engine by a modified S.A.E. No. 2 flange mounting. To remove starter, remove three mounting screws and slide starter from place.

Oiling.—Put 4 or 5 drops of light engine oil in the starter bearing oilers every month or each 1000 miles.

GENERATOR.—Model 943-A. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the generator output, loosen the small round headed screw on the generator end plate and shift the third brush mounting bracket by hand. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The maximum charging rate of 17 amperes is reached at 1600 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M
7	7-7.3	850			
17	8	1600	11-13	7.7	1800
11		2500			

Motoring freely, generator draws 5 amperes at 6 volts. Shunt field current is 4-6 amperes at 6 volts. Generator brush tension is 16-18 ounces.

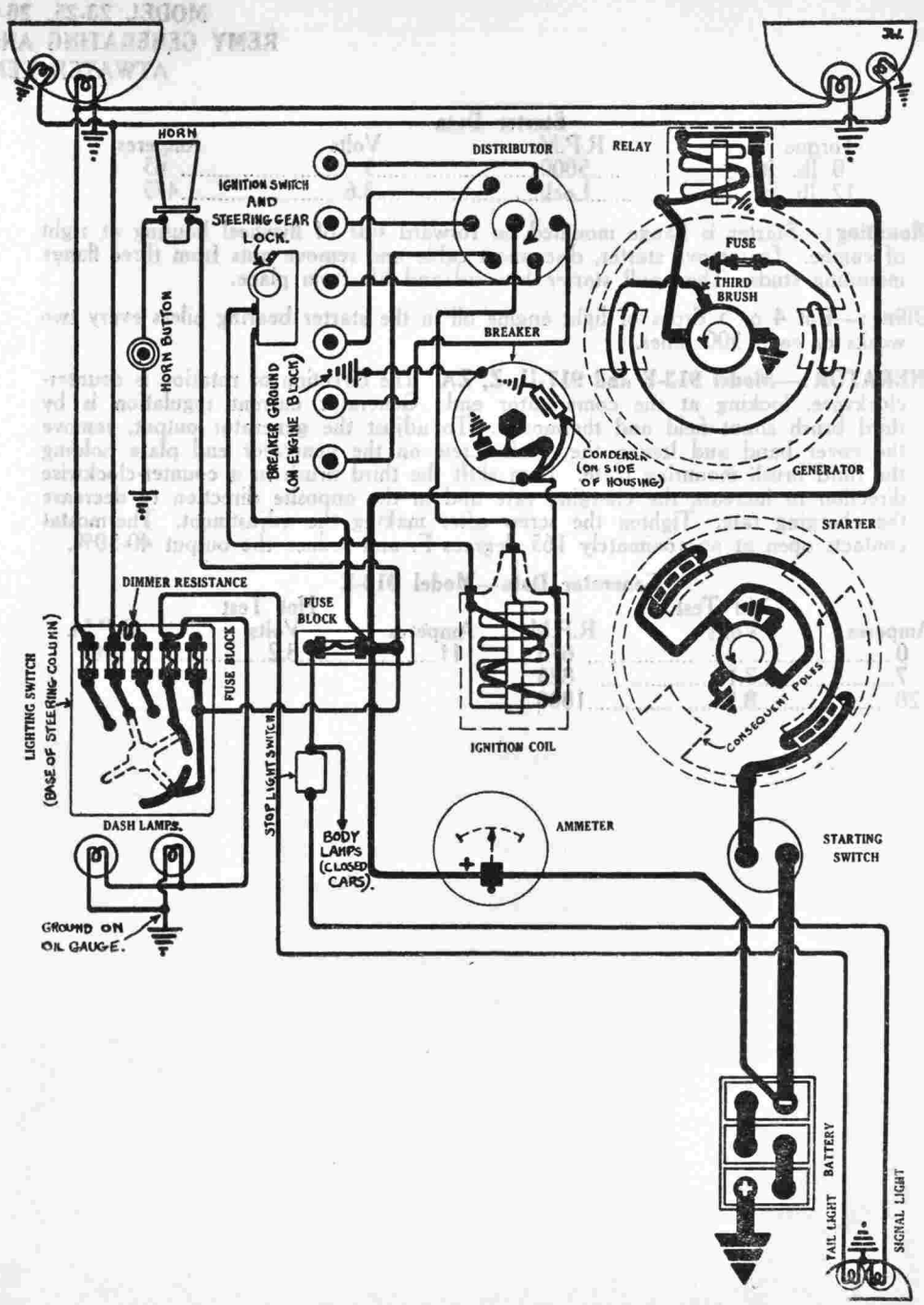
Mounting.—Generator is mounted at right front of engine by special mounting.

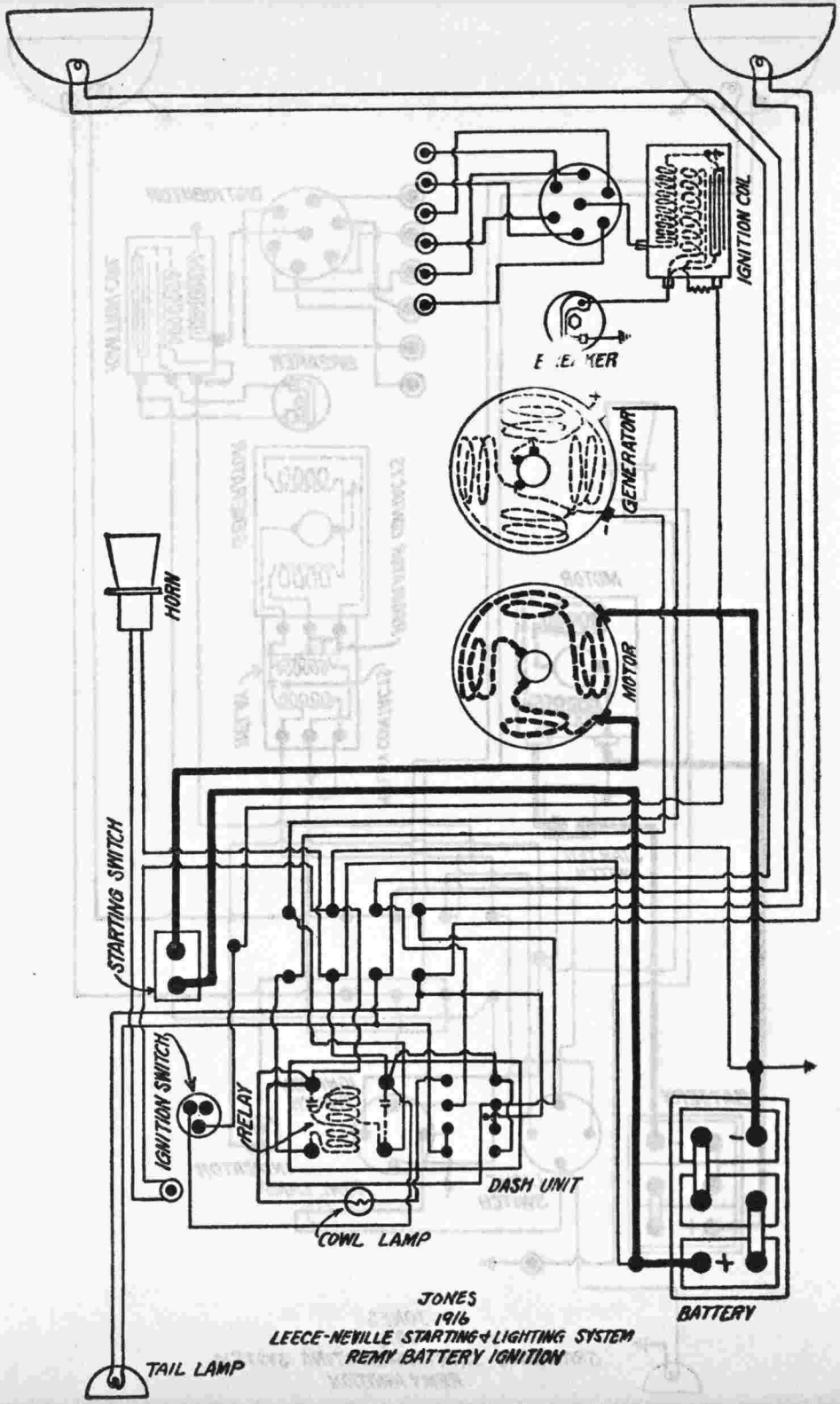
Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles.

RELAY.—Model 265-B. Relay is mounted on top of the generator. Relay closes when the voltage of the generator reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING.—Remy Lighting Switch Model 420-F. Head and stop lamps are each 6-8 volt, 21 cp. S. C. Side lamps are 6-8 volt, 3 cp. S. C. Dash lamp is 6-8 volt, 2 cp. D. C. Tail lamp is 6-8 volt, 2 cp. S. C.

FUSES.—Generator field fuse is 6 amperes. Lighting fuse is 20 amperes.





Jones

(1915)

Leece-Neville Starting and Lighting System
Remy Battery Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts should separate .020 inch to .025 inch. If burned or pitted, affecting the ignition, resurface them with a very fine, flat jeweler's file or a strip of worn No. 00 sand paper.

Timing.—Contacts should begin to separate when piston entering power stroke is on top dead center, spark control lever in the fully retarded position. First see that breaker assembly is fully retarded when lever is in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—The spark plug gaps should be .020 to .025 inch.

Oiling.—A grease cup with wick feed is provided for lubricating the distributor bearings. This cup is filled with vaseline which should be replenished every month. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 1000 miles in a month, these attentions should be given every 1000 miles.

Starter.—Starter is connected to engine through a chain drive and overrunning clutch. Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current.

Oiling.—Starter gear box is packed with soft cup grease which should be renewed every six months. Put 5 or 6 drops of light engine oil in the oiler on the opposite end every month.

Generator.—Generator current regulation is by third brush method. Maximum charging rate should be 15 amperes at 20 miles per hour. Position of third brush is adjustable by loosening the screw at right side of commutator end. Move upward to increase charging rate and downward to decrease.

Oiling.—Generator bearing and distributor drive are packed with soft cup grease, which should be renewed every six months. Every two weeks put 4 or 5 drops of light engine oil in the commutator end bearing. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—Relay should close at 8-10 miles per hour and open at 6-8 miles per hour. Clean relay contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a strip of well worn No. 00 sand paper, drawing a piece of unglazed paper between them to remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-7 volt, 15 cp. Dimmer lamps are 6-7 volt, 4 cp. Tail lamp is 6-7 volt, 2 cp.

JONES

MODEL 25 AND 26 (1916-17)
GRAY AND DAVIS STARTING AND LIGHTING SYSTEM
REMY IGNITION

Battery.—Battery is 6 volt, 85 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate .020 to .025 inch If burned or pitted, affecting the ignition, resurface them with a very fine flat jeweler's file or a strip of worn No. 00 sand paper.

Timing.—Contacts should just begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps—The spark plug gaps should be .020 to .025 inch.

Oiling.—The grease cup under the breaker head should be kept full of soft cup grease and tightened every 500 miles. In case the oiler is provided with a wick, use pure vaseline instead of cup grease.

Starter.—Starter is connected to the engine through a pinion shifted by the operator, a set of reduction gears with ratio 49 to 14, and an overrunning clutch. Starter, when running free, should draw 35 amperes at 6 volts, turning at 7000 R. P. M. It should deliver 1½ pound-feet torque at 2400 R. P. M., drawing 137 amperes at 5¾ volts pressure. Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current.

Oiling.—Every two weeks put 4 or 5 drops of light engine oil in the commutator-end oiler and oilers at each end of intermediate shaft. Every three months remove plug in starter gear case and put in one tablespoonful of heavy engine oil. The sliding surfaces of the starting mechanism must be oiled once a week.

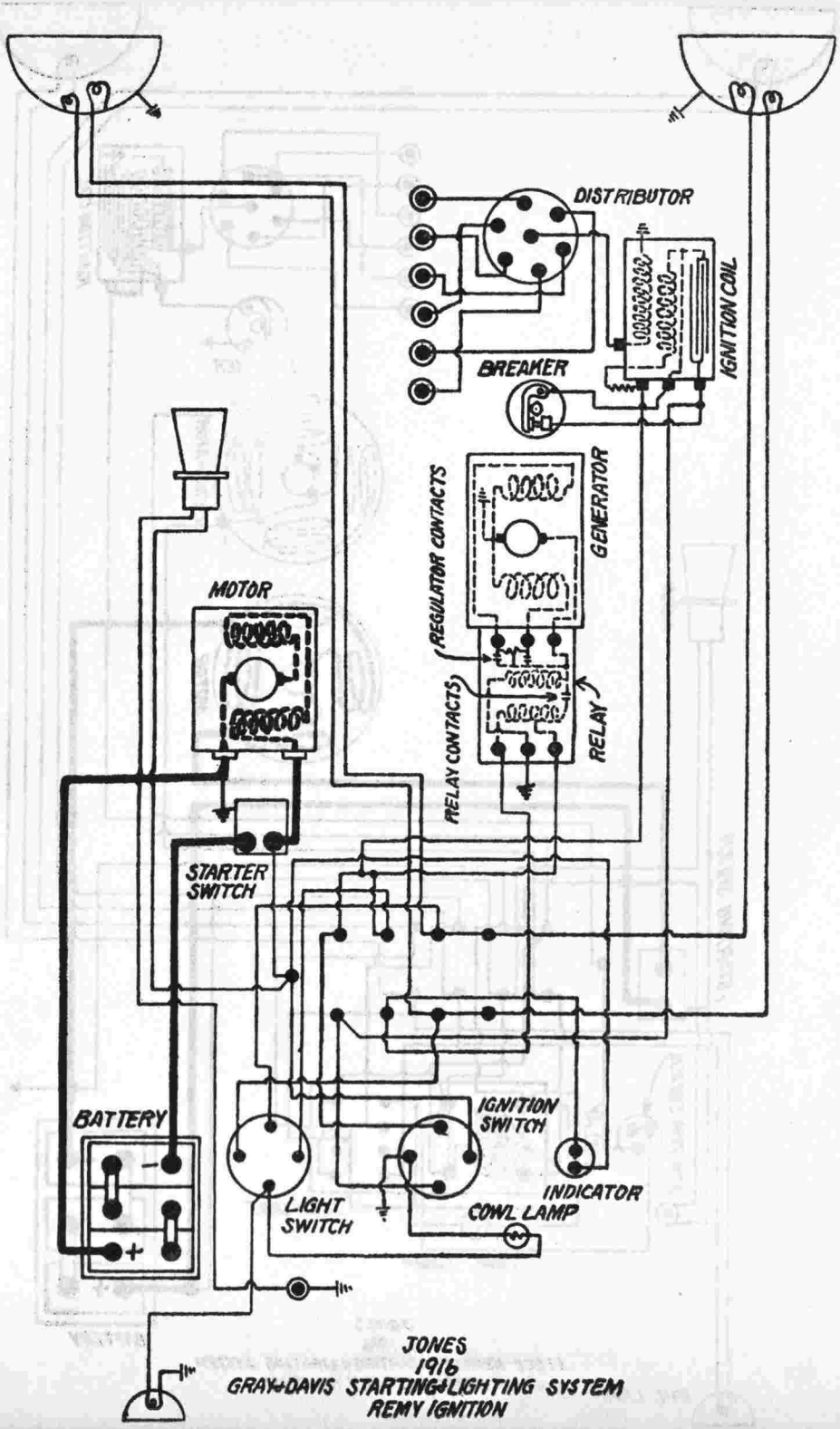
Generator.—Generator output regulation is by a vibrating regulator. Generator should deliver 10 amperes at 6½ volts when driven 1000 R. P. M., which corresponds to a car speed of 10 miles per hour. Output will vary slightly with battery condition. When running at 12 miles per hour or over, ammeter should indicate 6 to 9 amperes "Charge" with lamps off and ½ to 2½ amperes with lights on.

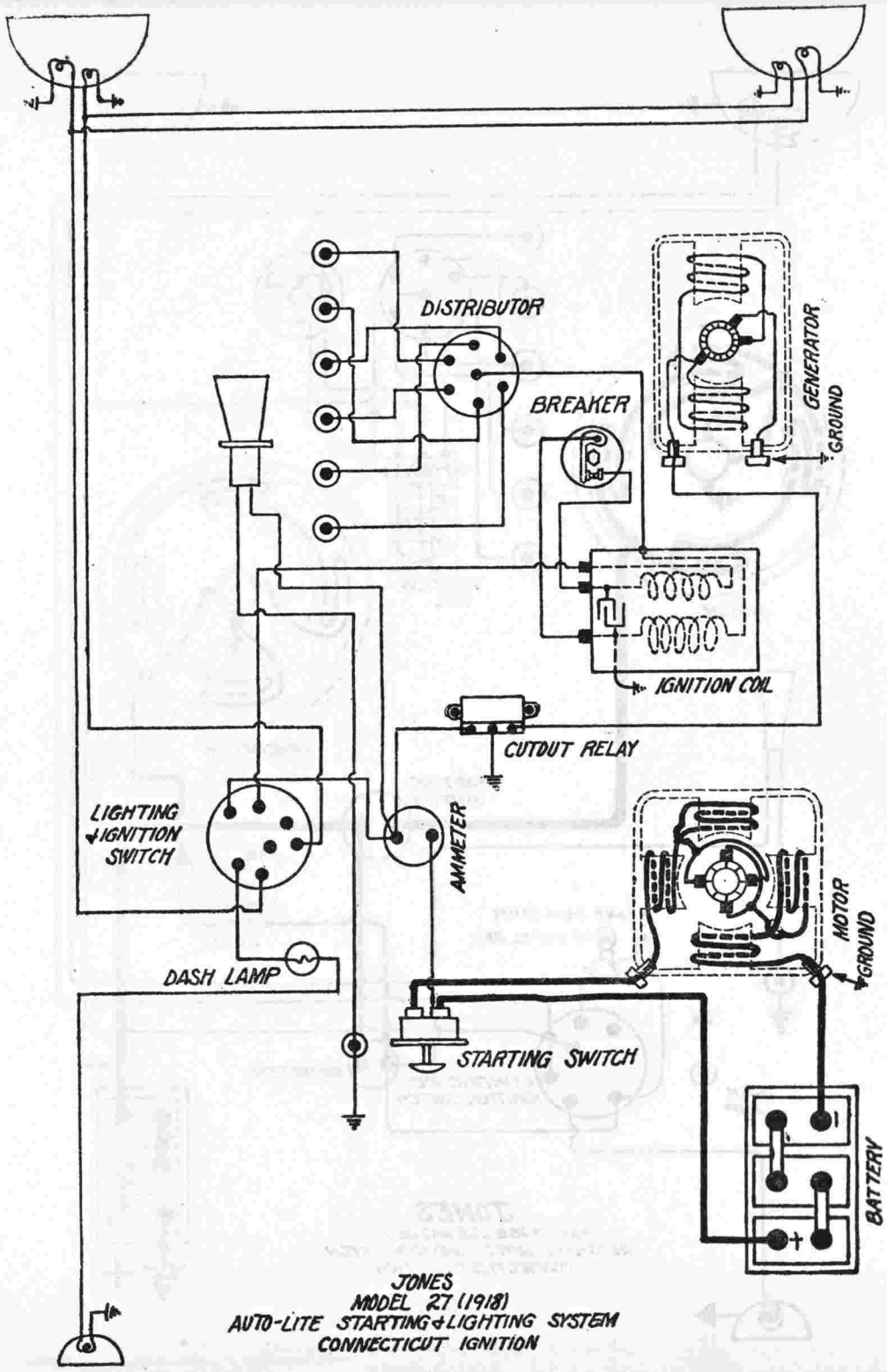
Oiling.—Put 8 to 10 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay-Regulator.—Relay is combined with regulator. Relay should close when generator voltage reaches 6 to 6½ volts, and open when discharge current from battery reaches ½ to 2 amperes. Clean relay and regulator contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a strip of well worn No. 00 sand paper, drawing a piece of unglazed paper between them to remove all grit. Adjust before again putting into service. To adjust regulator, hold one set of contacts apart and adjust the other set until the desired output is obtained. Then hold the first set apart and adjust the other set in the same way. Then allow both sets to operate together. Increasing spring tension will increase output, and decreasing spring tension will decrease output. Do not increase output above 11 amperes. Generator output should be driven at 1750 R. P. M., while regulator is being adjusted.

Lamps.—Head lamps are 6-8 volts, 15 cp. Dimmer lamps are 6-8 volts, 5 cp. Dash and tail lamps are 6-8 volt, 2 cp.

Model Numbers.—Generator is Type T. Starter is No. 136. Ignition coil is No. 175A. Ignition distributor is No. 203A. Ignition switch is No. 192A.





JONES

CONNECTICUT IGNITION
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
MODEL 27 AND 28 (1918-19-20)

Battery.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded at the starting motor.

Ignition.—Breaker contacts should separate .023 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should begin to separate when piston entering power stroke is on top dead center, spark control lever 1½ inch from the fully retarded position. (First see that breaker assembly is fully retarded when lever is in the fully retarded position.)

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be .027 inch.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Starter.—Starter is connected to the engine by a Bendix drive. Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coil and commutator bars or open circuits are the chief causes of low speed and low current.

Oiling.—Starter bearings are packed with soft cup grease. Grease should be renewed twice a season. No oil is required.

Generator.—Generator current regulation is by third brush method.

Amperes	Generator Data, Model GH	R. P. M.
5.0		760- 820
10.0		1020-1100
12.5		1200-1300
15.0-17		1950-2250

If operated freely as a motor, generator armature should revolve at 450 R. P. M., generator taking 2.7 amperes. Much higher speed indicates damp, grounded or short circuited field coils. Greater current or lower speed indicates tight bearings or damp, grounded or short circuited armature windings or commutator. Shunt field should take 1.7 amperes.

Relay.—Relay should close at 550-600 R. P. M. of generator armature. Charging current should be .5 to 1.5 amperes at closing, and discharge current 0 to 1 ampere at opening of relay contacts.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling should be done every 500 miles.

Lamps.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are in series. They are each 3-4 volt, 2 cp.

JONES

MODELS 28 B E &G (1920-21)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

CONNECTICUT IGNITION

BATTERY.—Prest-O-Lite, Type 613-RHN, 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .020 inch. When the condition of the contacts affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

OILINC.—Refill the cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model MH. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes
0 lb. ft.	3000-4000	70
2 lb ft.	1160	110
6 lb. ft.	700	225
10 lb. ft.	460	325
12 lb. ft.	375	365
17.5 lb. ft.	Lock	600

OILING.—Put 4 or 5 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Model GJ. Generator current regulation is by third brush system. Maximum charging rate is 16 amperes, reached at 1700 R.P.M. of the armature or 25 miles per hour.

Generator Data.

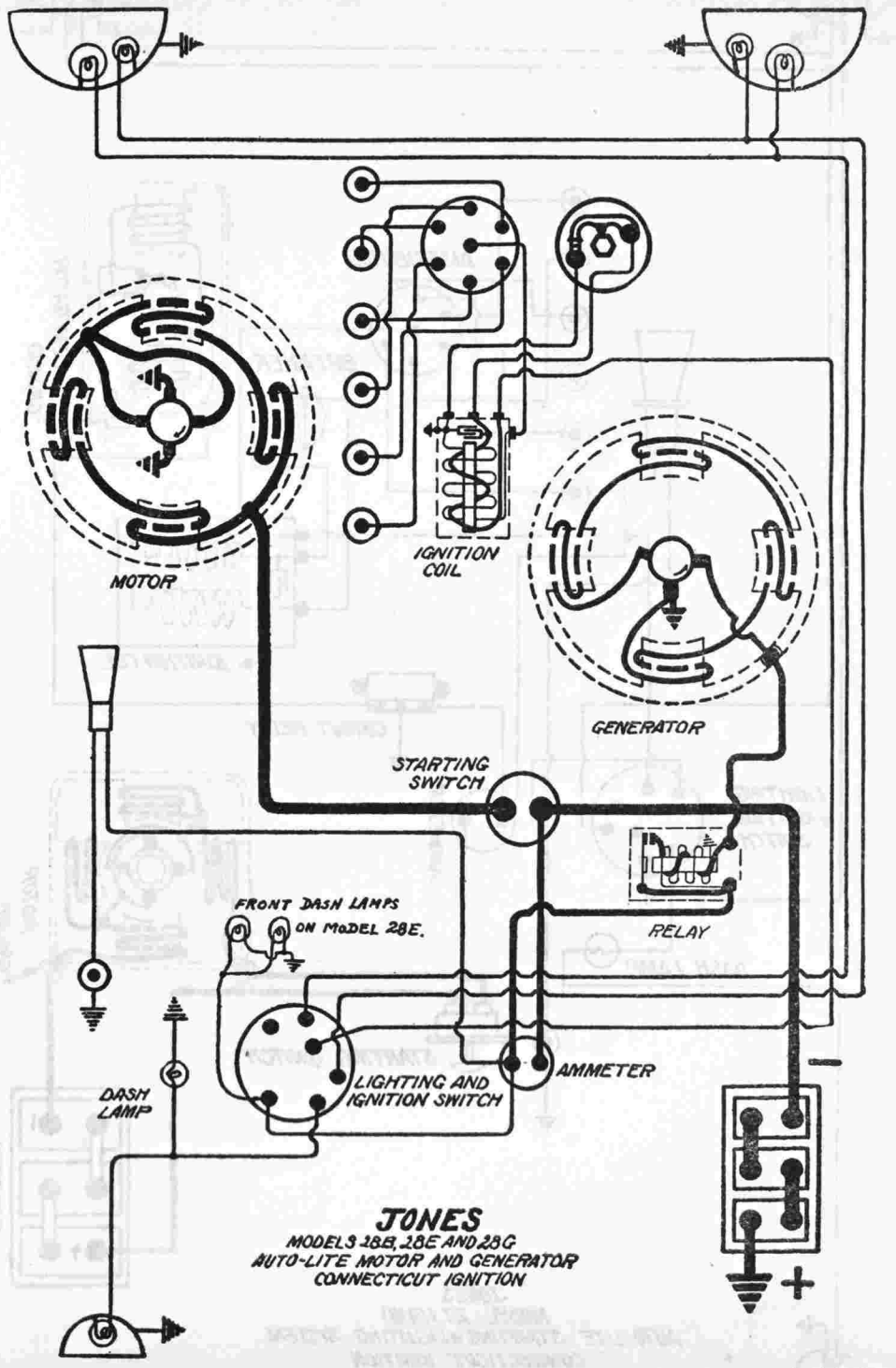
Amperes	Cold Test	R.P.M.	Amperes	Hot Test	R.P.M.
0		500	0		580
4		600	3		700
8		750	6		840
12		960	9		1050
16		1400	12		1360
16.5		1700	12.7		1700

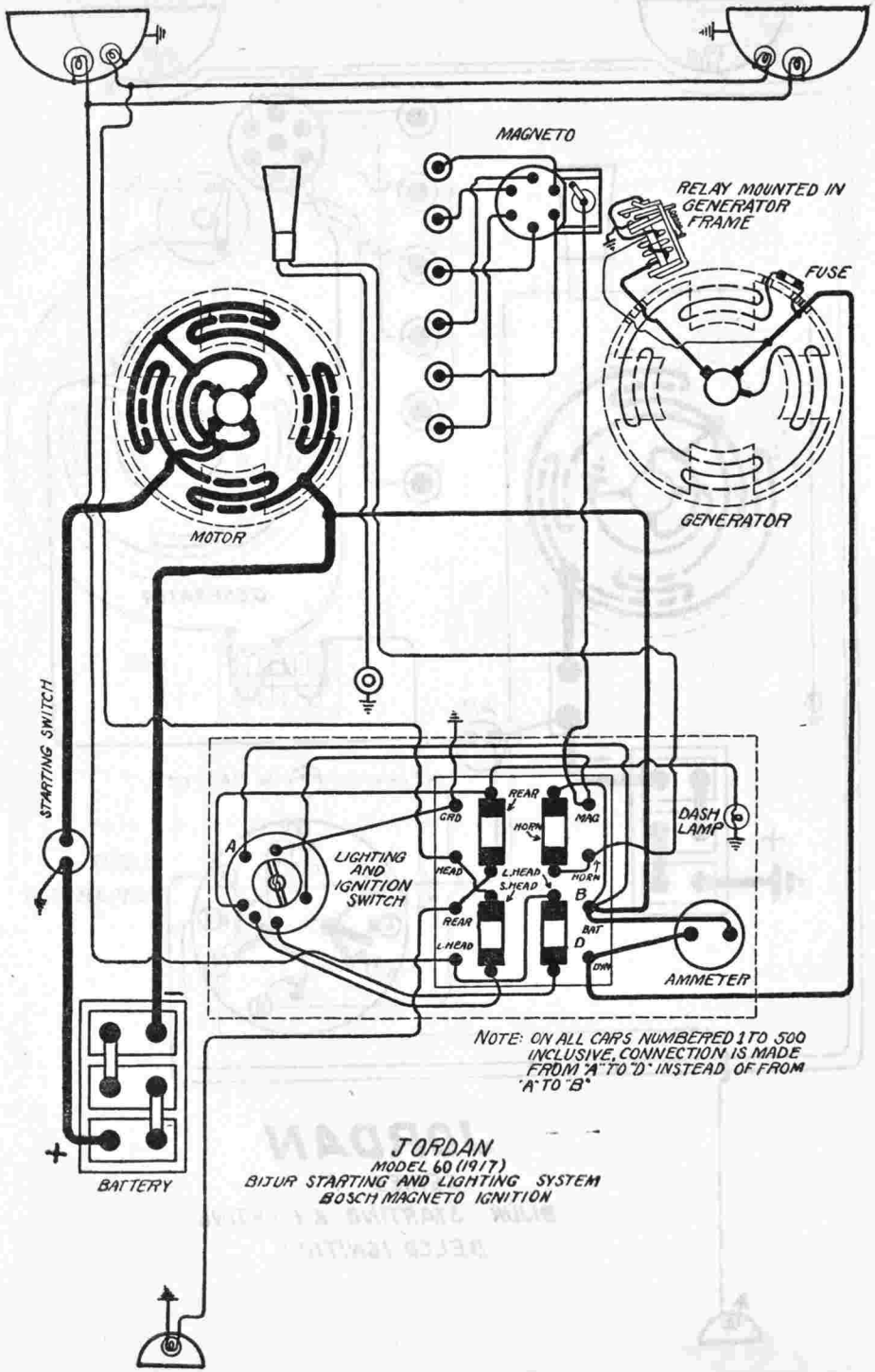
Charging rate is varied by adjustment of the third brush setting. Move the third brush in the direction of armature to increase the charging rate and in the opposite direction to decrease the charging rate.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes a 550-600 R.P.M. of the armature or 8-10 miles per hour and opens at 500-550 R.P.M. of the armature or 6-8 miles per hour. Relay contacts separate .030 inch. Air gap between relay armature and coil core is .045 to .050 inch. Adjust relay to close at 7.5 generated volts, and open with a discharge of ½ ampere. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again puttting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are 6-8 volt, 2 cp.





Jordan

MODEL 60 (1917)

BIJUR GENERATING. STARTING AND LIGHTING SYSTEM
BOSCH MAGNETO IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Magneto breaker contacts separate .014 to .016 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 2 or 3 drops of light machine oil in each of magneto bearing oilers and a very small amount of vaseline on fiber bumper of contact arm, applying with a toothpick, every month. If car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

TIMING.—Magneto breaker contacts begin to separate when mark "1-6 DC" on flywheel is 5/8 to 3/8 inch before indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .020 to .025 inch.

STARTER.—Type ED-160, Model 979, anti-clockwise rotation, commutator end. Starter is connected to the engine through a Bijur automatic gear shift, treated on Page 286.

OILING.—Put several drops of engine oil in each of starter oilers every month.

GENERATOR.—Type L-61, Model 832 or **1090,** anti-clockwise rotation, commutator end. Generator current regulation is by third brush system. Maximum generator output is 12-16 amperes, reached at 20-25 miles per hour, or 1400-1600 R.P.M. of armature. Output is varied by shifting third brush. Third brush is secured to generator by two stud bolts, the nuts of which appear in a recess in the front head of generator. Loosen these nuts with a socket wrench and shift the brush by gently tapping the shank of the wrench. Shifting the brush in the direction of the armature rotation will increase the output. Shifting the brush in the opposite direction will decrease the output Shifting the brush 1/16 inch will vary the output 2 or 3 amperes. Tighten the nuts after adjusting the brush. Brush adjustment is made to give the desired rate with generator hot and charging a 3-cell battery, battery reading 1.250 or above. There is a 20 ampere fuse in the small aluminum cap on generator housing to protect the generator windings, should excessively high resistance occur in the charging circuit.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Relay closes at 10-12 miles per hour or 500-600 R.P.M. of armature. and opens at 8-10 miles per hour or 450-500 R.P.M of armature. The charging current is 1-3 amperes at closing and the discharge current 0-1 ampere at opening of relay.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 3 cp. Tail lamp is 6-8 volt, 3 cp.

FUSES.—Fuses are 20 ampere.

JORDAN
MODEL C (1918)
SERIES F (1919)
BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SJW-4, 6 volt, 118 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 4 or 5 drops of light engine oil in each of the ignition unit oilers every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is one inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER.—Type ED-160, M-979A. Rotation is counter-clockwise, looking at commutator end. Starter is connected to the engine through a Bendix drive. Lock torque is 16.5 pound-feet, current 665 amperes at 3.6 volts. Pressure of brushes on commutator is 25 ounces.

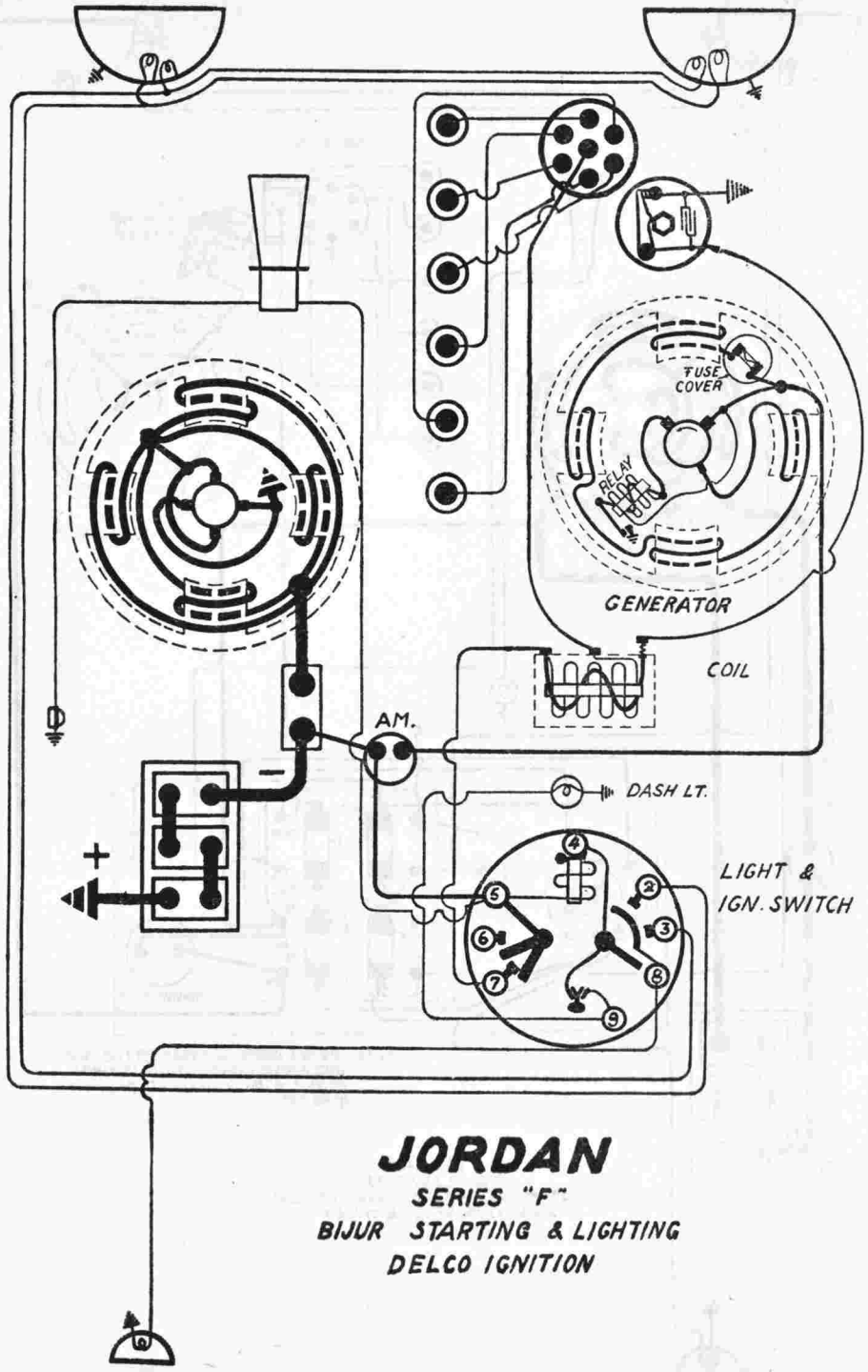
OILING.—Put 5 or 6 drops of light engine oil in each of starter oilers every month.

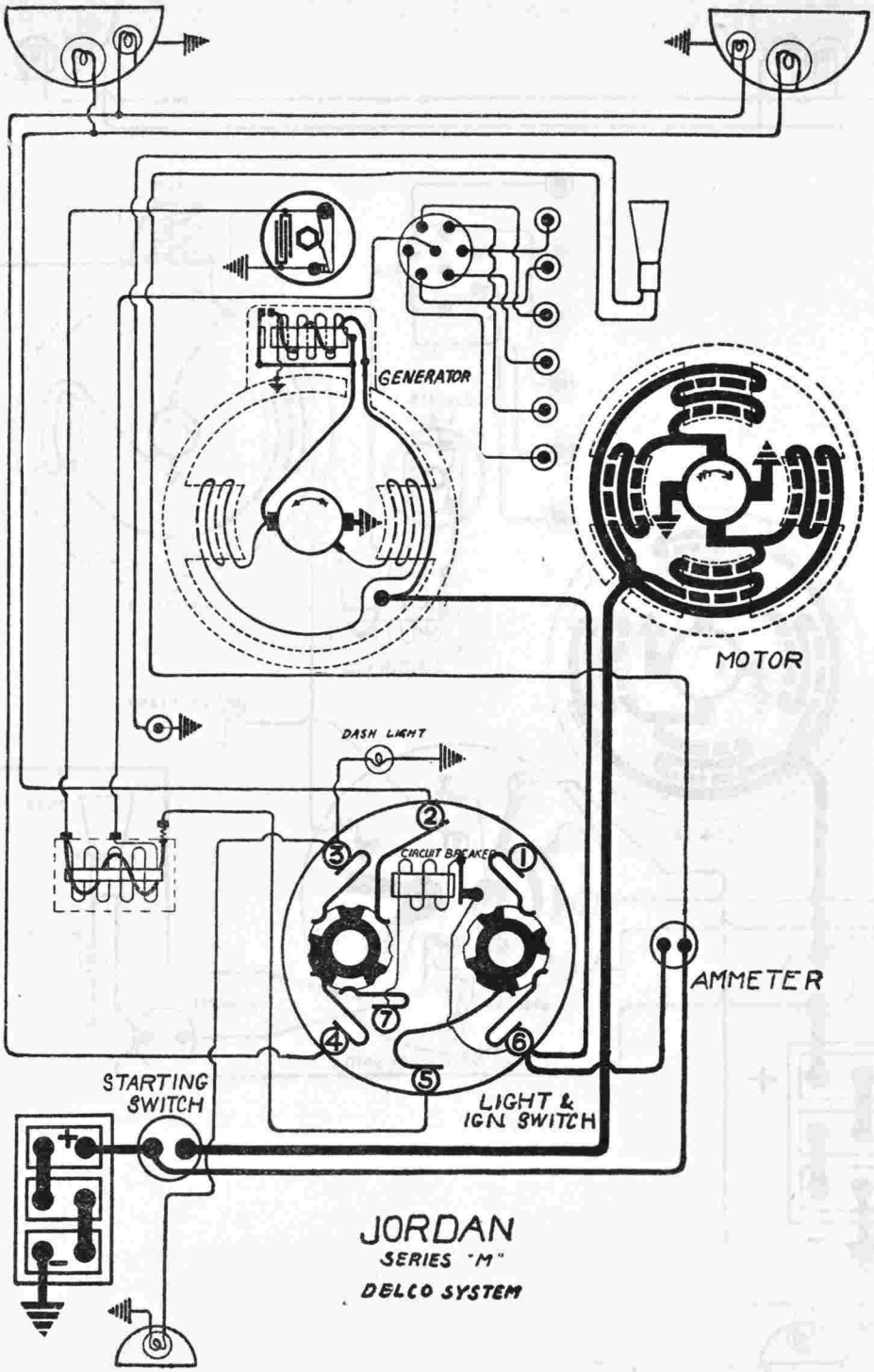
GENERATOR.—Type L-61, M-1090 or M-1195. Rotation is counter-clockwise, looking at commutator end. Generator current regulation is by third brush system. Maximum charging rate is 15 amperes, reached at 15 to 20 miles per hour. Charging rate reduces to 12 amperes at 30-40 miles per hour. Shunt field current is 6-8 amperes at 7.8 volts. Pressure of brushes on commutator is 14 ounces. Charging rate is varied by inserting a special toothed wrench in the adjusting hole in the commutator end plate and moving the third brush assembly. Turn the wrench in a clockwise direction to increase the charging rate, and in a counter-clockwise direction to decrease the charging rate.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in generator frame. Relay closes at 8-9 miles per hour or 550-600 R.P.M. of the armature, and opens at 6-7 miles per hour or 500-550 R.P.M. of the armature. Relay contacts separate .045 inch. Air gap between the relay armature and coil core is .035 inch, contacts closed. To adjust relay, connect a voltmeter across the main brushes of the generator, and slowly speed up the engine. Insert the special socket wrench in the small adjusting hole in the commutator end plate and vary the spring tension on the relay armature until the contacts close when the voltmeter indicates 6.5 volts. Closing of relay will be indicated by the ammeter showing "Charge". Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are each 6-8 volt, 3 cp.





JORDAN

SERIES M (1920). SERIAL NOS. 10,001 UP
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SJW-B, 6 volt, 94 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2159. Distributor Model No. 5207. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling:—Put 4 or 5 drops of light engine oil in each ignition unit oilers every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing:—Breaker contacts begin to separate when the top dead center mark on the flywheel is 2¼ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plug Gaps:—Spark plug gaps are .025 to .030 inch.

STARTER.—Model No. 164. Starter is connected to the engine through a set of reduction gears and a Bendix drive. Starter cranks the engine at 125 R.P.M., taking 180 amperes. Lock torque is 28 lb. ft., current being 450-500 amperes at 2.75 volts.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter bearing oilers every month. Remove the grease plug in the reduction gear case and inject soft cup grease every six months.

GENERATOR.—Model No. 165. Rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Maximum charging rate is 11-15 amperes, reached at 1200 R.P.M. of the armature or 16-20 miles per hour.

Amperes	Generator Data	R.P.M.
Neutral		550
4		800
8		1000
11-15		1200
11-14		2000

Charging rate is varied by the adjustment of the third brush setting. To move the third brush, loosen the three screws holding the bearing retainer plate on the commutator end and shift the plate. Move in a counter-clockwise direction to increase the charging rate, or in the opposite direction to decrease the charging rate. Tighten the adjusting screws and reseat the brush after making the adjustment. Maximum charging rate must not exceed 16 amperes.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY:—Relay is mounted on the generator frame. Relay closes at 550-600 R.P.M. of the armature or 7-8 miles per hour, and opens at 500-550 R.P.M. of the armature or 5-6 miles per hour. Relay contacts separate .046 to .062 inch. Air gap between the relay armature and coil core is .020 to .035 inch, contacts closed. To adjust relay connect a voltmeter between the positive (+) generator brush and ground. Then slowly speed up the generator and adjust the relay spring tension by turning the thumb nut until the contacts close when the voltmeter indicates 7.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 3 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires a current of 25 amperes to start this device vibrating. While vibrating, the current is 3 to 5 amperes.

JORDAN

MODEL "F" (1920-21-22) SERIAL NOS. 1501 TO 5400
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Willard (1920) Type SJW-4, 6 volt 118 ampere hour (1921-22) Type SJRN-4, 6 volt, 120 ampere hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2159, Distributor Model No. 5215. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 4 or 5 drops of light engine oil in each of the ignition unit oilers every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 2¼ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER.—Model No. 179. Starter is connected to the engine through a Bendix drive Starter cranks the engine at 125 R.P.M., taking 180 amperes. Lock torque is 7 pound-feet.

OILING.—Put 4 or 5 drops of light engine oil in the starter oilers every month.

GENERATOR.—Model No. 180. Rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Maximum charging rate is 11-15 amperes, reached at 1200 R.P.M. of the armature or 16-20 miles per hour.

Amperes	Generator Data	R.P.M.
Neutral		550
4		800
8		1000
11-15		1200
11-14		2000

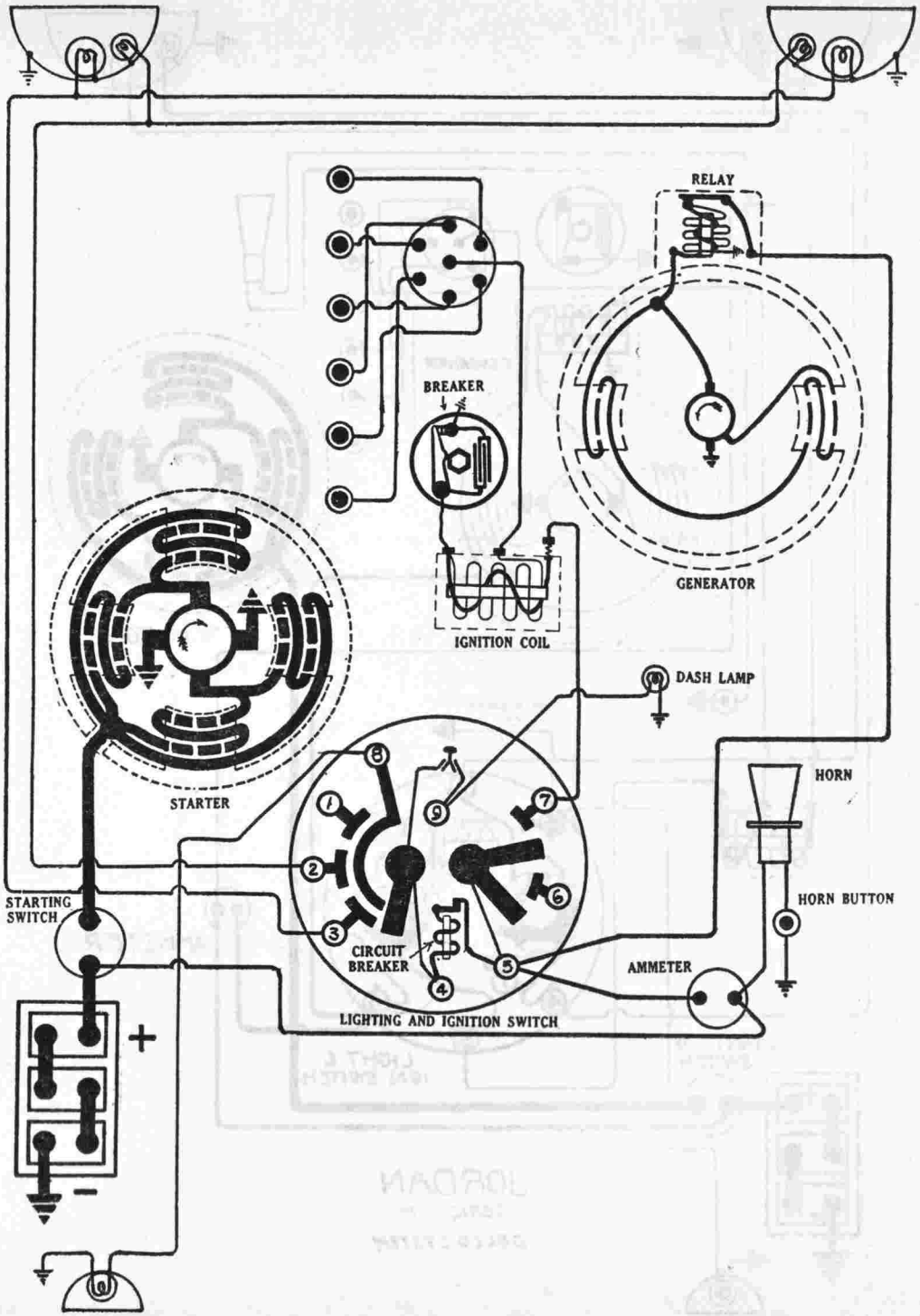
Charging rate is varied by the adjustment of the third brush setting. To move the third brush, loosen the three screws holding the bearing retainer plate on the commutator end and shift the plate. Move in a counter-clockwise direction to increase the charging rate, or in the opposite direction to decrease the charging rate. Tighten the adjusting screws and reseat the brush after making the adjustment. Maximum charging rate must not exceed 16 amperes.

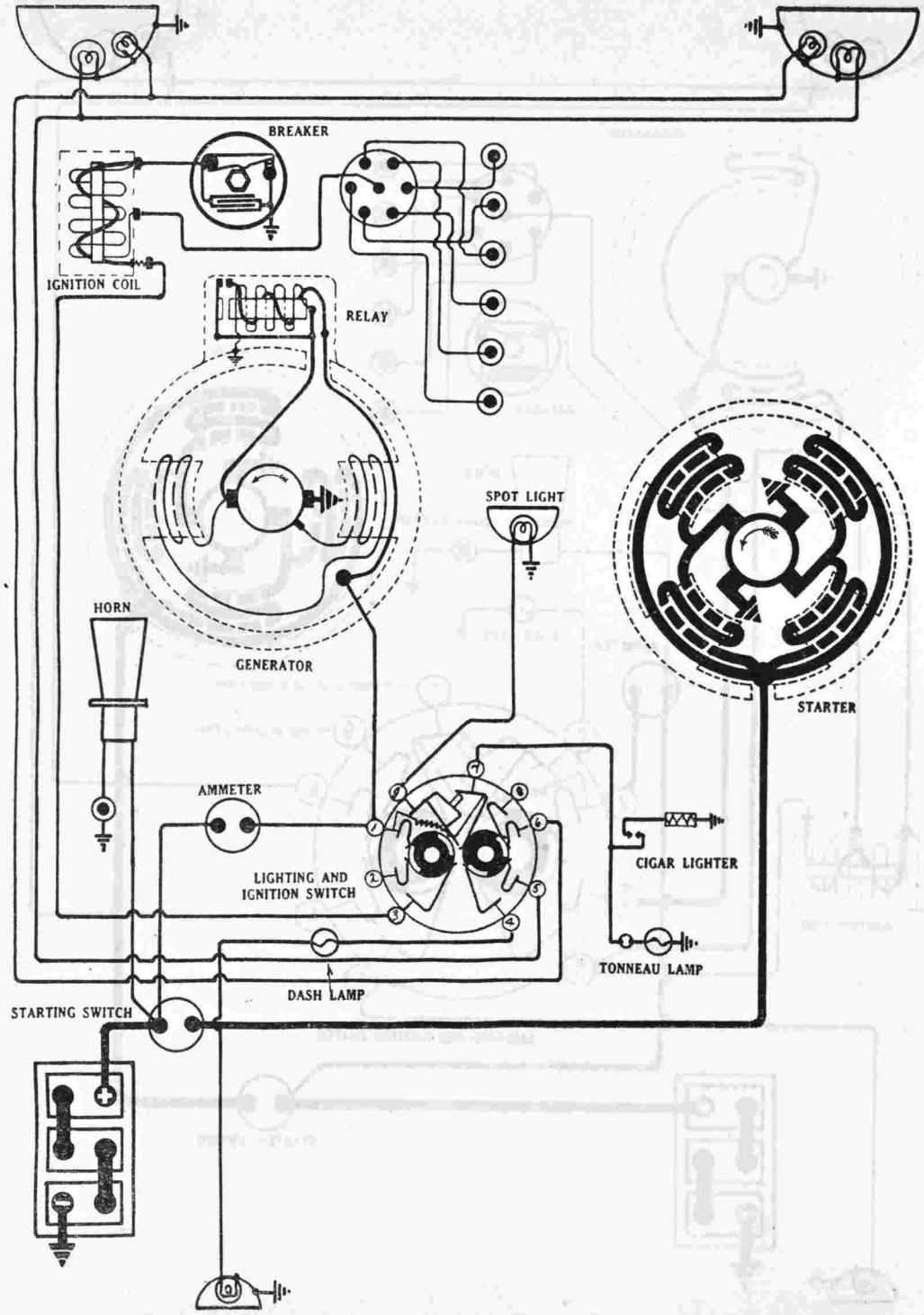
OILING.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes at 550-600 R.P.M. of the armature or 7-8 miles per hour, and opens at 500-550 R.P.M. of the armature or 5-6 miles per hour. Relay contacts separate .046 to .062 inch. Air gap between the relay armature and coil core is .020 to .035 inch, contacts closed. To adjust relay connect a voltmeter between the positive (+) generator brush and ground. Then slowly speed up the generator and adjust the relay spring tension by turning the thumb nut until the contacts close when the voltmeter indicates 7.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp. On 1920 cars, head lamps are 6-8 volt, 18 cp. Dash and tail lamps are 6-8 volt 3 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start the vibrator. While vibrating the current is 3-5 amperes.





JORDAN

MODEL MX (1921) SERIAL NOS. 1500 TO 20000
MODEL F (1922) SERIAL NOS. 5401 TO 9243
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION
7-R CONTINENTAL ENGINE

BATTERY.—Willard, Type SJRN-4, 6 volt, 113 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2159. Distributor Model No. 5207. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Put 4 or 5 drops of light engine oil in each of the ignition unit oilers every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 2¼ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—The spark plug gaps are .030 inch.

STARTER.—Model No. 181. Starter is connected to the engine through a Bendix drive Lock torque is 28 pound-feet at 4 volts, the current being 525 amperes. Remove the grease plug in the reduction gear case and inject soft cup grease every six months.

Oiling.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Model No. 165. Rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Maximum charging rate is 11-15 amperes, reached at 1200 R.P.M. of the armature or 16-20 miles per hour.

Generator Data

Amperes	R.P.M.
Neutral	550
4	800
8	1000
11-15	1200
11-14	2000

Charging rate is varied by the adjustment of the third brush setting. To move the third brush, loosen the three screws holding the bearing retainer plate on the commutator end and shift the plate. Move in a counter-clockwise direction to increase the charging rate, or in the opposite direction to decrease the charging rate. Tighten the adjusting screws and reseat the brush after making the adjustment. Maximum charging rate must not exceed 16 amperes.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes at 550-600 R.P.M. of the armature or 7-8 miles per hour, and opens at 500-550 R.P.M. of the armature or 5-6 miles per hour. Relay contacts separate .046 to .062 inch. Air gap between the relay armature and coil core is .020 to .035 inch, contacts closed. To adjust the relay connect a voltmeter between the positive (+) generator brush and ground. Then slowly speed up the generator and adjust the relay spring tension by turning the thumb nut until the contacts close when the voltmeter indicates 7.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash, tail, tonneau and side lamps are 6-8 volt, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit takes the place of fuses. It requires amperes to start the vibrator. While vibrating, the current is 3-5 amperes.

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JORDAN

MODEL MX (1922) SERIAL NOS. 20001 UP
MODEL H (1922) SERIAL NOS. 35001 UP
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION
6-S CONTINENTAL ENGINE

BATTERY.—Willard, Type SJR-4, 6 volt, 112 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2159. Distributor Model No. 5247. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Put 4 or 5 drops of light engine oil in each of the ignition unit oilers every two weeks. If the track of the rotor button in the distributor head is not well polished apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 2¼ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—The spark plug gaps are .030 inch.

STARTER.—Model No. 208. Starter is connected to the engine through a Bendix drive. Lock torque is 28 pound-feet at 4 volts, the current being 525 amperes. Starter cranks the engine at 120 R.P.M. The direction of rotation is counter-clockwise, viewed from the commutator end.

Oiling.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Model No. 234. Generator current regulation is by the third brush system

Amperes	Generator Data	R.P.M.
Neutral		650
4		800
8		1000
12-16		1600
8-12		2300

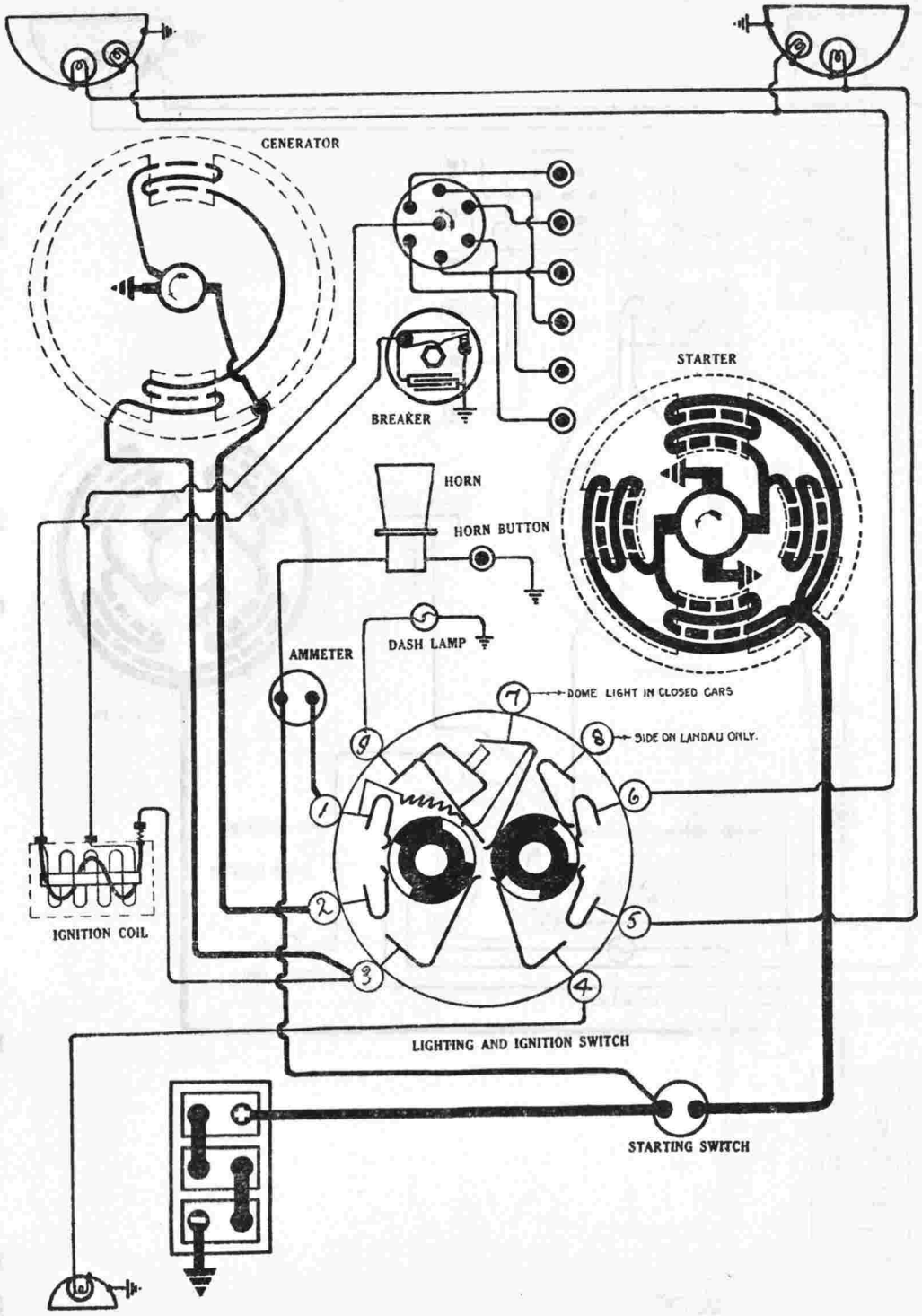
Charging rate is varied by the adjustment of the third brush setting. To move the third brush, loosen the three screws holding the bearing retainer plate on the commutator end and shift the plate. Move in a counter-clockwise direction to increase the charging rate, or in the opposite direction to decrease the charging rate. Tighten the adjusting screws and reseat the brush after making the adjustment. Maximum charging rate must not exceed 16 amperes.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

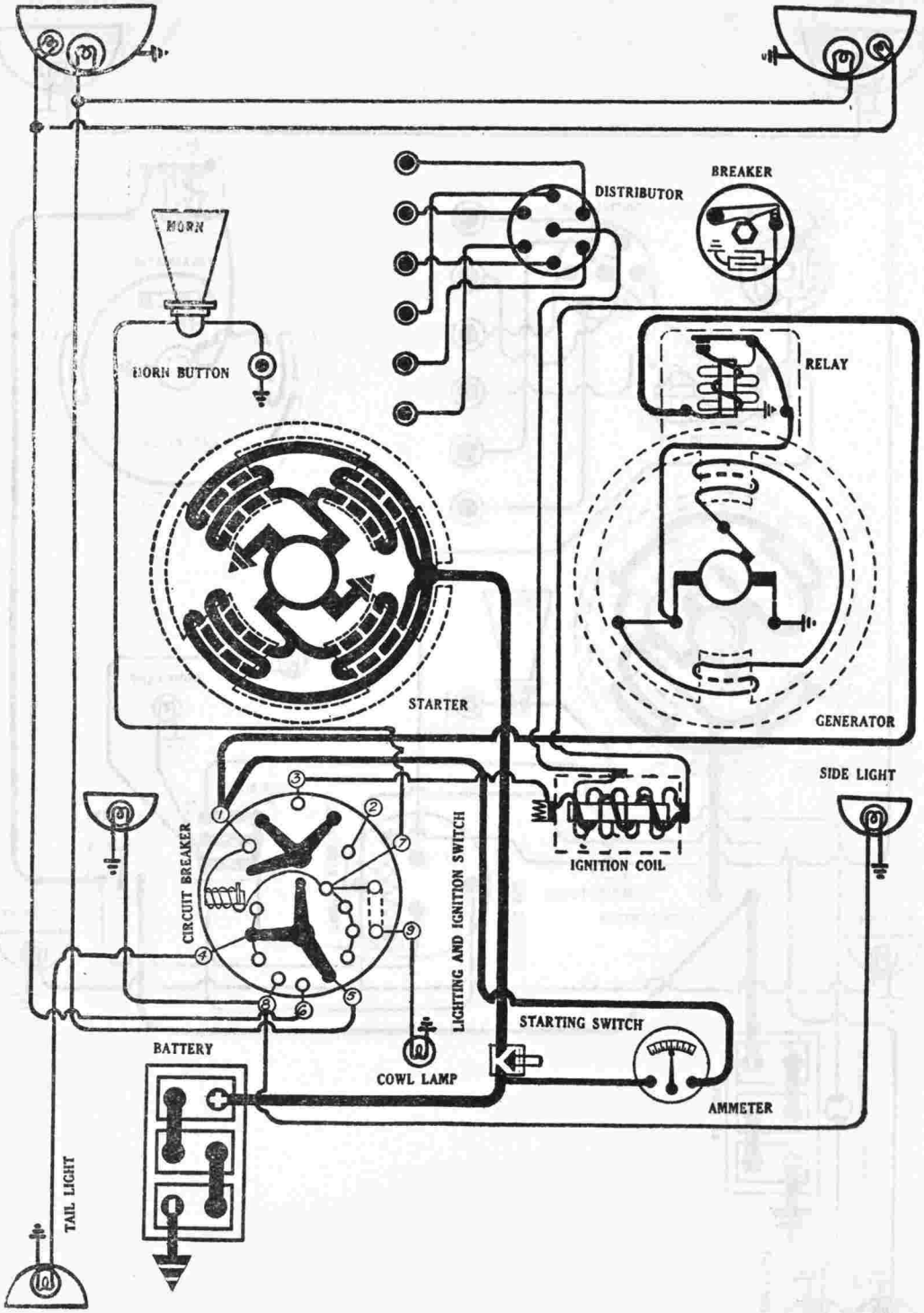
RELAY.—There is no relay. The circuit between the generator and battery is controlled through the ignition switch.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash, tail, tonneau and side lamps are 6-8 volt, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker, mounted on the back of the combination switch, takes the place of fuses. It requires 25 amperes to start the vibrator, but 3-5 amperes will cause it to continue.



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JORDAN

MODELS MX AND H (1923)
MODELS K AND L (1924-25)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard Type XR-15. 6 volt, 110 ampere hour, The starting capacity is 125 amperes for 20 minutes. Lighting capacity is 5 amperes for 22 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2178. Distributor Model 5255. Breaker contact gap is .022 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a hard oilstone.

Oiling.—Place 8 or 10 drops of light engine oil in distributor oilers every two weeks. If the car is driven more than 500 miles in two weeks, this attention must be given every 500 miles. Repack distributor shaft housing with soft cup grease up to advance ring and yoke once each season.

Timing.—Breaker contact points begin to separate when No. 1 piston is 3⅝ inch past top dead center, measured on flywheel, spark control lever and breaker assembly fully retarded; or 25° early, measured on the flywheel, with spark control lever and breaker fully advanced.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plugs.—The spark plug gaps are .025-.030 inch.

STARTER.—Starter Model No. 208. The direction of rotation is clockwise, looking at commutator end. Starter cranks engine at 800 R.P.M. of motor armature, or 120 R.P.M. of engine, taking a current of 85 amperes (hot) or 105 amperes (cold). Lock torque is 27 pound-feet at 2.75 volts. Starter running free draws 36 amperes at 6 volts. The brush tension of the starter brushes should be from 2½ to 2¾ pounds each.

Oiling.—Repack once or twice a season with soft cup grease by means of the grease plugs on the side of the gear housing. Put 8 or 10 drops of light engine oil into each starter oiler every two weeks. If the car is driven over 500 miles in two weeks, this care must be given every 500 miles. The wick under the oiler on the outward bearing of the splined shaft should be saturated with light engine oil every 2000 miles. The starting motor must be withdrawn from the engine for this purpose.

GENERATOR.—Model No. 256. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush is used for current regulation. The maximum charging rate is 15 amperes, reached at 15 miles per hour.

Generator Test Data

Amperes	Hot Test R.P.M.	Amperes	Cold Test R.P.M.
5	700	6	700
11	1000	12	1000
14-16	1600	15-18	1600
15 Max.	1800	17 Max.	1800

Oiling.—Refill the two oil cups with light engine oil every two weeks. If the car is driven over 500 miles in two weeks, this care must be given every 500 miles. Avoid lubricating in such amount that the oil would eventually foul the generator commutator, and perhaps interfere with the proper amount of current generated.

RELAY.—Model No. 5754. Relay closes at approximately 8 miles per hour, and opens at approximately 5 miles per hour. The contact gap is .025-.035 inch. The air gap between the relay armature coil core is .025-.035 inch, contacts closed.

LIGHTING.—Delco Combination Switch No. 1243 is used. Head lights are 6-8 volts, 21 cp. Auxiliary lights are 6-8 volts, 4 cp. Dash and tail lights are 6-8 volts, 2 cp.

CIRCUIT BREAKER.—A circuit breaker is used in the place of fuses. The circuit breaker is mounted on the back of the switch. In operation, the circuit breaker intermittently cuts off the flow of current and produces an audible clicking sound, giving warning of an abnormal condition in one of the lighting circuits. This action will continue until the ground is removed or the switch operated to cut off the circuit on which the ground exists. In this manner the circuit breaker protects the wiring, switch and storage battery. Circuit breaker begins to operate with a current flow of 25 to 30 amperes, and will continue to operate with a current flow of not more than 15 amperes. Length of plunger which changes the maximum break between contacts is normally .012-.030 inch. Air gap, totally, between the disc and the walls of the U-shaped frame is .019-.025 inch.

JORDAN

MODEL A—GREAT LINE EIGHT (1924-25-26)
AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

BATTERY.—Willard, Type CRR-19. 6 volt, 135 ampere hour. Starting capacity is 145 amperes for 20 minutes. Lighting capacity is 5 amperes for 26 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model TC-30. Distributor Model T-8202. Breaker contacts separate .014 to .016 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone.

Oiling:—Fill the oiler on the side of the distributor housing with light engine oil once each month or every 1000 miles, if the car is driven more than 1000 miles in a month. Put one drop of oil on the interrupter lever pivot and place a small bit of grease on the interrupter cam under the fibre bumper every three months.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control lever in the half advanced position.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Model No. 937. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 93 R.P.M.

Starter Data.

Torque.	R.P.M.	Volts.	Amperes.
0 lb. ft.	2000	6	60
22 "	Lock	3.5	500

Oiling:—Oilless bearings are used. They require no attention.

GENERATOR:—Model No. 1261. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the generator output, remove the end-plate and loosen the slotted hexagon head screw which holds the third brush plate in position. Then move the third brush in a counter-clockwise direction (toward the engine) to increase the charging rate and in the opposite direction to decrease the charging rate. The maximum charging rate of 16-18 amperes (cold) is reached at 1300 R.P.M. of the generator armature or 23 M.P.H.

Generator Data.

Cold Test.			Hot Test.		
Amperes.	Volts.	R.P.M.	Amperes.	Volts.	R.P.M.
0	6.75	550	0	6.5	625
7	7.	700	2.5	6.5	700
12	7.6	850	8	7.5	900
17	8.	1300	13	8.	1300
12.6	8.	2000	11	8.	2000
9.5	7.6	2800	9	7.	2800

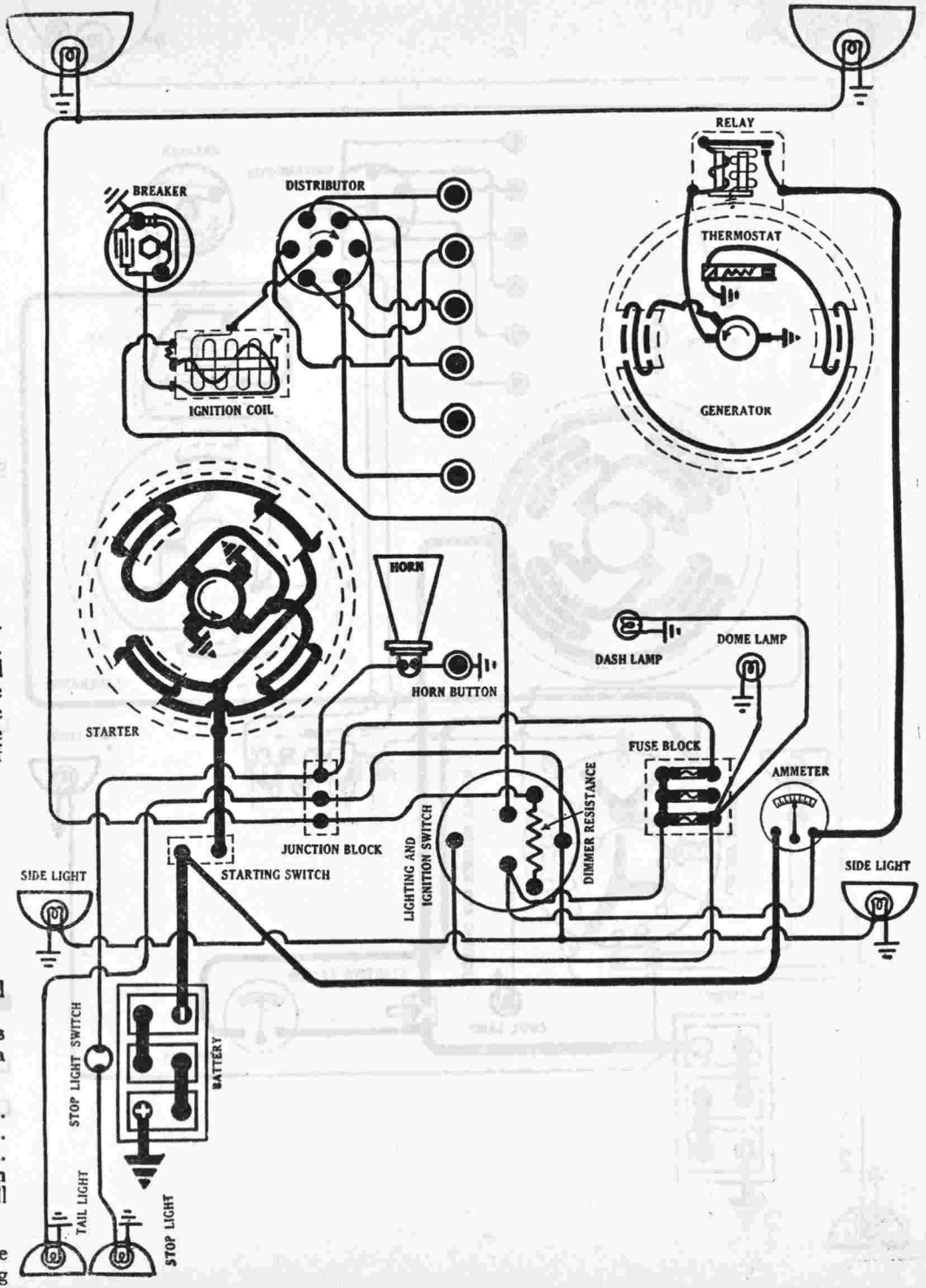
Motoring freely the generator takes 6 amperes at 6 to 6.5 volts. The shunt field draws 6.1 to 6.8 amperes at 6 volts.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month, or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY:—Relay is mounted on top of the generator. Relay closes at 500-600 R.P.M. when the generator voltage reaches 6.5 to 7.5 volts and opens at 400-500 R.P.M. with a discharge current of 0 to 3 amperes. Relay contacts separate .015 inch. Air gap between relay armature and coil core is .010 inch, contacts closed. Clean relay contacts by drawing well worn No. 00 sandpaper between them. Remove all grit and adjust before again putting into service.

LIGHTING.—Head and stop lamps are each 6-8 volt, 21 cp. S. C. Dimmer lamps are 6-8 volt, 6 cp. S. C. Dash and tail lamps are each 6-8 volt, 2 cp. S. C. A vibrating circuit breaker protects all lighting circuits and horn circuit. The ignition current does not pass through the circuit breaker.

FUSES:—Generator field fuse is 7.5 ampere capacity.



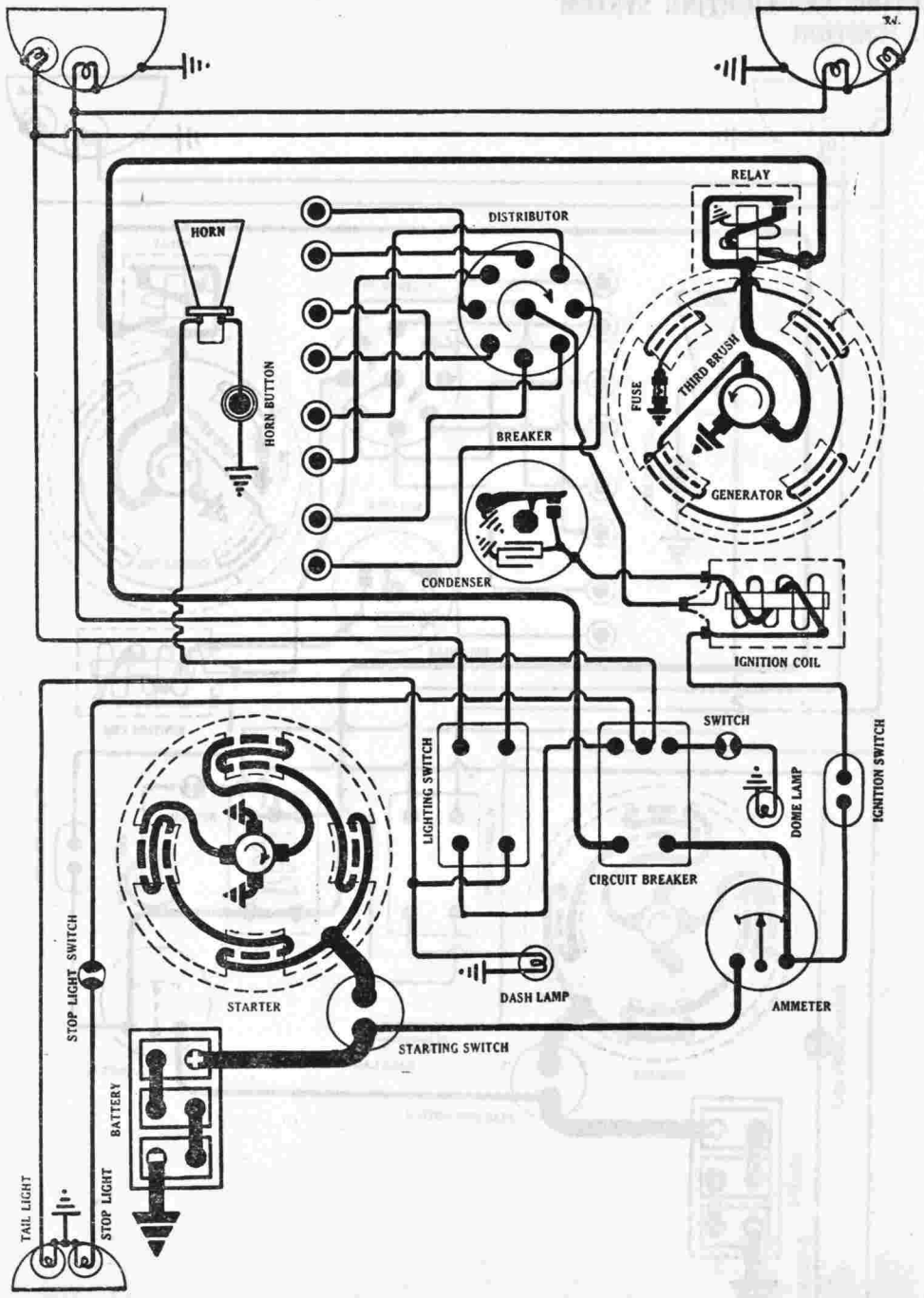
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JORDAN

MODEL J (1926) SERIAL NOS. 70001 UP

AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM

AMERICAN BOSCH IGNITION



BATTERY.—Willard, Type CRR-15. 6 volt, 105 ampere hour. Starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model TC-34-VI. Distributor Model T-8218. Breaker contacts separate .015-.018 inch. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone.

Oiling.—Fill the oiler on the side of the distributor housing with light engine oil every month or each 1000 miles. Put one drop of oil on the interrupter lever arm pivot and place a small bit of heavy grease on the face of the breaker cam under the fiber bumper every month.

Timing.—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever in the half advanced position, or midway between the fully retarded and fully advanced ends of the segment.

Firing Order.—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .025-.030 inch.

STARTER.—Model 965. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, looking at the commutator end.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2000	6	60
22 "	Lock	3.5	500

Oiling.—Starter bearings are of the oilless type. They require no attention.

GENERATOR.—Model 1277. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, remove timer adapter end plate and loosen the hexagonal headed screw which holds the third brush plate in position. Then move the third brush in the counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Maximum charging rate is 16-18 amperes reached at 1100-1300 R.P.M. or approximately 18.5-21.5 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.75	550	0	6.5	625
8	7	750	2.5	6.5	700
12	7.6	850	8	7.5	900
16-18	8	1300	13	8	1300
12.6	8	2000	11	8	2000
9.5	7.6	2800	9	7	2800

Motoring freely, generator draws 6 amperes at 6 volts. Shunt field current is 6.6 amperes at 6 volts. Generator brush spring tension is 1½-1¾ pounds each.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles.

RELAY.—Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 6.5-7.5 volts and open with a discharge current of 1-3 amperes. Contacts separate .015 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING.—Kellogg Switch, Model 404. Head and stop lamps are each 6-8 volts, 21 cp. S. C. Dimmer lamps are 6-8 volt, 6 cp. S. C. Dome lamp is 6-8 volt, 4 cp. S. C. Dash and tail lamps are each 6-8 volt, 2 cp. S. C. A vibrating circuit breaker protects the lighting circuits. Ignition current does not pass through the circuit breaker.

FUSES.—Generator field fuse is 7.5 amperes.

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JORDAN

MODEL J (1927)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—Willard, Type CWR-15, 6 volt. Starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded. Battery is mounted under the driver's seat.

IGNITION:—Coil Model IG-4078. Distributor Model IB-4004A. Breaker contacts separate .018-.022 inch. They are made of tungsten. Resurface contacts with a fine flat jeweler's file or on a medium hard oilstone. Ignition current is 1.3 amperes with engine running and 3-4.5 amperes with engine stopped. Distributor is semi-automatic. Manual advance is 14°. Automatic advance begins at 200 R.P.M. and reaches a maximum of 14° at 2800 R.P.M.

Mounting:—Ignition coil is mounted in the frame, right hand side rail adjacent to generator. Distributor is mounted on generator at rear end and driven by armature shaft. To remove distributor, disconnect primary lead and remove distributor head with high tension cables intact. Then remove screw from manual advance arm and lift distributor from place.

Oiling:—Fill the oiler on the side of the distributor housing with light engine oil every month or each 1000 miles. At the same time put one drop of oil on the breaker arm pivot pin and put a small bit of heavy grease on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 1½ inches (on the flywheel) before top dead center with the manual spark control lever in the fully advanced position. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance spark control lever and continue to crank engine until the mark 'IGN' on the flywheel is opposite the pointer in the flywheel case. This mark is 1½ inches before the top dead center mark 'D.C.'. If breaker contacts do not separate at this point, loosen advance lever clamp screw and rotate distributor housing until contacts begin to separate. This can be checked by connecting a six volt lamp in ignition circuit or by watching dash ammeter. Tighten the clamp screw after making the adjustment and see that the rotor is opposite the segment connected to the spark plug in cylinder No. 1.

Valve Timing:—INLET VALVES:—Head diameter, 1½ inches; stem diameter, .3095-.3085 inch; valve length, 5 61/64 inches (from top of seat to end); valve lift, 5/16 inch; spring pressure, 61 pounds on the outer spring and 26 pounds on the inner or a total of 87 pounds; tappet clearance, .006-.004 inch (hot); inlet valves open 8° past top dead center and close 40° past lower dead center.

EXHAUST VALVES:—Head diameter, 1⅜ inches; stem diameter, .3095-.3085 inch; valve length, 5 61/64 inches (from top of seat to end); valve lift 5/16 inch; spring pressure, 61 pounds on the outer spring and 26 pounds on the inner or a total of 87 pounds; tappet clearance, .006-.004 inch (hot); exhaust valves open 40° before lower dead center and close 8° after top dead center. This point is marked on the flywheel by the mark '#1-EX.CL'. Valve stem guides are removable. Oversize valve stems are made on order.

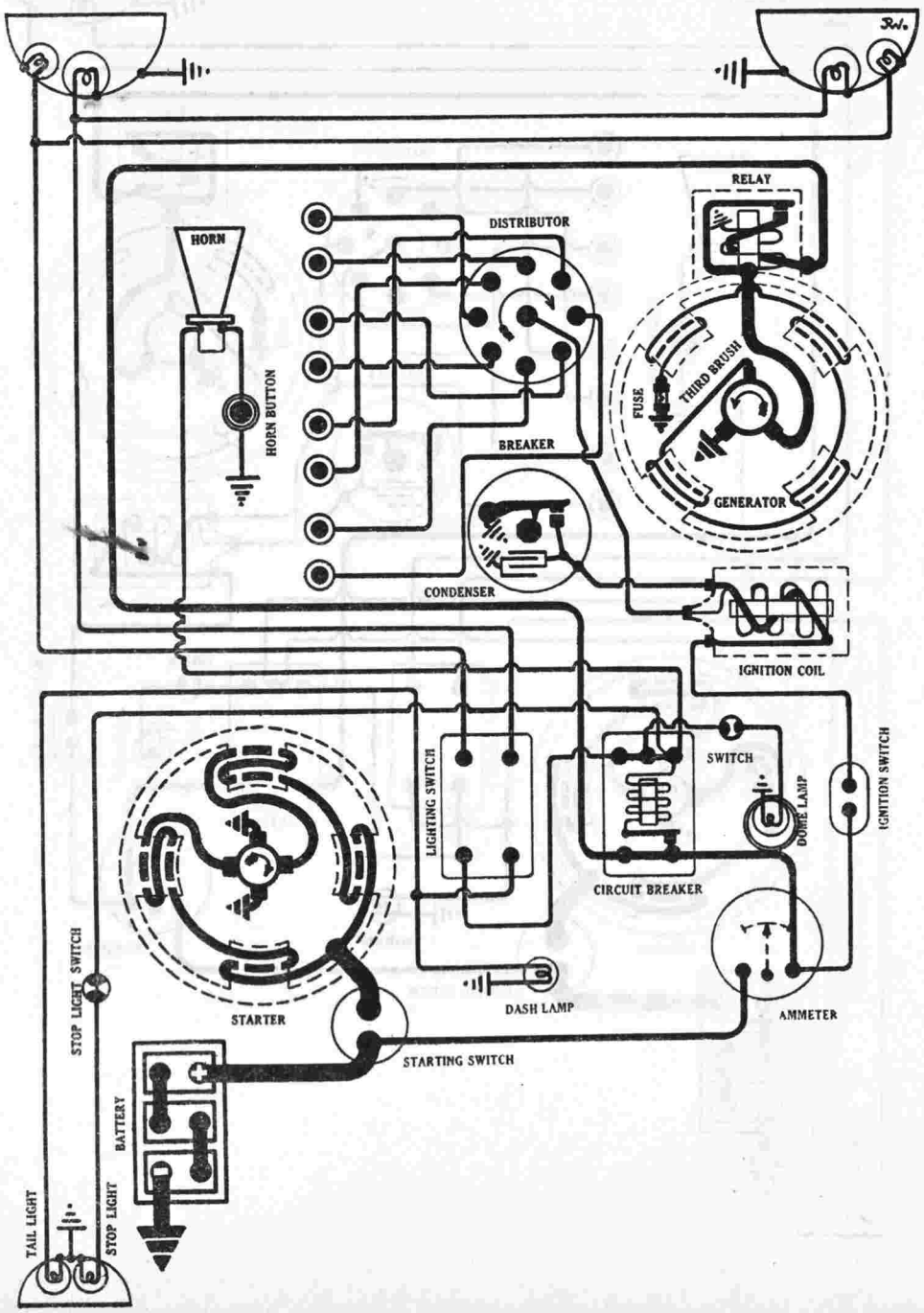
Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are Champion No. 4. Gaps are .030-.025 inch.

STARTER:—Model MUA-4003. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, looking at the commutator end. Starter switch is Model SW-3646. Brush spring tension is 1½ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2000	6	60
22 "	Lock	3.5	500



JORDAN

MODEL J (1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect starter cable and remove three flange mounting bolts. Then slide starter forward from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GAB-4002. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush and mounting plate by tapping on the mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Maximum charging rate is 17.5 amperes reached at 1300 R.P.M. or 25 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
4	6.8	630	4	6.8	750
10	7.4	780	10	7.6	1000
14	7.8	950	13	8.0	1400
17	8.0	1300	11	7.8	2000
13	7.8	1950			

Generator motoring draws 6 amperes at 6 volts. Shunt field current is 6.6 amperes at 6 volts. Brush spring tension is 1½-1¾ pounds each.

Mounting:—Generator is flange mounted on right of engine on rear face of timing chain case. To remove generator, disconnect generator lead and remove three nuts from flange mounting screws. Then slide generator to the rear. This does not change timing chain adjustment.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Model CB-4012. Relay is mounted on top of the generator. Relay closes at 600-650 R.P.M. when voltage of the generator reaches 6.5-7.5 volts, and opens with a discharge current of 1-3 amperes. Charging current at closing of contacts must not be over 2 amperes. Contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING:—Kellogg Switch Model 404. Head and stop lamps are each 6-8 volt, 21 cp. S.C. Auxiliary head lamps are 6-8 volt, 6 cp. S.C. Dome lamp is 6-8 volt, 4 cp. S.C. Dash and tail lamps are each 6-8 volt, 2 cp. S.C.

CIRCUIT BREAKER:—A vibrating circuit breaker protects the lighting circuits. The ignition current does not pass through the circuit breaker.

FUSES:—Generator field fuse is 7.5 amperes.

JORDAN

MODEL AA (1927)

AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

BATTERY:—Willard, CRR-17, 6 volt. Starting capacity is 130 amperes for 20 minutes. Lighting capacity is 5 amperes for 23 hours. The negative (—) terminal is grounded. Battery is mounted under the driver's seat.

IGNITION:—Coil Model TC-30. Distributor Model T-8202. Breaker contacts separate .014-.016 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine flat contact file. Ignition current is 1.3 amperes with engine running and 3-4.5 amperes with engine stopped. Distributor is semi-automatic. Manual advance is 15°. Automatic advance begins at 200 R.P.M. and reaches a maximum of 15° at 2800 R.P.M. Breaker arm spring tension is 18-20 ounces.

Mounting:—Ignition coil is mounted in the frame, right hand side rail, adjacent to generator. Distributor is mounted on generator at rear end and driven by armature shaft. To remove distributor, disconnect primary lead and remove distributor head with high tension cables intact. Then remove screw from manual advance arm and lift distributor from place.

Oiling:—Fill the oiler on the side of the distributor housing with light engine oil every month or each 1000 miles. Put one drop of oil on the breaker arm pivot pin and place a small bit of heavy grease on the face of the breaker cam every month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 1½ inches (on the flywheel) before top dead center with the manual spark control lever in the fully advanced position. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance spark control lever and continue to crank engine until the mark 'IGN' on the flywheel is opposite the pointer in the flywheel case. This mark is 1½ inches before the top dead center mark 'DC'. If breaker contacts do not separate at this point, loosen advance lever clamp screw and rotate distributor housing until contacts begin to separate. This can be checked by connecting a six volt lamp in ignition circuit or by watching dash ammeter. Tighten the clamp screw after making the adjustment and see that the rotor is opposite the segment connected to the spark plug in cylinder No. 1.

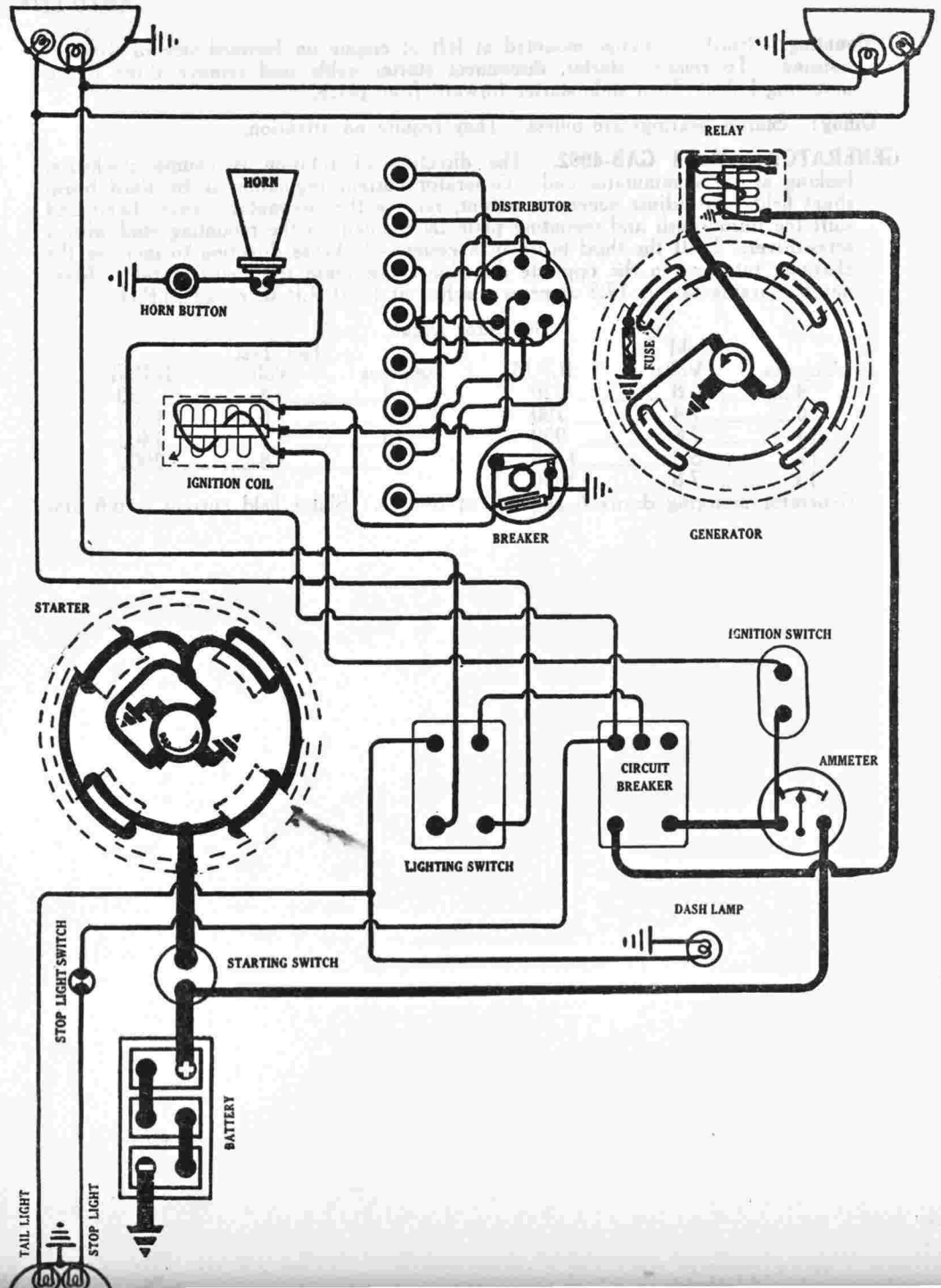
Valve Timing:—INLET VALVES:—Head diameter, 1⅝ inches; stem diameter, .3715-.3705 inch; valve length, 6 1/32 inches (from top of seat to end); valve lift, 5/16 inch; spring pressure, 60 pounds on the outer spring and 20 pounds on the inner or a total of 80 pounds; tappet clearance, .006-.004 inch (hot); inlet valves open 12° past top dead center and close 40° after lower dead center.

EXHAUST VALVES:—Head diameter, 1½ inches; stem diameter, .3715-.3705 inch; valve length, 6 1/32 inches (from top of seat to end); valve lift, 5/16 inch; spring pressure, 60 pounds on the outer spring and 20 pounds on the inner or a total of 80 pounds; tappet clearance, .006-.004 inch (hot); exhaust valves open 40° before lower dead center and close 8° after top dead center. This point is marked on the flywheel by the mark '#1-EX.CL.' Valve stem guides are removable. Oversize valve stems are made on order.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are ⅞ inch. Gaps are .025 inch.

STARTER:—Model 937. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter switch is Model S-203. Brush spring tension is 1½ pounds each. Starter cranks the engine at 93 R.P.M.



JORDAN

MODEL AA (1927)

AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2000	6	60
22 "	Lock	3.5	500

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect starter cable and remove three flange mounting bolts. Then slide starter forward from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model 1261. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and the hexagonal headed screw holding the third brush mounting plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. The maximum charging rate is 16-18 amperes reached at 1300 R.P.M. of the generator armature or 23 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.75	550	0	6.5	625
7	7.0	700	2.5	6.5	700
12	7.6	850	8	7.5	900
17	8.0	1300	13	8.0	1300
12.6	8.0	2000	11	8.0	2000
9.5	7.6	2800	9	7.0	2800

Motoring freely, generator draws 6 amperes at 6 volts. Shunt field current is 6.1-6.8 amperes at 6 volts. Brush spring tension is 1½ pounds.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles.

RELAY:—Relay is mounted on top of the generator. Relay closes at 500-600 R.P.M. when the generator voltage reaches 6.5-7.5 volts and opens with a discharge current of 0.3 amperes at 400-500 R.P.M. Charging current at closing of contacts must not exceed 3 amperes. Relay contacts separate .015 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING:—Kellogg Switch Model 404. Head and stop lamps are each 6-8 volt, 21 cp. S.C. Auxiliary head lamps are 6-8 volt, 6 cp. S.C. Dash and tail lamps are each 6-8 volt, 2 cp. S.C.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the back of the switch. It protects the lighting and horn circuits. Ignition current does not pass through the circuit breaker.

FUSES:—Generator field fuse is 7.5 amperes.

JORDAN

MODEL R "LITTLE CUSTOM SIX" (1927)
SERIES DE000S AND SD000S
AUTO-LITE GENERATING, STARTING AND LIGHTING YSTEM
AUTO-LITE IGNITION

BATTERY:—Willard, Type WR-13, 6 volt. Starting capacity is 98 amperes for 20 minutes. Lighting capacity is 5 amperes for 17 hours. The negative (—) terminal is grounded. Battery is mounted under the driver's seat.

IGNITION:—Coil Model IG-4065. Distributor Model IGA-4013. Breaker contacts separate .018 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 15°. Automatic advance begins at 300 R.P.M. and reaches a maximum of 15° at 2800 R.P.M. Breaker arm spring tension is 18-20 ounces. Ignition current is 1-3 amperes with engine running and 3.4-5 amperes with engine stopped.

Mounting:—Ignition coil is mounted on the dash. Distributor is mounted on top of the cylinder block and can be removed from the left side. To remove distributor, disconnect primary lead and remove distributor head with high tension cables intact. Then remove screw from manual advance arm and lift distributor from place.

Oiling:—Put 10 drops of light engine oil in the oiler on the side of the distributor housing every month or each 1000 miles. At the same time put 5 drops of oil in the oiler on the end of the breaker cam shaft in the distributor head. Every 3000 miles put a small amount of vaseline on the face of the breaker cam under the fiber bumper of the contact arm.

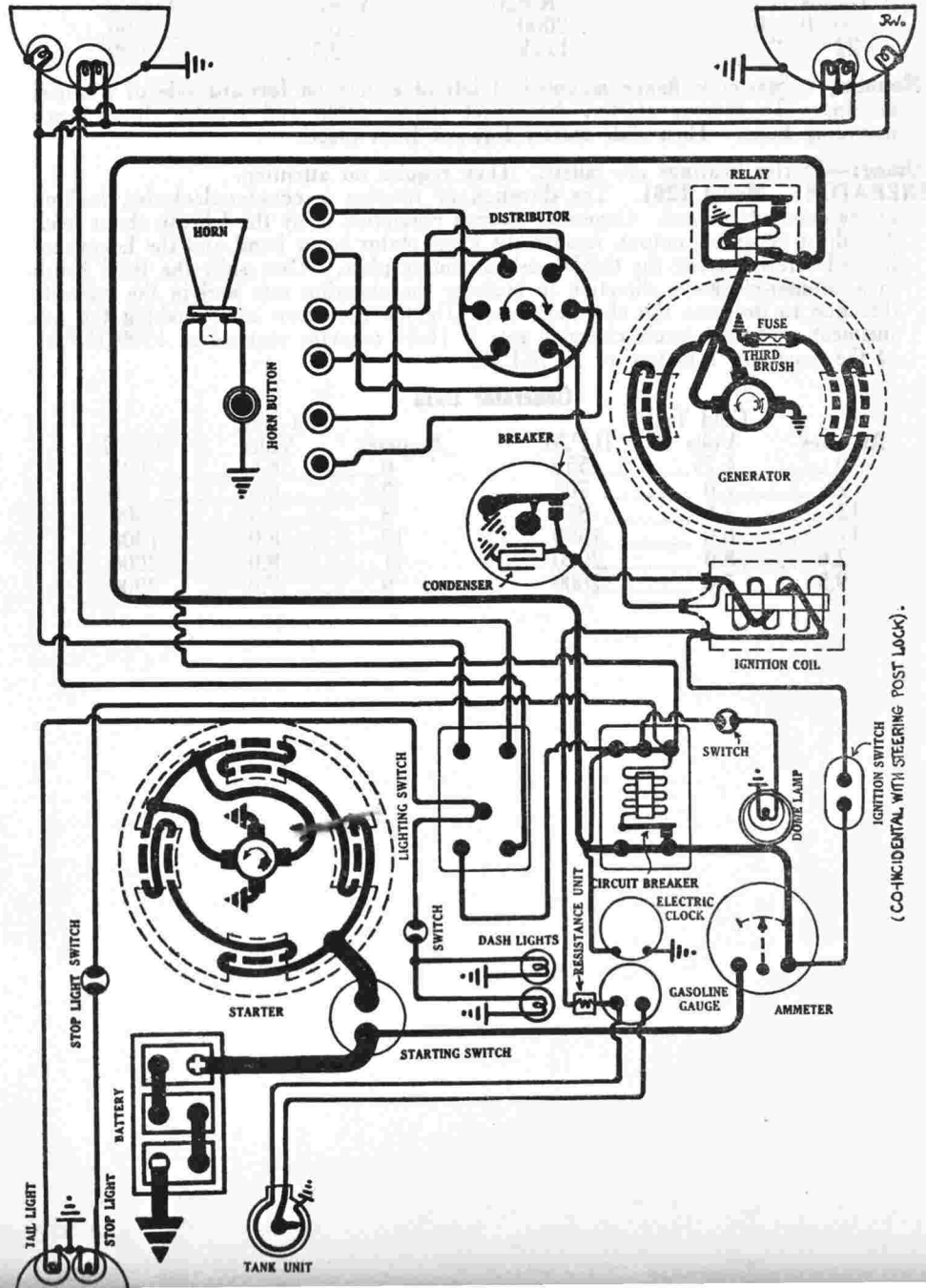
Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 1⅜ inches before top dead center (on the flywheel) with the spark control lever in the fully advanced position. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Make certain that the manual advance lever is in the fully advanced position. Then remove the clutch inspection plate and continue to crank engine until the mark 'IGN' on the flywheel is under the pointer stud in the flywheel case. This mark is 1⅜ inches before the top dead center mark. The breaker contacts should begin to separate at this point. Loosen the manual advance arm clamp screw and rotate the distributor cup until the contacts begin to separate. Tighten the clamp screw and make certain that the rotor is under the segment connected to the spark plug in cylinder No. 1.

Valve Timing:—INLET VALVES:—Head diameter, 1 9/16 inches; stem diameter, .34025-.33925 inch; valve length, 5 11/32 inches (from top of seat to end); valve lift, 5/16 inch; spring pressure, 103 pounds; tappet clearance, .004-.006 inch (hot); inlet valves open 5° after top dead center and close 45° after lower dead center.
EXHAUST VALVES:—Head diameter, 1 7/16 inches; stem diameter .34025 .33925 inch; valve length, 5 11/32 inches (from top of seat to end); valve lift, 5/16 inch; spring pressure, 103 pounds. Exhaust opens 40° before lower dead center and closes 5° after top dead center. This point is marked on the flywheel '1-EX-CL'. Valve stem guides are removable. Oversize valve stems are made on order.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are Champion No. 4. Gaps are .030 inch.

STARTER:—Model MN-4124. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension is 1¼-1½ pounds each. Starter switch is Model SW-4002.



JORDAN

MODEL R 'LITTLE CUSTOM SIX' (1927)
SERIES DE000S AND SD000S
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	5.5	45 (Without Bendix)
0 "	Free	5.5	50 (With Bendix)
.5 "	2800	5.5	100
2.4 "	1450	5.0	200
4.8 "	950	4.5	300
7.2 "	650	4.0	400
13.6 "	Lock	3.0	540

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect starter cable and remove three flange mounting cap screws. Then slide starter forward from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GYA-4207. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, remove the commutator cover band and shift the third brush mounting plate by tapping on the third brush stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The mounting plate is held in any desired position by friction between the mounting stud and the generator end plate. Maximum charging rate is 19 amperes (cold) reached at 1300 R.P.M. or 23 M.P.H.

Generator Data

Cold Test			Hot Test	
Amperes	Volts	R.P.M.	Amperes	R.P.M.
2	6.6	620		
5	7.0	700	2	700
10	7.3	860	5	840
14	7.7	1050	10	1100
16	7.9	1200	14	1600
19	8.0	1300		

Generator motoring draws 5 amperes at 6 volts. Shunt field current is 3.8 amperes at 6.2 volts. Brush spring tension is 1¼-1½ pounds each.

Mounting:—Generator is flange mounted at right of engine at rear of timing chain case. To remove generator, disconnect generator lead and loosen chain adjustment jamb nut and adjusting screw on side of generator flange. Then remove two flange mounting cap screws and slide generator to the rear.

Oiling:—Put 5 or 6 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles.

RELAY:—Model CB-4011. Relay is mounted on top of the generator. Relay closes at 620-690 R.P.M. when the generator voltage reaches 7-7.5 volts, and open with a discharge current of ½-2½ amperes each. Charging current is 2 amperes at closing of contacts. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING:—Kellogg Switch Model 409. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Stop lamp is 6-8 volt, 15 cp. S.C. Auxiliary head lamps are 6-8 volt, 3 cp. S.C. Dome lamp is 6-8 volt, 6 cp. S.C. Instrument board lamps and tail lamp are each 6-8 volt, 3 cp. S.C.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the dash. It protects the lighting circuits.

JORDAN

MODEL JE (1928) SERIAL NUMBERS 125001 UP
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—Willard, Type CWR-15, 6 volt, 15 plates. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 114 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted under the driver's seat.

IGNITION:—Coil Model IG-4078. Coil is mounted on the right frame member at the right of the engine. Ignition current is 1.2 amperes at 6.2 volts with engine running at 2200 R.P.M. and 4.8 amperes (cold) or 4.4 amperes (hot) at 6.2 volts with engine stopped.

Distributor Model IGD-4001:—Breaker contacts separate .018-.020 inch. To adjust contact gap, loosen lock screw and turn contact screw with a screwdriver. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-20 ounces at the contact points. Distributor is semi-automatic. Maximum manual advance is 25 degrees of distributor. Automatic advance begins at 500 R.P.M. of engine. Maximum automatic advance is 20 degrees (engine) reached at 3400 R.P.M.

Mounting:—Distributor is mounted on rear of generator at right of engine. To remove distributor, disconnect manual advance rod and primary lead and remove distributor head with cables intact. Remove clamp screw from manual advance arm and lift distributor from place.

Oiling:—Put 8 or 10 drops of light oil in the oiler on the side of the distributor housing every 1000 miles. Put 5 drops of oil on the breaker arm pin every 500 miles. Every 3000 miles put a small amount of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 1½ inches (on the flywheel) before top dead center with the manual advance lever fully advanced. To set timing, crank engine until piston No. 1 enters compression stroke (this is the upstroke with both valves closed). Then fully advance spark lever and remove inspection hole cover on flywheel case. Continue to crank engine until flywheel mark 'IGN' is opposite indicator on flywheel case. This mark is 1½ inches before the top dead center position. Then loosen advance arm clamp screw and rotate distributor until contacts begin to separate. Tighten the clamp screw. Connect the segment opposite the rotor to the spark plug in cylinder No. 1 and connect the remaining plugs in order 6-2-5-8-3-7-4 clockwise around the distributor head.

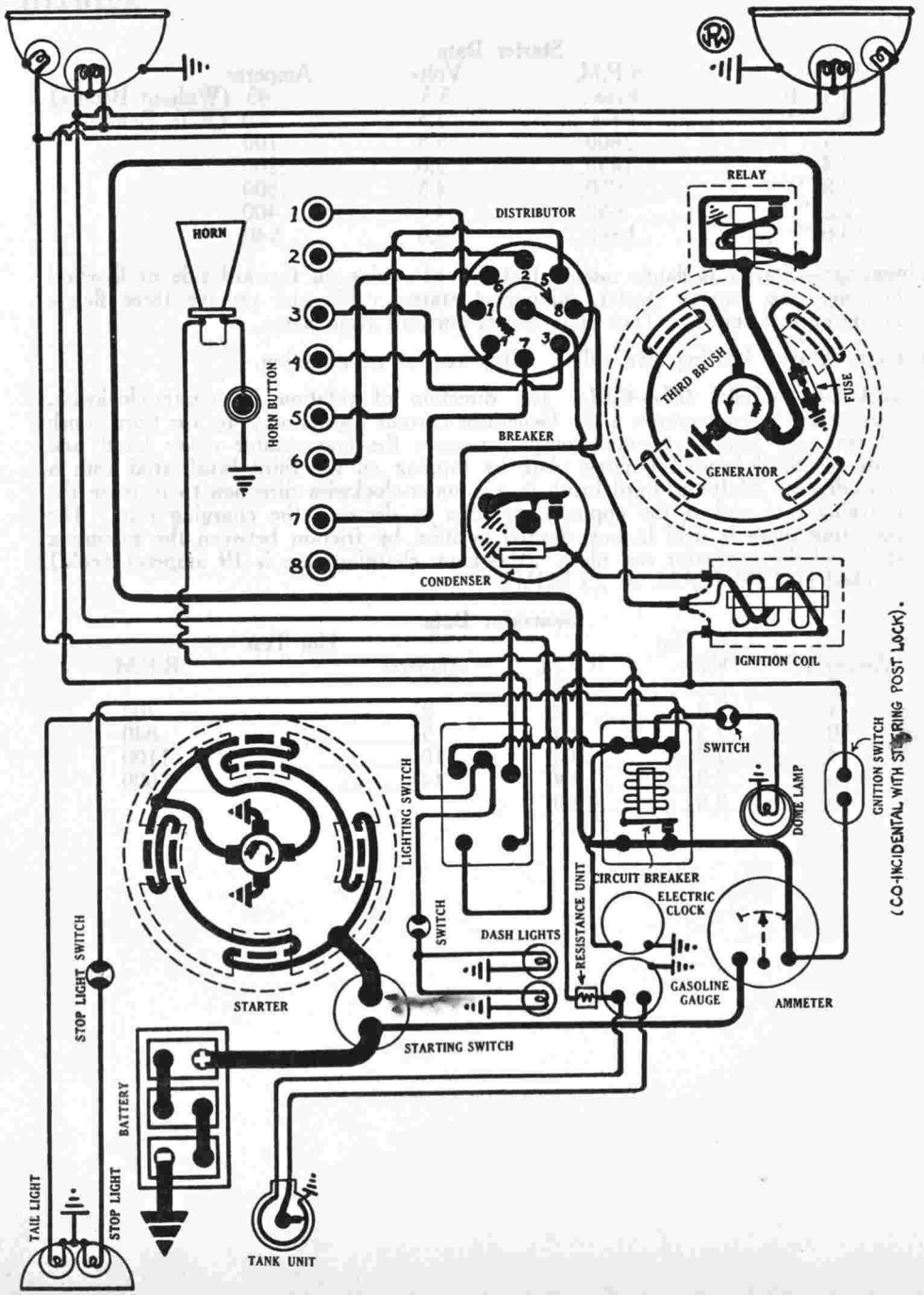
Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are .025 inch.

VALVE TIMING:—Specifications:—Head diameter, 1½ inches (inlet valves), 1⅜ inches (exhaust valves); stem diameter, .3095-.3085 inch; length, 5 61/64 inches (from top of head to end). Valve lift, 5/16 inch. Tappet clearance, .006-.004 inch (hot). Spring pressure, 61 pounds outer spring and 26 pounds inner spring or 87 pounds total. Valve stem guides are removable. Oversize valve stems are made.

Timing:—Inlet valves open 8 degrees past top dead center and close 40 degrees past lower dead center. Exhaust valves open 40 degrees before lower dead center and close 8 degrees past top dead center. Inlet opening and exhaust closing point is indicated by mark '#1-EX.CL'.

STARTER:—Model MUA-4003. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, looking at the commutator end Starter switch is Model SW-3646. Brush spring tension is 1½ pounds each.



JORDAN

MODEL JE (1928) SERIAL NUMBERS 125001 UP
AUTO-LITE GENERATING AND STARTING SYSTEM
AUTO-LITE IGNITION

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2000	6	60
22 "	Lock	3.5	500

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel case. To remove starter, disconnect cable and remove 3 flange mounting cap screws. Then slide starter forward and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GAG-4105. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove commutator cover band and shift third brush by tapping on mounting stud with a screwdriver. Shift third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush is held in any position by friction between the mounting stud and the end plate. The maximum charging rate is 18 amperes at 8 volts reached at 1400 R.P.M. or 23-24 miles per hour.

Generator Data

Amperes	Volts	R.P.M.
0	6.4	475
4	6.75	575
8	7.1	700
12	7.45	850
16	7.8	1050
18	8.0	1300

Motoring geenrator draws 5 amperes at 6 volts. Shunt field current is 4.5 amperes at 6 volts. Brush spring tension is 22-28 ounces.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect all ignition wiring or remove distributor. Then disconnect generator lead and remove three nuts from flange mounting bolts. Slide generator to rear and lift from place. Be careful not to disturb timing chain.

Oiling:—Put 4 or 5 drops of light oil in each of the generator oilers every 500 miles.

RELAY:—Model CB-4012. Relay is mounted on the generator. Relay closes at 7-8 M.P.H. at 550 R.P.M. of armature when generator voltage reaches 6.5-7 volts and opens with a discharge current of ½-2½ amperes. Charging current at closing of contacts must not exceed 3 amperes. Relay contacts separate .030 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Kellogg Switch Model 418. Switch is mounted on the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dome light is 6-8 volt, 6 cp. S.C. Mazda No. 81. Auxiliary head lights (in head lamps) are 6-8 volt, 3 cp. S.C. Mazda No. 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Generator field fuse is 7.5 amperes capacity.

JORDAN

CROSS COUNTRY SIX MODEL RE (1928)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—Willard, Type WR-13, 6 volt. Starting capacity is 98 amperes for 20 minutes. Lighting capacity is 5 amperes for 17 hours. The negative (—) terminal is grounded. Battery is mounted under the driver's seat.

IGNITION:—Coil Model IG-4065. Ignition current is 1-3 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped.

Distributor Model IGB-4011. Breaker contacts separate .020-.025 inch. Set contact opening by loosening lock nut on stationary contact stud and turning up stud until proper opening is secured with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 15 degrees. Automatic advance begins at 300 R.P.M. Maximum automatic advance is 15 degrees reached at 2800 R.P.M.

Mounting:—Ignition coil is mounted on the dash. Distributor is mounted on top of the cylinder block and can be removed from the left side. To remove distributor, disconnect primary lead and remove distributor head with high tension cables intact. Then remove screw from manual advance arm and lift distributor from place.

Oiling:—Put 10 drops of light engine oil in the oiler on the side of the distributor housing every month or each 1000 miles. At the same time put 5 drops of oil in the oiler on the end of the breaker cam shaft in the distributor head. Every 3000 miles put a small amount of vaseline on the face of the breaker cam under the fiber bumper of the contact arm.

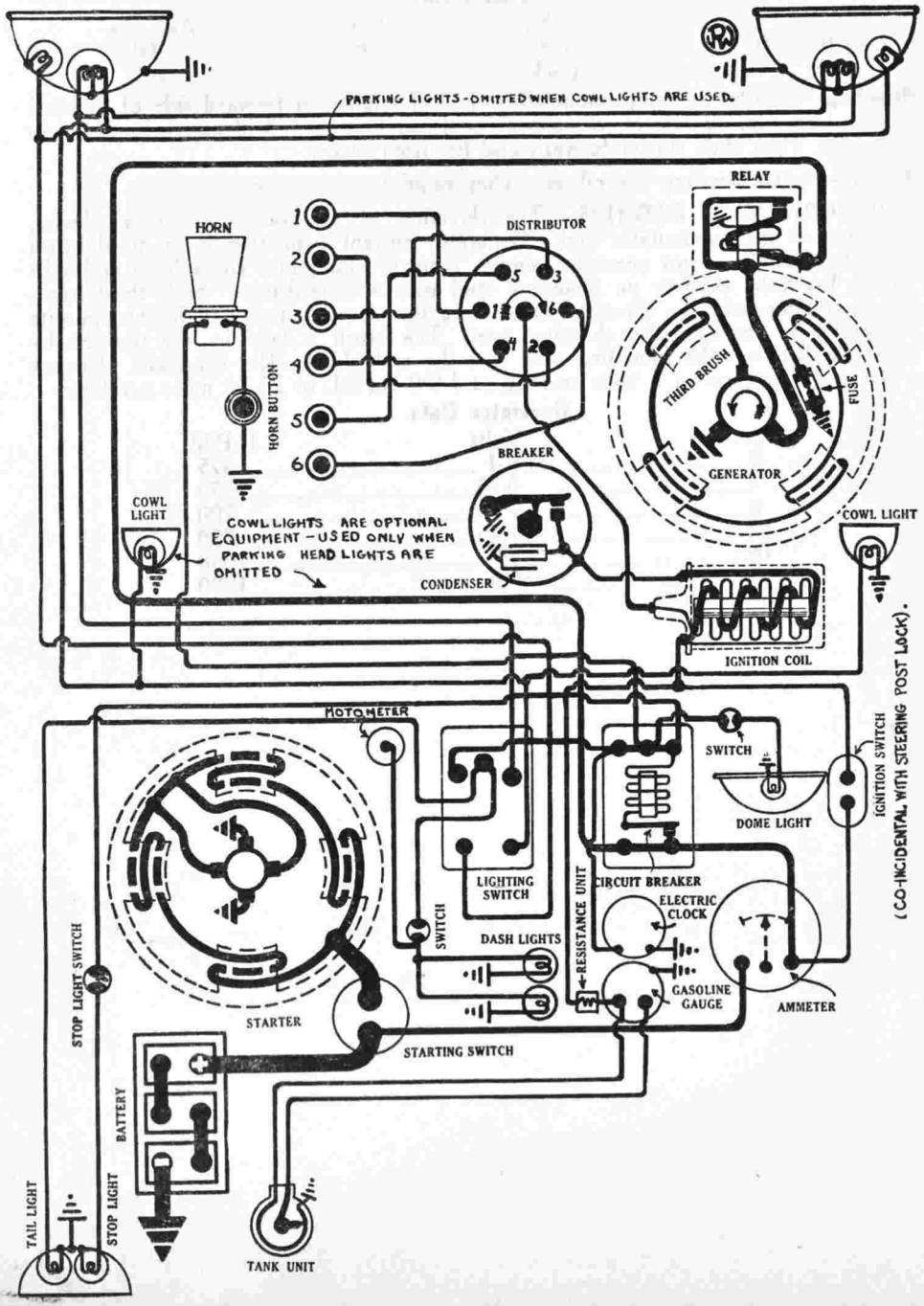
Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 1⅜ inches before top dead center (on the flywheel) with the spark control lever in the fully advanced position. To set timing crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Make certain that the manual advance lever is in the fully advanced position. Then remove the clutch inspection plate and continue to crank engine until the mark 'IGN' on the flywheel is under the pointer stud in the flywheel case. This mark is 1⅜ inches before the top dead center mark. The breaker contacts should begin to separate at this point. Loosen the manual advance arm clamp screw and rotate the distributor cup until the contacts begin to separate. Tighten the clamp screw and make certain that the rotor is under the segment connected to the spark plug in cylinder No. 1.

Valve Timing:—INLET VALVES:—Head diameter, 1 9/16 inches; stem diameter, .34025-.33925 inch; valve length, 5 11/32 inches (from top of seat to end); valve lift, 5/16 inch; spring pressure, 103 pounds; tappet clearance, .004-.006 inch (hot); inlet valves open 5° after top dead center and close 45° after lower dead center.

EXHAUST VALVES:—Head diameter, 1 7/16 inches; stem diameter, .34025-.33925 inch; valve length, 5 11/32 inches (from top of seat to end); valve lift, 5/16 inch; spring pressure, 103 pounds. Exhaust opens 40° before lower dead center and closes 5° after top dead center. This point is marked on the flywheel '1-EX-CL'. Valve stem guides are removable. Oversize valve stems are made on order.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are Champion No. 4. Gaps are .030 inch.



JORDAN

CROSS COUNTRY SIX MODEL RE (1928)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

STARTER:—Model MN-4124. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension is 1¼-1½ pounds each. Starter switch is Model SW-4002.

Starter Data

Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	Free	5.5	45	(Without Bendix)
0 "	Free	5.5	50	(With Bendix)
.5 "	2800	5.5	100	
2.4 "	1450	5.0	200	
4.8 "	950	4.5	300	
7.2 "	650	4.0	400	
13.6 "	Lock	3.0	540	

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect starter cable and remove three flange mounting cap screws. Then slide starter forward from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GAG-4110. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush and mounting plate by tapping on the third brush mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The mounting plate is held in any position by friction between the mounting stud and the end plate. The maximum charging rate is 16 amperes at 8 volts reached at 1350 R.P.M. or 23 miles per hour.

Generator Data

Amperes	Volts	R.P.M.
2	6.6	525
6	6.9	625
10	7.3	735
14	7.65	900
17	8.0	1350
12	7.45	2125

Brush spring tension is 24-32 ounces. Generator motoring draws 4.75-5.25 amperes at 6 volts. Shunt field current is 3.9-4.4 amperes at 6 volts.

Mounting:—Generator is flange mounted at right of engine at rear of timing chain case. To remove generator, disconnect generator lead and loosen chain adjustment jamb nut and adjusting screw on side of generator flange. Then remove two flange mounting cap screws and slide generator to the rear.

Oiling:—Put 5 or 6 drops of light engine oil in the oiler at each of the generator every 1000 miles.

RELAY:—Model CB-4011. Relay is mounted on top of the generator. Relay closes at 620-690 R.P.M. when the generator voltage reaches 7-7.5 volts, and open with a discharge current of ½-2½ amperes each. Charging current is 2 amperes at closing of contacts. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING:—Kellogg Switch Model 409. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Auxiliary head lights (or side lights used as optional equipment) are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dome light is 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the dash. It protects the lighting circuits.

KANKAKEE

7-N ENGINE (1919)
9-N ENGINE (1920-21)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—6 volt. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2159. Distributor Model No. 5215. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard emery stone.

Oiling.—Put 4 or 5 drops of light engine oil in each of the distributor head oilers every two weeks. If the track of the rotor button is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1⅜ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Fiing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .030 inch.

STARTER:—Model No. 102, 179. Starter is connected to the engine through a Bendix drive.

Oiling.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month. Remove the grease plug in the reduction gear housing and inject soft cup grease every six months.

GENERATOR:—Model No. 101, 180. Generator current regulation is by the third brush system. Maximum current output of 11-15 amperes is reached at 1200 R.P.M. of the armature or 18-24 miles per hour.

Amperes	Generator Data	R.P.M
4		800
8		1000
11-15		1200
11-14		**2000**
8-12		2300

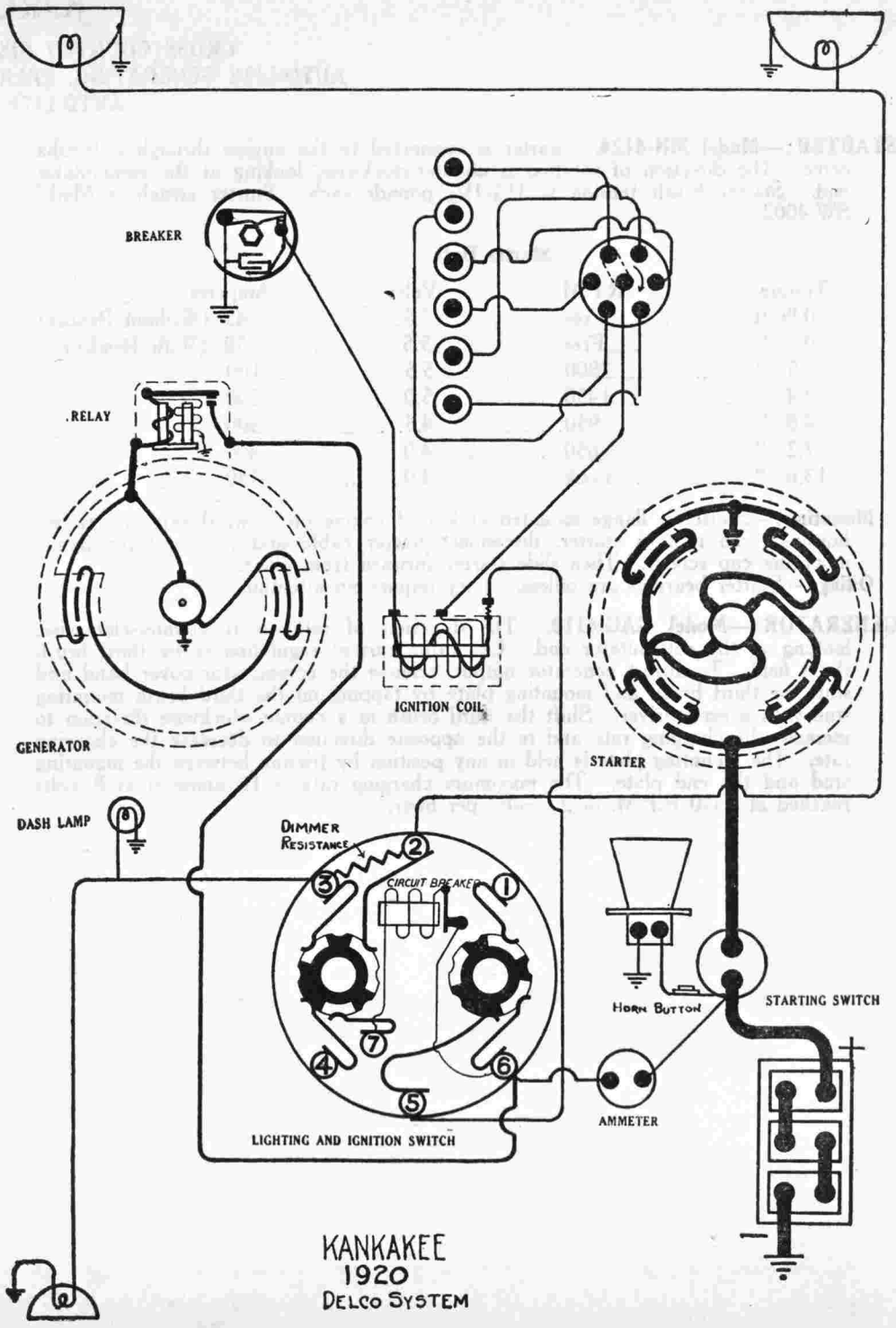
Charging rate is varied by adjusting third brush setting. Loosen the three screws holding the third brush plate and move the third brush in a counter-clockwise direction (looking at the commutator end) to increase the charging rate. Move the brush in the opposite direction to decrease the charging rate. Tighten the screws and reseat the brush after adjusting position.

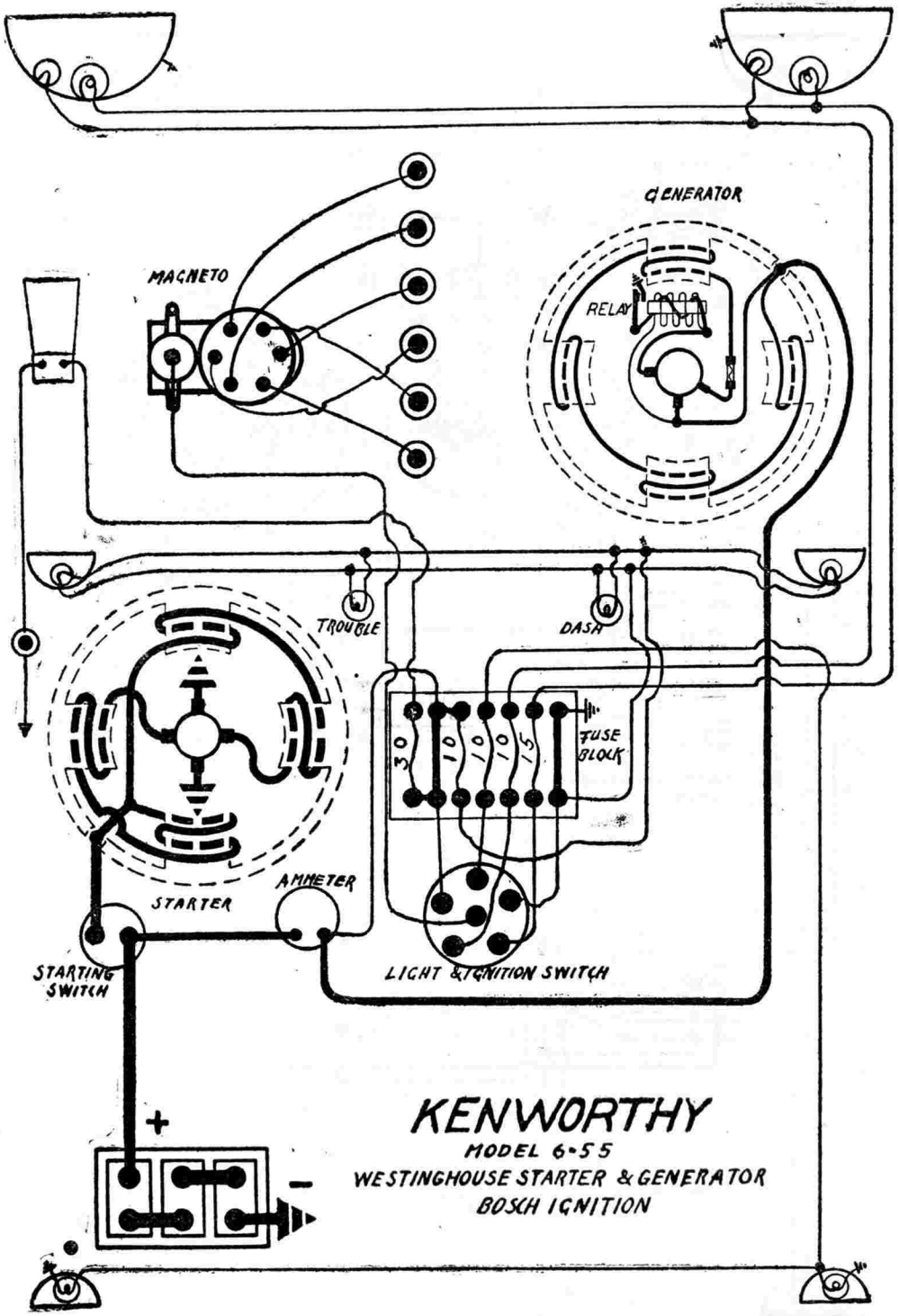
Oiling.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on generator frame. Relay closes at 8-9 and opens at 5-7 miles per hour. Relay contacts separate .046 to .062 inch. Air gap between relay armature (moving member) and coil core is .020 to .035 inch, contacts closed. To adjust relay, connect a voltmeter between the positive generator brush and ground. Then slowly speed up the generator and adjust the relay spring tension by turning the thumb screw until the relay contacts close when the voltmeter indicates 7.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash, tail, tonneau and step lamps are 6-8 volt, 2 cp. Dome lamp is 6-8 volt, 5 cp. Dash, dome and step lamps have double contact base. All other lamps have single contact base.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start the vibrator, but 3-5 amperes will cause it to continue.





KENWORTHY

MODEL 6-55 (1920-21)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM

BOSCH IGNITION

BATTERY.—Exide, 6 volt, 140 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Type DU-6. Breaker contacts separate .014 to .016 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 2 or 3 drops of light engine oil in the magneto oilers every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUGS.—Diameter, 7/8 inch. Spark gaps are .020 to .025 inch.

STARTER.—Frame No. 751. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 115-120 R.P.M.

Starter Data

Torque	R.P.M.	Amperes
2.5 lb. ft.	1450	140
7.5 lb. ft.	1150	200
12.5 lb. ft.	650	400
17.5 lb. ft.	500	530
21.0 lb. ft.	Lock	650

OILING.—Put 5 or 6 drops of light engine oil in the starter bearing oilers every month.

GENERATOR.—Frame No. 760.—Generator current regulation is by the third brush system. Maximum current output is 15-17 amperes, reached at 1250 R.P.M. of the armature or 16-20 miles per hour.

Generator Data

Amperes	Cold Test	R.P.M.	Amperes	Hot Test	R.P.M.
0		450	0		500
8		675	6		725
12		840	9		850
15-17		1250	12-14		1250
10		2000	7- 8		2000

The cold test readings are obtained with a generator temperature under 95°F. The hot test readings are obtained after the generator has been operated one hour at 1800 R.P.M., charging a half-charged battery. Shunt field current is 2.8 to 3.25 amperes at 6 volts. When the generator is operating freely as a motor, current is 3.5 to 5 amperes at 6 to 6.6 volts.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in the generator frame. Relay closes at 500-550 R.P.M. of the armature or 7-9 miles per hour and opens at 450-500 R.P.M. of the armature or 5-7 miles per hour. Adjust the spring tension on the relay armature so that the contacts open with a discharge current of 0-3 amperes. Adjust the air gap between the relay armature and coil core so that the contacts close when the voltage of the generator reaches 6.2 to 6.5 volts. Air gap between relay armature and coil core is .005 inch, contacts closed. Contacts separate .030 to .035 inch. Resistance of the shunt coil is 68 ohms. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again puting into cervice.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer and side lamps are 6-8 volt, 5 cp. Dash and tail lamps 6-8 volt, 2 c.p.

KING

MODEL C (1915) SERIAL NOS. 2200 TO 3200
MODEL D (1915-16). SERIAL NOS. 5000-8000
WARD LEONARD GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The two-wire system is used.

IGNITION.—Breaker contacts separate .010 to .012 inch. They are made of tungsten. When condition of contacts affects ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put a drop of light machine oil on each of the wearing parts of breaker and 4 or 5 drops in the hole beside notched shaft every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

TIMING.—Breaker contacts separate when piston entering power stroke is on top dead center, spark control in the fully retarded position.

FIRING ORDER.—The firing order is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

SPARK PLUG GAPS.—Spark plug gaps are .027 to .031 inch.

STARTER.—Starter is connected to engine through a Bendix drive.

OILING.—Put 3 or 4 drops of light engine oil in oil hole on top of rear starter bearing every month. Every three months remove cup under bearing and repack with vaseline.

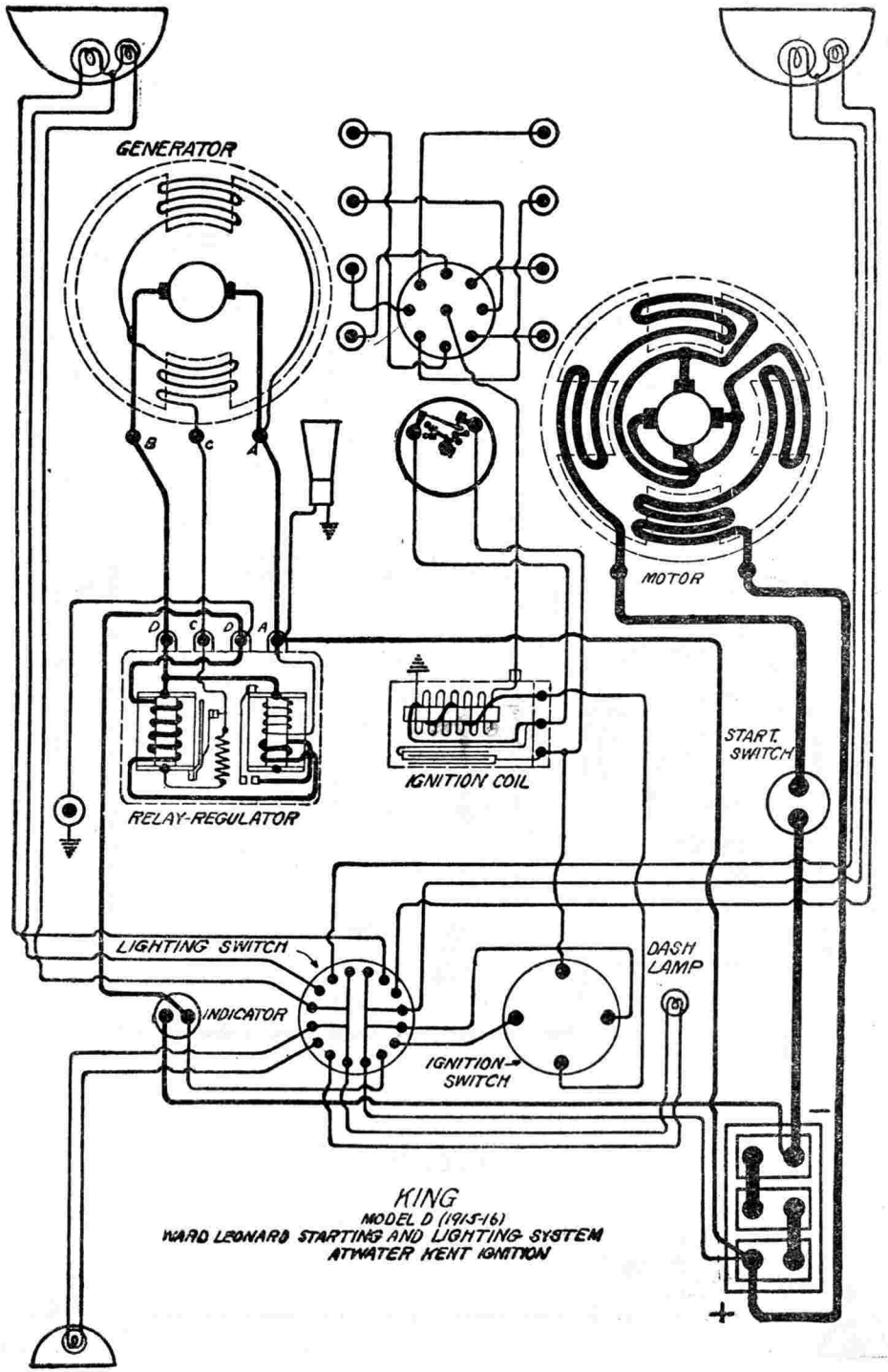
GENERATOR.—Generator current regulation is by a vibrating regulator. Relay is combinder with regulator. Maximum charging rate is 12-14 amperes reached at 20 miles per hour.

OILING.—Put 2 or 3 drops of light engine oil in rear generator bearing oiler every month. If car is driven more than 1000 miles in a month, oiling must be done every 1000 miles. Thoroughly clean out bearing and repack with soft cup or ball bearing grease every six months.

RELAY-REGULATOR.—Relay closes at 9-10 and opens at 8-9 miles per hour. Charging current is 1-3 amperes at closing and the discharge current 0-1 ampere at opening of relay. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service. Increasing spring tension on regulator armature increases output. Decreasing spring tension decreases output.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

FUSES.—Fuses are 10 ampere.



KING

MODEL E (1916) SERIAL NOS. 12,000 TO 14,950
WARD-LEONARD GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER-KENT IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION:—Breaker contacts separate .010 to .012 inch. They are made of tungsten. When condition of contacts affects ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling:—Put a drop of light machine oil on each of the wearing parts of breaker and 4 or 5 drops in the hole beside notched shaft every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Timing:—Breaker contacts separate when piston entering power stroke is on top dead center, spark control in the fully retarded position.

Firing Order:—The firing order is 1R-4L-3R-2L-4R-1L-2R-3L.

Spark Plug Gaps:—Spark plug gaps are .027 to .031 inch.

STARTER:—Starter is connected to engine through a Bendix drive.

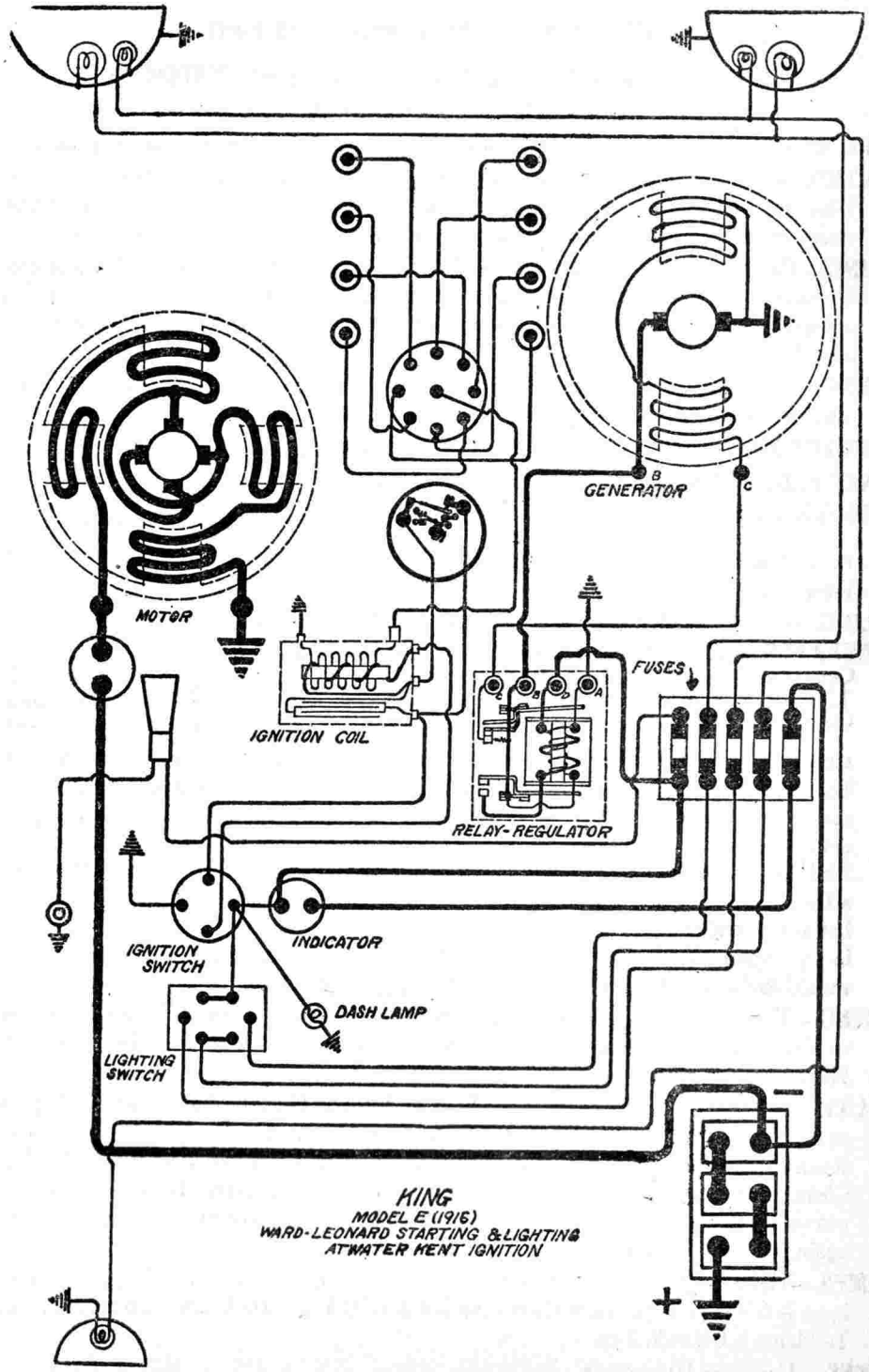
Oiling:—Put 3 or 4 drops of light engine oil in oil hole on top of rear starter bearing every month. Every three months remove cup under bearing and repack with vaseline.

GENERATOR:—Generator current regulation is by a vibrating regulator. Relay is combined with regulator. Maximum generator output of 10 amperes is reached at 15 miles per hour.

Oiling:—Put 2 or 3 drops of light engine oil in rear generator oiler every month. If car is driven more than 1000 miles in a month, oiling must be done every 1000 miles. Thoroughly clean out bearing and repack with soft cup or ball bearing grease every six months.

RELAY-REGULATOR:—Relay closes at 9-10 and opens at 8-9 miles per hour. Charging current is 1-3 amperes at closing and the discharge current 0-1 ampere at opening of relay. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before putting into service. Increasing spring tension on regulator armature increases output. Decreasing spring tension decreases output.

LAMPS:—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.



KING

MODEL EE (1917-18), F AND G (1918-19)

BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER-KENT IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .005 to .008 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put several drops of light engine oil in the oil hole, exposed when distributor cap is removed, every two weeks. Put a very small amount of vaseline on the cam, applying with a toothpick. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever ½ inch from the fully retarded position.

FIRING ORDER.—The firing order is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER:—Type ED-160, M 794, M 908 or M 909. Starter is connected to engine through a Bijur automatic pinion shift. Rotation is clockwise viewed from commutator end.

OILING.—Put several drops of light engine oil in each of starter bearing oilers every month

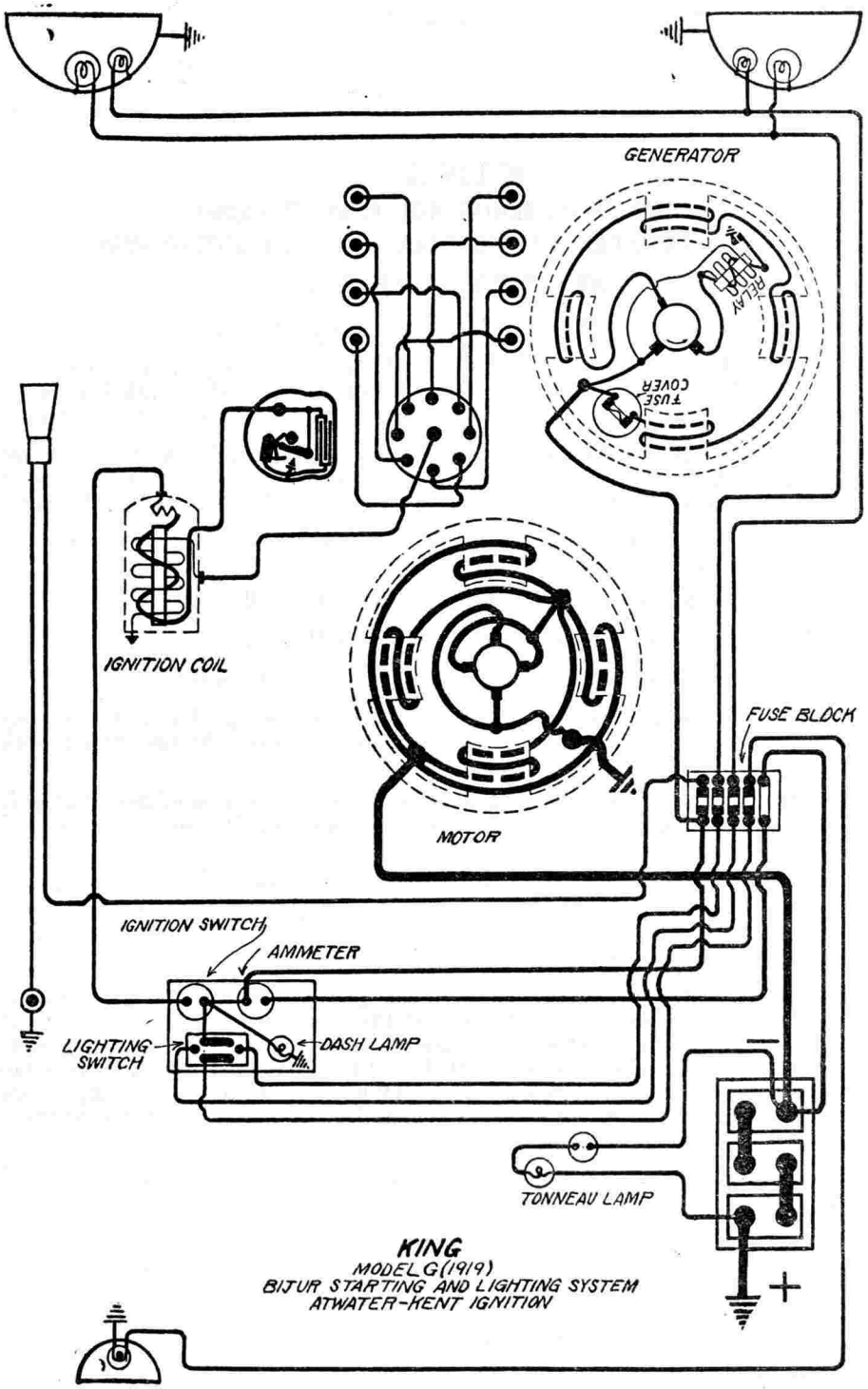
GENERATOR:—Type L61, M-741 or M-1088. Anti-clockwise rotation, commutator end. Generator current regulation is by third brush system. Maximum generator output is 12-16 amperes, reached at 20-25 miles per hour, or 1400-1600 R.P.M. of armature. Output is varied by shifting third brush. Third brush is secured to generator by two stud bolts, the nuts of which appear in a recess in the front head of generator. Loosen these nuts with a socket wrench and shift the brush by gently tapping the shank of the wrench. Shifting brush in the direction of armature rotation will increase the output. Shifting brush in the opposite direction will decrease the output. Shifting the brush 1/16 inch will vary the output 2 or 3 amperes. Tighten nuts after adjusting brush. Brush adjustment is made to give the desired rate with generator hot and charging a 3 cell battery, reading 1.250 or above. There is a 10 ampere fuse in the small aluminum cap on generator housing to protect generator windings, should excessively high resistance occur in the charging circuit.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

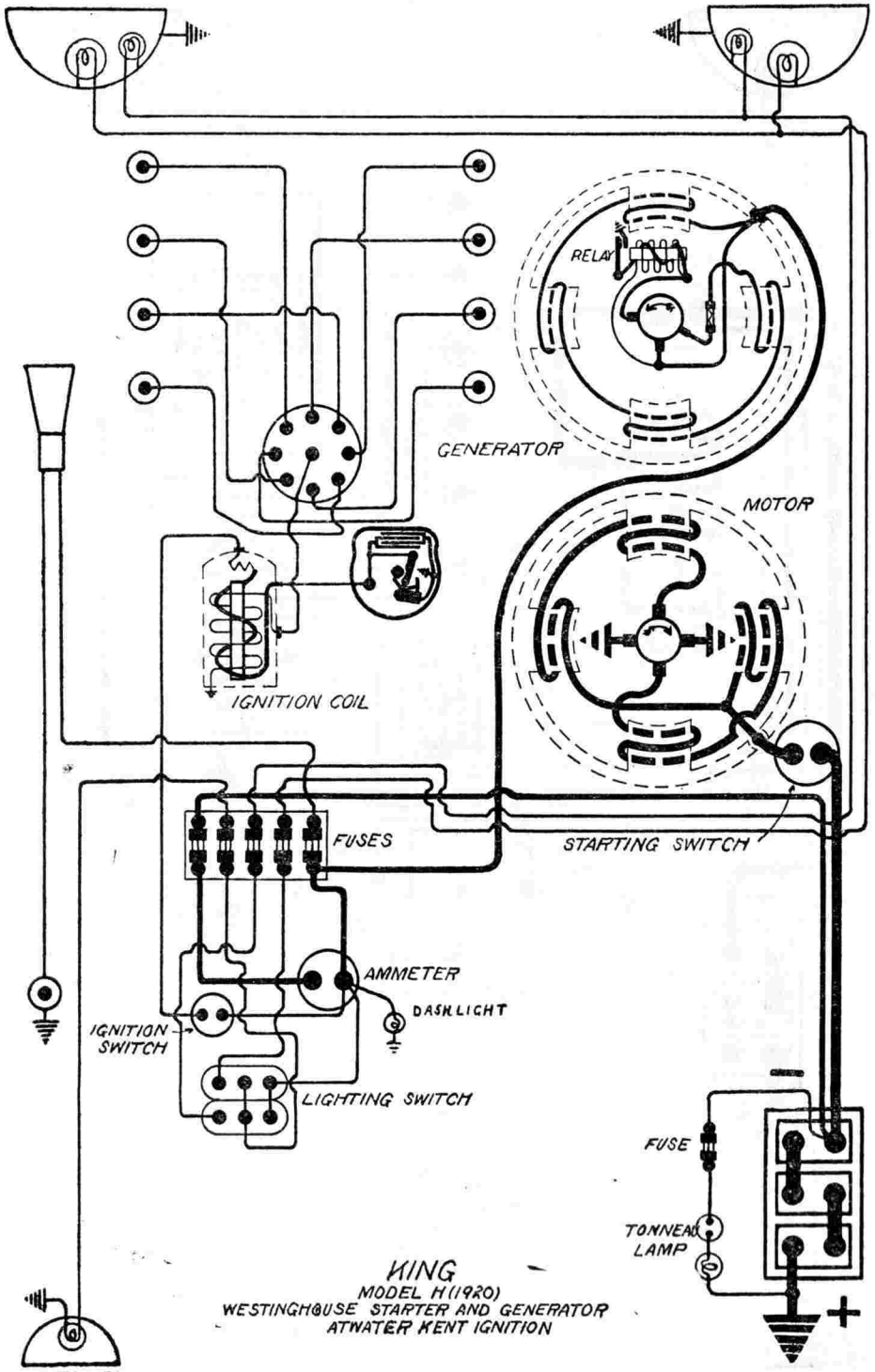
RELAY.—Relay closes at 10-12 miles per hour or 500-600 R.P.M. of armature, and opens at 8-10 miles per hour, or 450-500 R.P.M. of armature. The charging current is 1 to 3 amperes at closing and the discharge current 0 to 1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 4 cp. Tonneau lamp is 6-8 volt, 4 cp. Inspection lamp is 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

FUSES.—Fuses are 10 amperes.



KING
MODEL G (1919)
BIJUR STARTING AND LIGHTING SYSTEM
ATWATER-KENT IGNITION



KING

MODEL G, H, J, K (1920-21-22-23)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY.—Prest-O-Lite, Type 615-RHN, 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type CC. Breaker contacts separate .006 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oilstone.

OILING.—Remove the distributor cap every two weeks and put 4 or 5 drops of light engine oil in the exposed oil hole. Put a small amount of vaseline on the cam, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Frame No. 100. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 125 R.P.M., taking 250 amperes. Lock torque is 12 pound-feet, current being 475 amperes at 4 volts. Running freely, starter takes 75 amperes, armature revolving 4000 R.P.M.

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR:—Frame No. 150 and 35-AT. Generator current regulation is by the third brush system. Maximum current output is 15-16 amperes at 7.5 volts, reached at 1450-1750 R.P.M. of the armature or 25 miles per hour.

Generator Data

Amperes	R.P.M.	Volts
0	575	6.5
8.5-10.5	1000	7-7.5
15-16	1450-1750	7.5

Shunt field winding takes 3.25 to 4 amperes at 6 to 6.3 volts. Move the third brush in the direction of armature rotation to increase the charging rate, and in the opposite direction to decrease the charging rate.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in the generator frame. Relay closes at 575-625 R.P.M. of the armature or 7-9 miles per hour and opens at 525-575 R.P.M. of the armature or 5-7 miles per hour. Adjust the spring tension on relay armature so that the contacts open with a discharge current of 0-3 amperes. Adjust the air gap between the relay armature and coil core so that the contacts close when the voltage of the generator reaches 6.2-6.5 volts. Air gap between relay armature and coil core is .005 inch, contacts closed. Contacts separate .030 to .035 inch. Resistance of the shunt coil is 68 ohms. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

KISSEL-KAR

MODEL 6-42 (1915-16-17)
WESTINGHOUSE GENERATING SYSTEM. KISSEL STARTER
EISEMANN MAGNETO IGNITION

BATTERY.- -Willard, Type SLB-610-AB-30, 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Magneto breaker contacts separate .018 to .022 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 2 or 3 drops of light engine oil in the magneto oilers every month. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .027 inch.

STARTER.—Kissel. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 100 R.P.M.

OILING.—Put 4 or 5 drops of light engine oil in the starter oilers every month.

GENERATOR:—Frame No. 208. Generator current regulation is by reverse series field.

Generator Data. Frame 208

Amperes	R.P.M.
0	425
8	650
11-15	1500

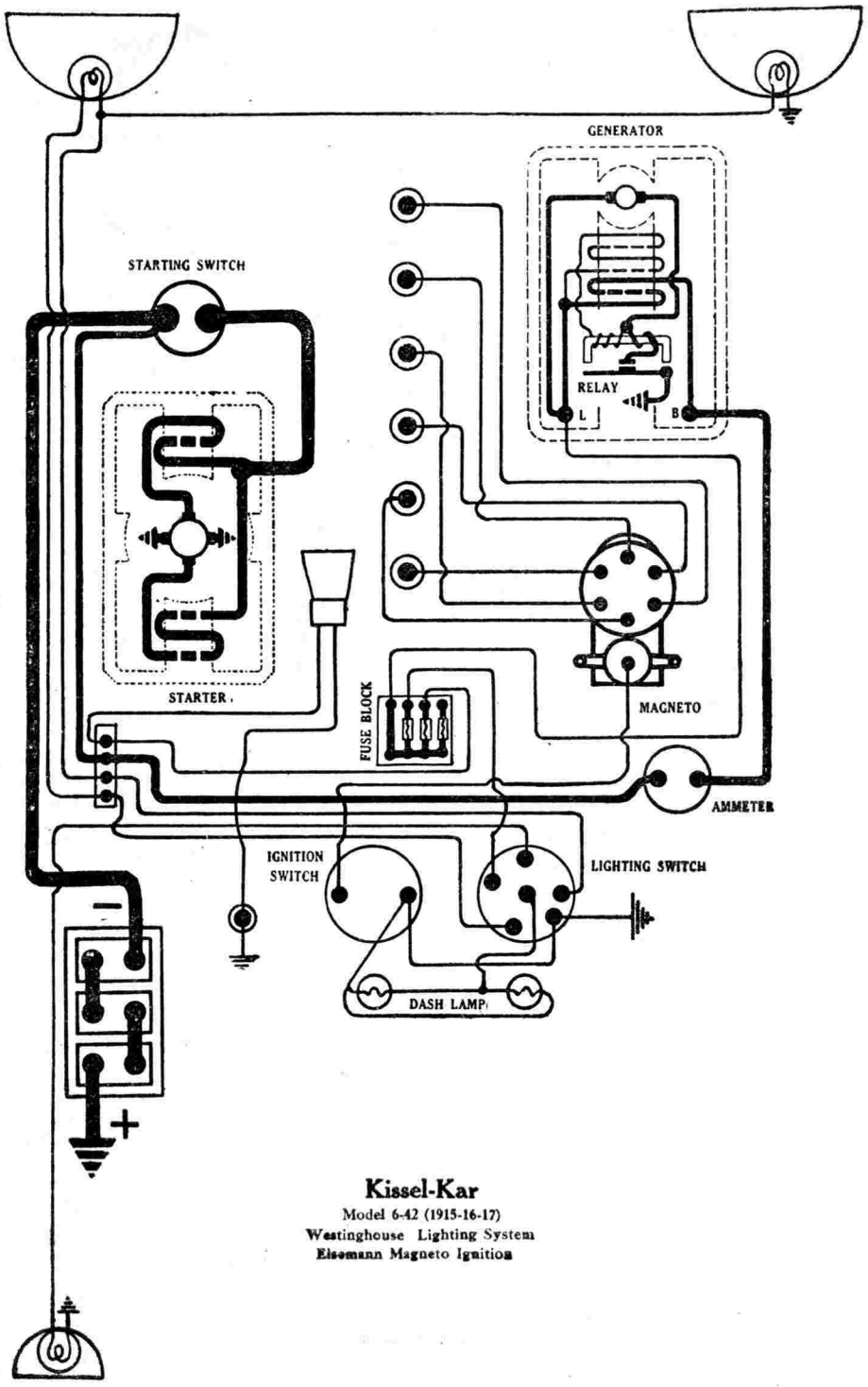
Shunt field current is 1.5-2.5 amperes at 6-6.3 volts. Operating freely as a motor, generator takes 2.5-3.5 amperes at 6-6.3 volts. The current taken by the lamps does not pass through the reverse series field, hence has but little effect on the charging rate.

OILING.—Put 4 or 5 drops of light engine oil in the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

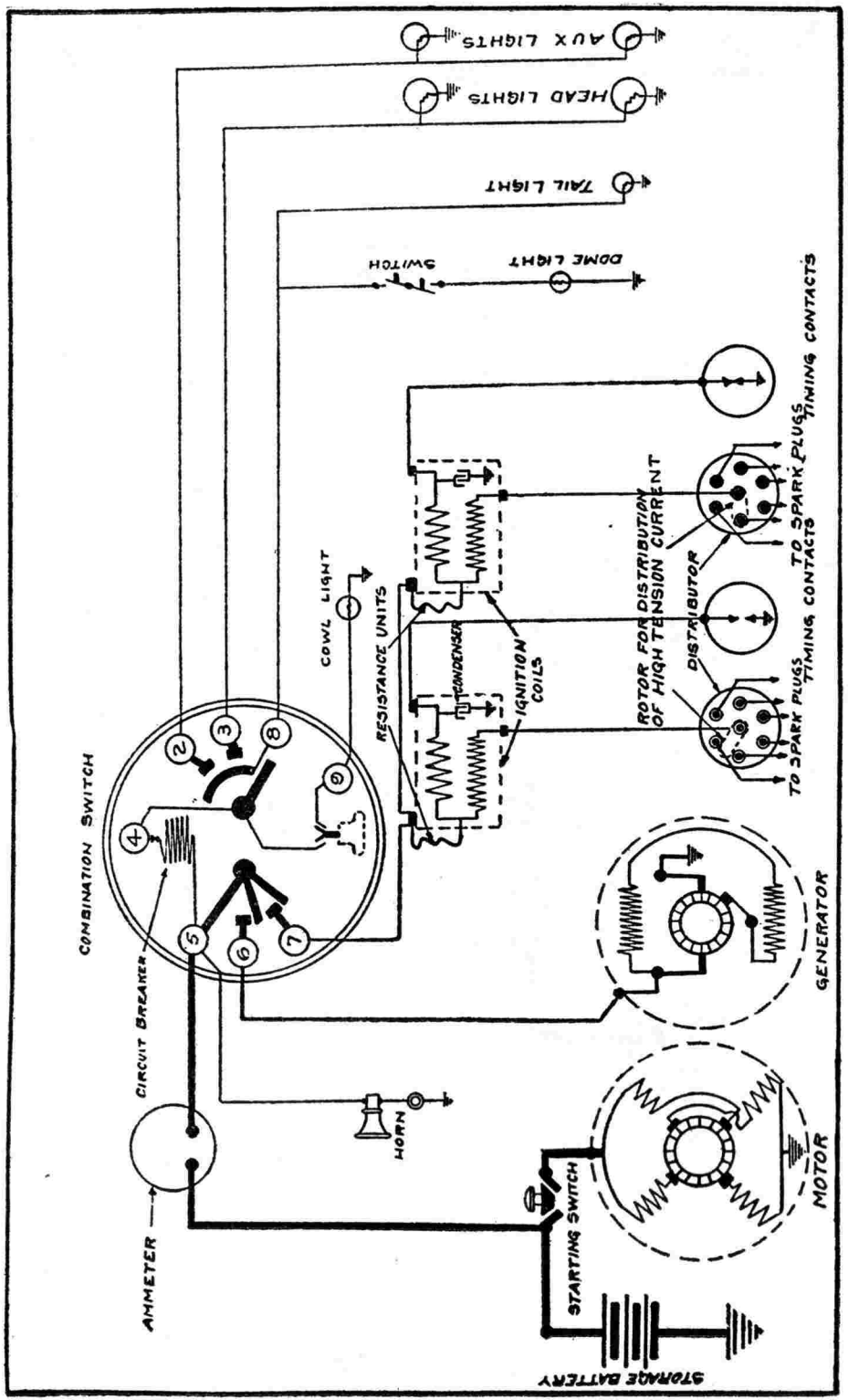
RELAY.—Relay is mounted in the generator frame. Relay closes at 425-475 R.P.M. of the armature or 8 miles per hour and opens at 375-425 R.P.M. of the armature or 6 per hour. Adjust relay to open with a discharge current of 0-2 amperes and close when the voltage of the generator reaches 7 to 7.5 volts, battery disconnected. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 12-18 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

FUSES.—Fuses are 20 ampere.



Kissel-Kar
Model 6-42 (1915-16-17)
Westinghouse Lighting System
Eisemann Magneto Ignition



Kissel Kar

12 CYLINDER (1917)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coils are Model No. 2123. Distributor Model No. 5156. There are two separate coils, timers and distributors, providing a separate ignition system for each cylinder block. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Remove top cover of timer and put 4 or 5 drops of light engine oil in each of oil holes exposed, and in the top vertical bearing. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

TIMING.—Contacts begin to separate when the top dead center mark on flywheel is at indicator, spark control level and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1R, 1L, 4R, 4L, 2R, 2L, 6R, 6L, 3R, 3L, 5R, 5L.

SPARK PLUG GAPS.—Spark plug gaps are .027 to .030 inch.

STARTER.—Model No. 86. Starter is connected to engine through a Bendix drive. Lock torque is 16 pound-feet. Running freely, starter takes 40 amperes.

OILING.—Put several drops of light engine oil in each of starter oilers every month.

GENERATOR.—Model No. 87. Generator current regulation is by third brush system. Generator begins to supply current at 7-9 miles per hour, or 500-550 R.P.M., of armature. Maximum charging rate is 15-17 amperes, reached at 20-25 miles per hour, or 1400 R.P.M., of armature.

Generator Data. Model No. 87

Hot Test		Cold Test	
Amperes	R.P.M.	Amperes	R.P.M.
Neutral	500	Neutral	500
11-13	900	11.5-13.5	900
16-18	1400	16.5-19.5	1400
15-17	1800	15.5-18.5	1800
14-16	2000	15.0-18.0	2000

Output is varied by adjusting third brush. Moving brush in direction of armature rotation increases output. Moving it in the opposite direction decreases output.

OILING.—Put 5 or 6 drops of light engine oil in each of generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4-6 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp. Tonneau lamp is 6-8 volt, 4 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires a current of 25 amperes to start this device vibrating, but when vibrating, 3 to 5 amperes will cause it to continue.

Kissel Kar

Hundred Point Six (1917-18)
Remy Generating and Lighting System. Remy Ignition
Remy or Kissel Starter

Battery.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should open .020 inch to .025 inch. Should they become badly burned or pitted, affecting the ignition, resurface them with a fine, flat jeweler's file or a piece of well worn No. 00 sand paper.

Timing.—Breaker contacts should just begin to separate when the flywheel marking "1-6 TC" is turned 1¼ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be .025 inch. If engine misses when running idle or pulling light, gap should be made wider. If engine misses when running at high speed, the gap should be made narrower. Of course, this is providing there is no other defect causing the trouble, such as lack of compression, leaky valves, carburetor adjustment, etc.

Oiling.—Fill the grease cup under the distributor head with medium cup grease and turn down two turns every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Starter.—Starter is connected to the engine through a Bendix drive.

Oiling.—Put 4 or 5 drops of light engine oil in starter oilers every 500 miles.

Generator.—Generator current regulation is by vibrating regulator,

GENERATOR DATA, MODEL 245-B

Amperes	R. P. M.	Volts
0	600-650	6.0
7	700-750	6.5
13-14	1500	6.9
13-14	3000	6.9

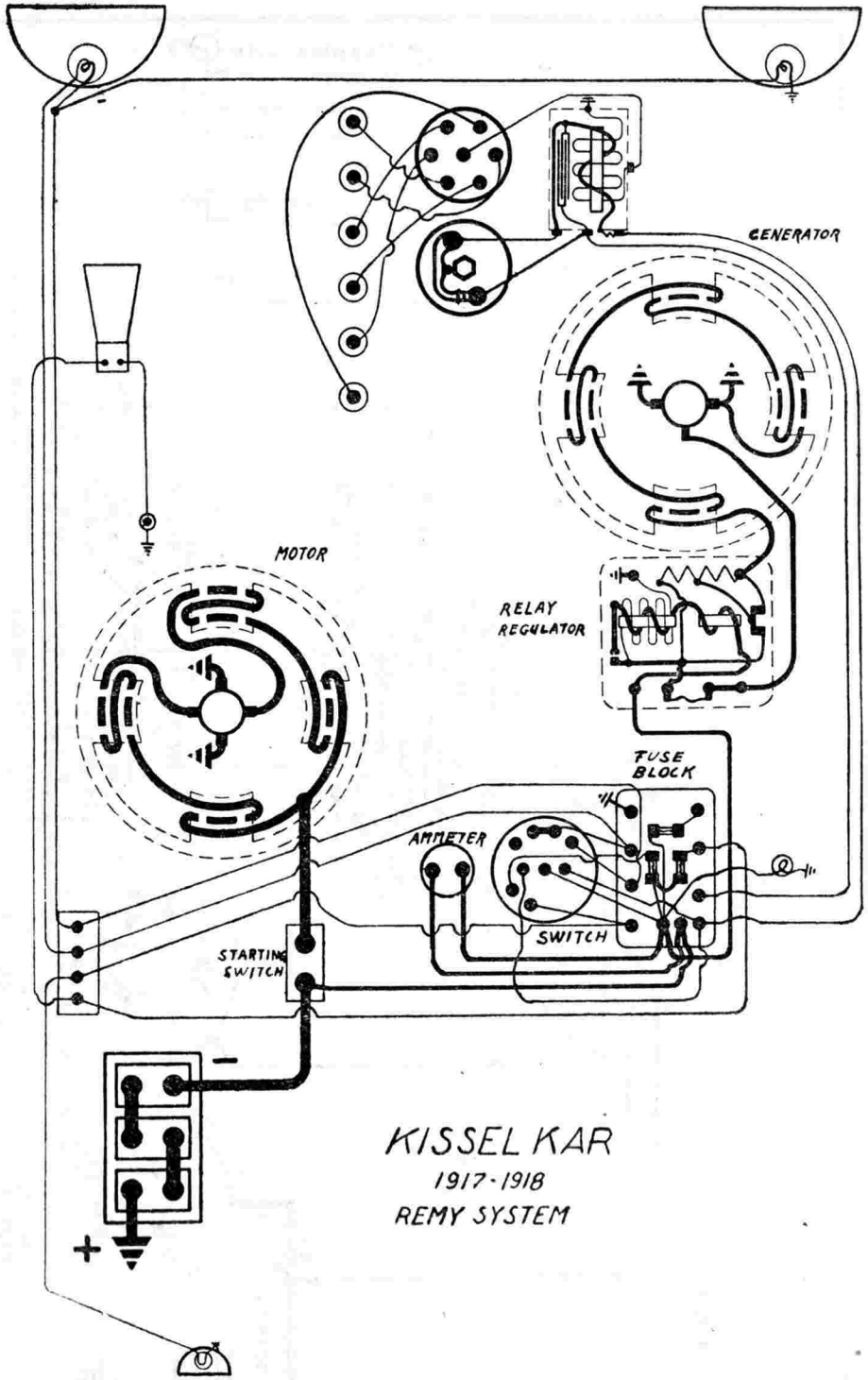
Above tests are made without ignition. Running free as a motor, generator should draw 6 to 6.5 amperes at 5.8 volts, and turn at 740 R. P. M. Shunt field should draw 3.5 to 4 amperes at 5.9 volts,

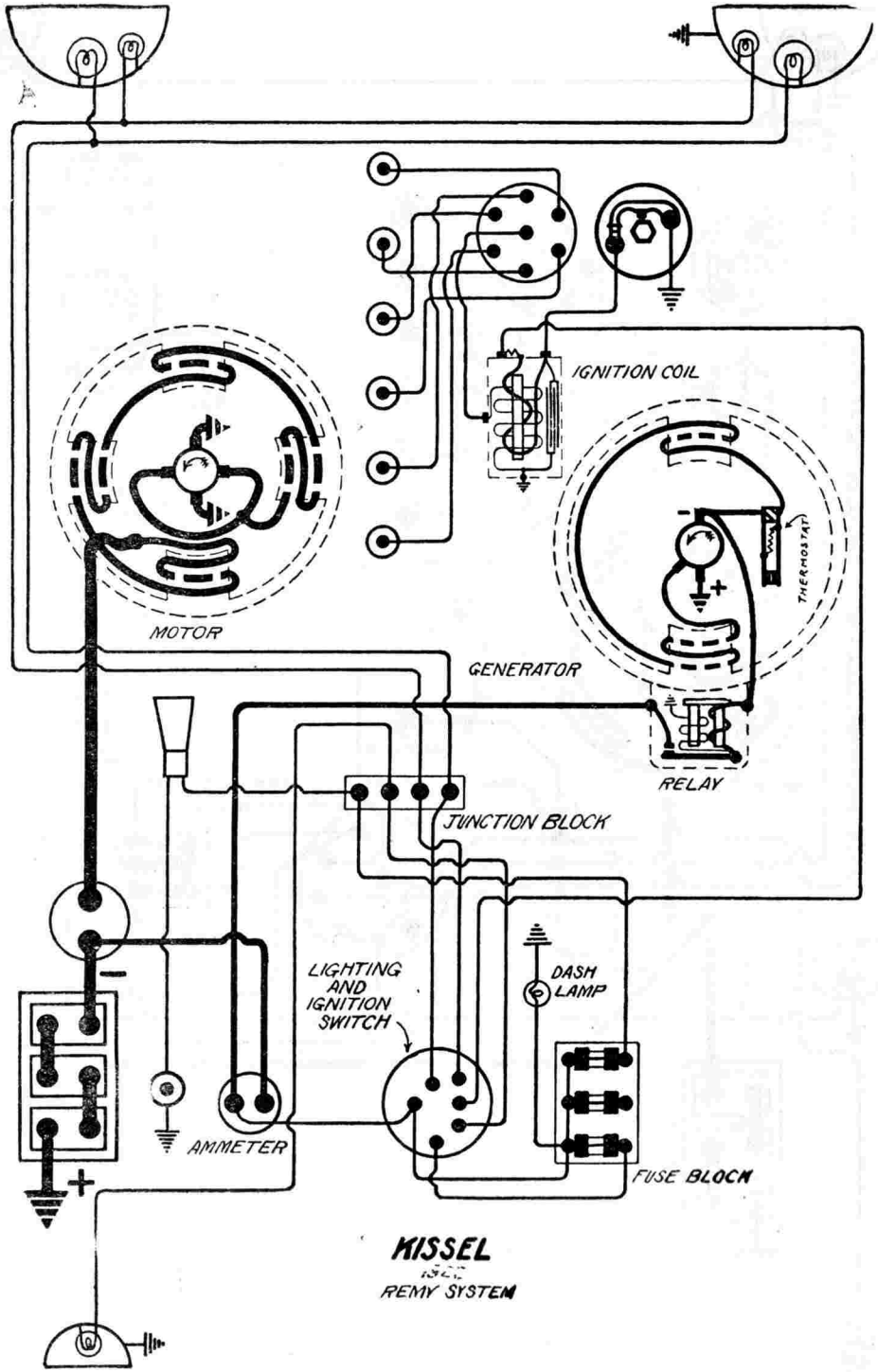
Oiling.—Put 4 or 5 drops of light engine oil in generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Relay-Regulator.—Type 60-A relay-regulator is used. The air gap between relay armature (moving member) and coil core should be .012 inch to .015 inch, contacts closed. Contacts should separate .012 inch to .015 inch. Clean relay and regulator contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a strip of well worn No. 00 sand paper, drawing a piece of unglazed paper between them to remove all grit, and adjust before again putting into service. Increasing spring tension on regulator armature will increase the output, Decreasing the spring tension will decrease the output.

Lamps.—Head lamps are 6-8 volt, 20 cp. Tail lamp is 6-8 volt, 2 cp. Dash lamp is 6-8 volt, 2 cp.

Fuses.—Generator fuse on relay-regulator base is 15 ampere, commercial fuse wire. Lighting circuit fuses are 20 ampere.





REMY GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY:—(1919) 6 volt, 80 ampere hour (1920-21) Willard Type SJRN-4, 6 volt, 117.5 ampere hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .020 to .025 inch. When the condition of the contacts affects the ignition, resurface them with a fine, flat jeweler's file or worn No. 00 sandpaper.

Oiling.—Refill the grease cup under the breaker head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

.Timing.—Breaker contacts begin to separate when the top dead center mark on the flywheel is ¾ inch past the indicator, spark control lever and breaker assembly in the fully retarded position in the 1920 and 1921 cars and when the marking is at the indicator on the 1919 cars.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—The spark plug gaps are .025 inch.

STARTER.—Model No. 303-C. Rotation is counter-clockwise, looking at the commutator end. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes	Volts
1 lb. ft.	1850	110-115	5.3-5.5
2 lb. ft.	1400	158-165	5.1-5.3
3 lb. ft.	1150	200-210	4.9-5.1
4 lb. ft.	850	238-250	4.6-4.8
5 lb. ft.	700	275-285	4.4-4.6
15 lb. ft.	Lock	550-575	3.3-3.4

Pressure of brushes on the commutator is 20-24 ounces.

Oiling.—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month.

GENERATOR:-Model Nos. 230-B & E. Rotation is counter-clockwise looking at the commutator end. Generator current output is 22 amperes, reached at 1800 R.P.M. of the armature or 25 miles per hour. A thermostat, located in the brush rigging of the generator, cuts a resistance into the field circuit when the temperature reaches 175° F., reducing th maximum charging rate 6 amperes.

Generator Data

Amperes	R.P.M.	Volts
0	515	6.4
7	745	7.1
14	1000	7.9
22	1800	8.6
17	2500	8.2
12.25	3000	7.8

Charging rate is varied by adjustment of the third brush setting. The third brush assembly is moved by turning a screw exposed in the commutator end plate. Turn the screw to the right to increase the charging rate and to the left to decrease the charging rate. Reseat the brush after adjusting position. The pressure of the main brushes on the commutator is 17-20 ounces. The pressure of the third brush is 13-17 ounces.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Model No. 264-A. Relay closes at 525 R.P.M. of the armature or 8 miles per hour and opens at 475 R.P.M. of the armature or 6 miles per hour. Contacts separate .012 to .015 inch. Air gap between relay contacts and coil core is .012 to .015 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dash and tail lamps are 6-8 volt, 2 cp. On the 1919 cars head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 5 cp

KISSEL

CUSTOM BUILT SIX, SERIES 45 (1922)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Willard, Type SJR-5, 6 volt, 139 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Model 284-A. Distributor Model No. 626-B. Breaker contacts separate .023 inch. They are made of tungsten. When condition affects ignition, resurface on a hard oilstone.

Oiling.—Turn grease cup two turns and fill oil cup on driving end every two weeks. If car is driven over 500 miles in two weeks, this attention must be given every 500 miles

Timing.—Breaker contacts begin to separate when the top dead center mark on flywheel is 1¼ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—The spark plug gaps are .025 inch.

STARTER.—Model 720-D. The direction of rotation, looking at commutator end, is counter-clockwise. Cranking engine at 100-150 R.P.M., it takes 150 to 200 amperes. Starter is connected to engine through a Bendix drive.

Starter Data

Torque	Amperes
15 lbs Min.	570 amperes Max.

The brush tension on commutator is 16 to 20 ounces.

Oiling.—Put 5 or 6 drops of light engine oil into starter oilers every month. If car is driven over 1000 miles per month, these attentions must be given every 1000 miles.

GENERATOR:—Model No. 912-A. Direction of rotation, looking at commutator end, is counter-clockwise. Current regulation is by the third brush system combined with a thermostat located in the shunt field circuit. With thermostat contacts open generator output is cut down approximately 50%. To adjust generator output, loosen the screw on the generator and shift the third brush in direction of armature rotation to increase the charging rate and in the opposite direction to decrease the charging rate.

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	7.0	675			
7	7.2	750	11	8.2	1900
20	8.5	1800			

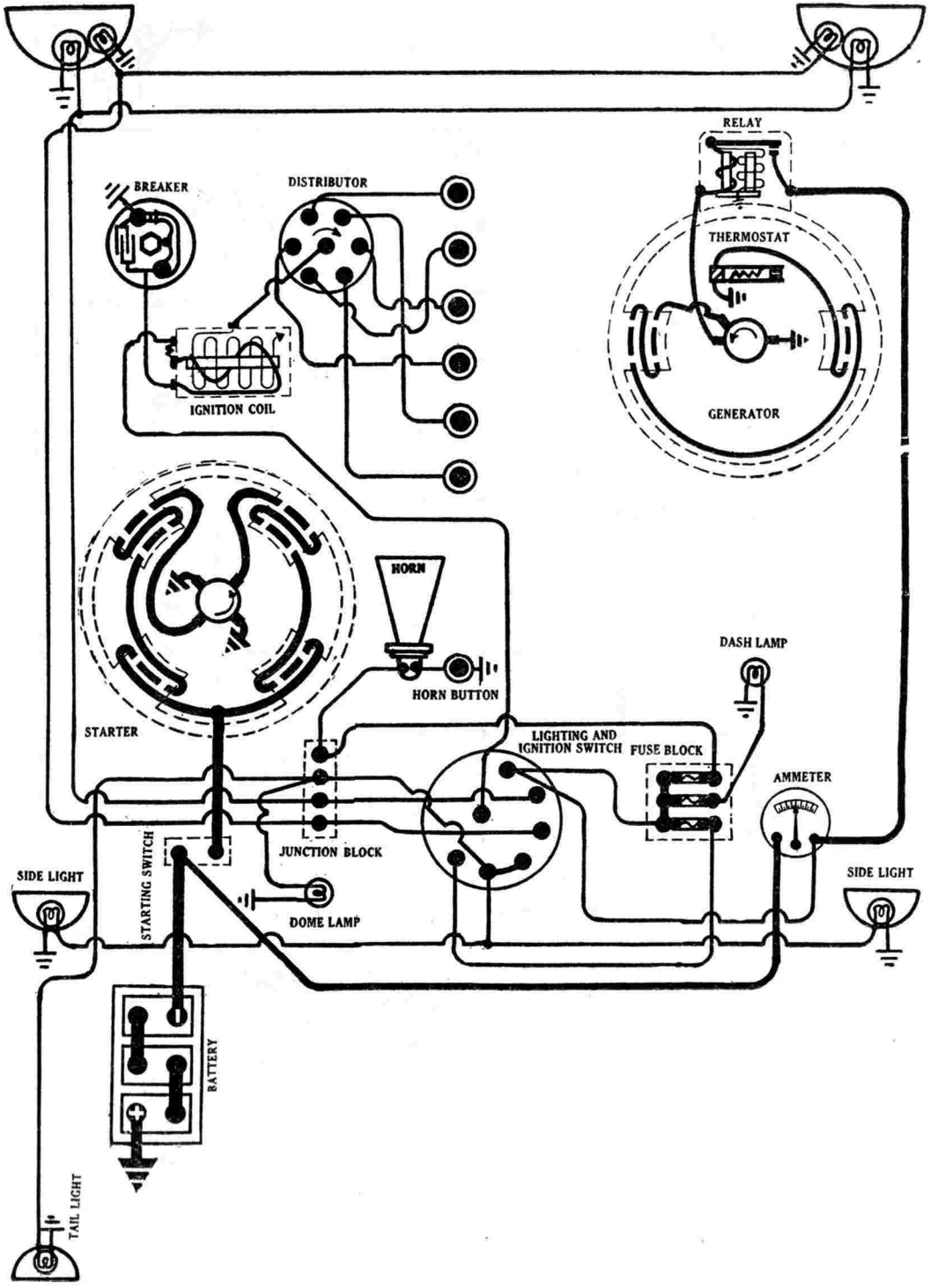
Shunt field current is 5 amperes at 6 volts. Generator brush tension should be 16 ounces each.

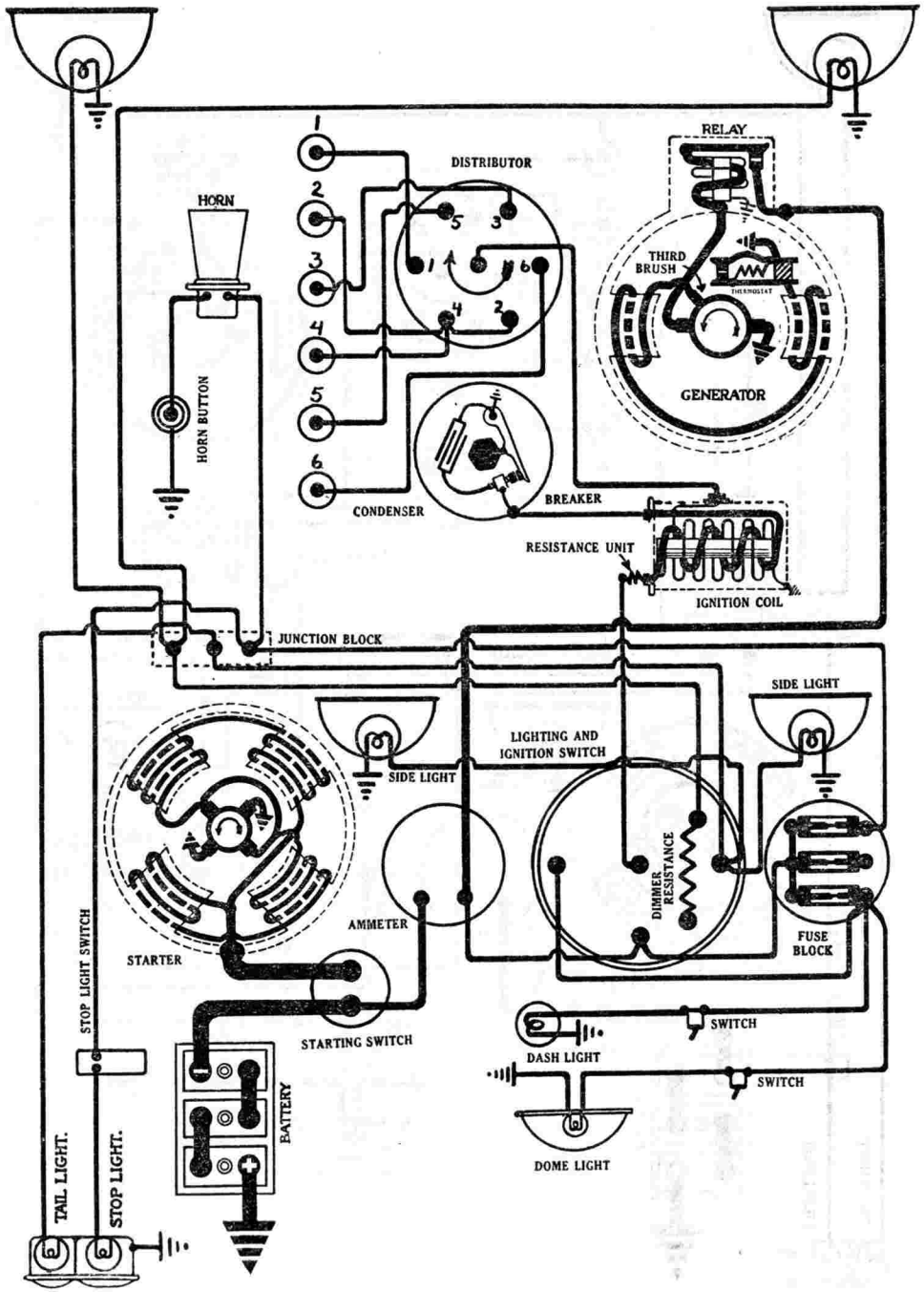
Oiling.—Put 5 or 6 drops of light engine oil into generator oilers every two weeks. If car is driven over 500 miles in two weeks, these attentions must be given each 500 miles.

RELAY.—Model No. 264-C. Contacts separate .012 to .015 inch. Air gap between relay contacts and coil core is .012 to .015 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volts, 21 cp. Dimmer lamps are 6-8 volts, 12 cp. Side lamps are 6-8 volts, 4 cp. Tail lamp is 6-8 volts, 2 cp. Dome lamp is 6-8volts, 6 cp.

FUSES.—All fuses are 20 ampere.





KISSEL

SERIES 55 (1923-24-25)

REMY GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY:—Willard, Type SJR-4. 6 volt, 110 ampere hour. The positive (+) terminal is grounded.

IGNITION.—Model 284-A. Distributor Model No. 626-B. Breaker contacts separate .023 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a hard oilstone. The manual advance is 20°. Automatic advance is 20°.

Oiling.—Turn grease cup two turns and fill oil cup on driving end every two weeks. If car is driven over 500 miles in two weeks, this attention must be given every 500 miles

Timing.—Breaker contacts begin to separate when the top dead center mark on flywheel is 1¼ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—The spark plug gaps are .030 inch.

STARTER.—Model 720-D. The direction of rotation, looking at commutator end, is counter-clockwise. Cranking engine at 100-150 R.P.M. it takes 150 to 200 amperes. Starter is connected to engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
15 lb. ft.	Lock	3.15	570

Starter brush tension should be 20-28 ounces each.

Oiling.—Put 5 or 6 drops of light engine oil into starter oilers every month. If car is driven over 1000 miles per month, these attentions must be given every 1000 miles.

GENERATOR.—Model No. 912-B. Direction of rotation, looking at commutator end, is counter-clockwise. Current or voltage regulation is by the third brush and thermostat system. The maximum charging rate is 19-21 amperes, reached at 1800 R.P.M. of armature.

Generator Test Data

Amperes	Colt Test	R.P.M.	Amperes	Hot Test	R.P.M.
7		750			
19-21		1800	10-14		1800
15-18.5		2500			

Brush tension is 14 to 18 ounces on all brushes.

Oiling.—Put 5 or 6 drops of light engine oil into generator oilers every two weeks. If car is driven over 500 miles in two weeks, these attentions must be given each 500 miles.

RELAY.—Model No. 264-C. Contacts separate .012 tto .015 inch. Air gap between relay contacts and coil core is .012 to .015 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volts, 21 cp. Dimmer lamps are 6-8 volts, 4 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volts, 6 cp. Dome lamp is 6-8 volts, 6 cp.

FUSES.—All fuses are 20 ampere.

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KISSEL

MODEL 55 (1926)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY:—Willard, Type SJR-4. 6 volt, 110 ampere hour. The positive (+) terminal is grounded.

IGNITION:—Coil Model 284-A. Distributor Model 626-R. Breaker contacts separate .023 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a hard oilstone. The manual advance is 20°. Automatic advance is 20°.

Oiling:—Turn grease cup two turns and fill oil cup on driving end every two weeks. If car is driven over 500 miles in two weeks, this attention must be given every 500 miles.

Timing:—Breaker contacts begin to separate when the top dead center mark on flywheel is 1¼ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plug Gaps:—The spark plug gaps are .030 inch.

STARTER:—Model 720-D. The direction of rotation, looking at commutator end, is counter-clockwise. Cranking engine at 100-150 R.P.M. it takes 150 to 200 amperes. Starter is connected to engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
15 lb. ft.	Lock	3.15	570

Starter brush tension should be 20-28 ounces each.

Oiling:—Put 5 or 6 drops of light engine oil into starter oilers every month. If car is driven over 1000 miles per month, these attentions must be given every 1000 miles.

GENERATOR:—Model No. 944-A. Direction of rotation, looking at commutator end, is counter-clockwise. Current regulation is by the third brush system combined with a thermostat located in the shunt field circuit. With thermostat contacts open generator output is cut down approximately 50%. To adjust generator output, loosen cover band and screw on the generator end plate and shift third brush in the direction of armature rotation to increase the charging rate and in the opposite direction to decrease the charging rate.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	7.0	675	11	8.2	1900
7	7.2	750			
20	8.5	1300			

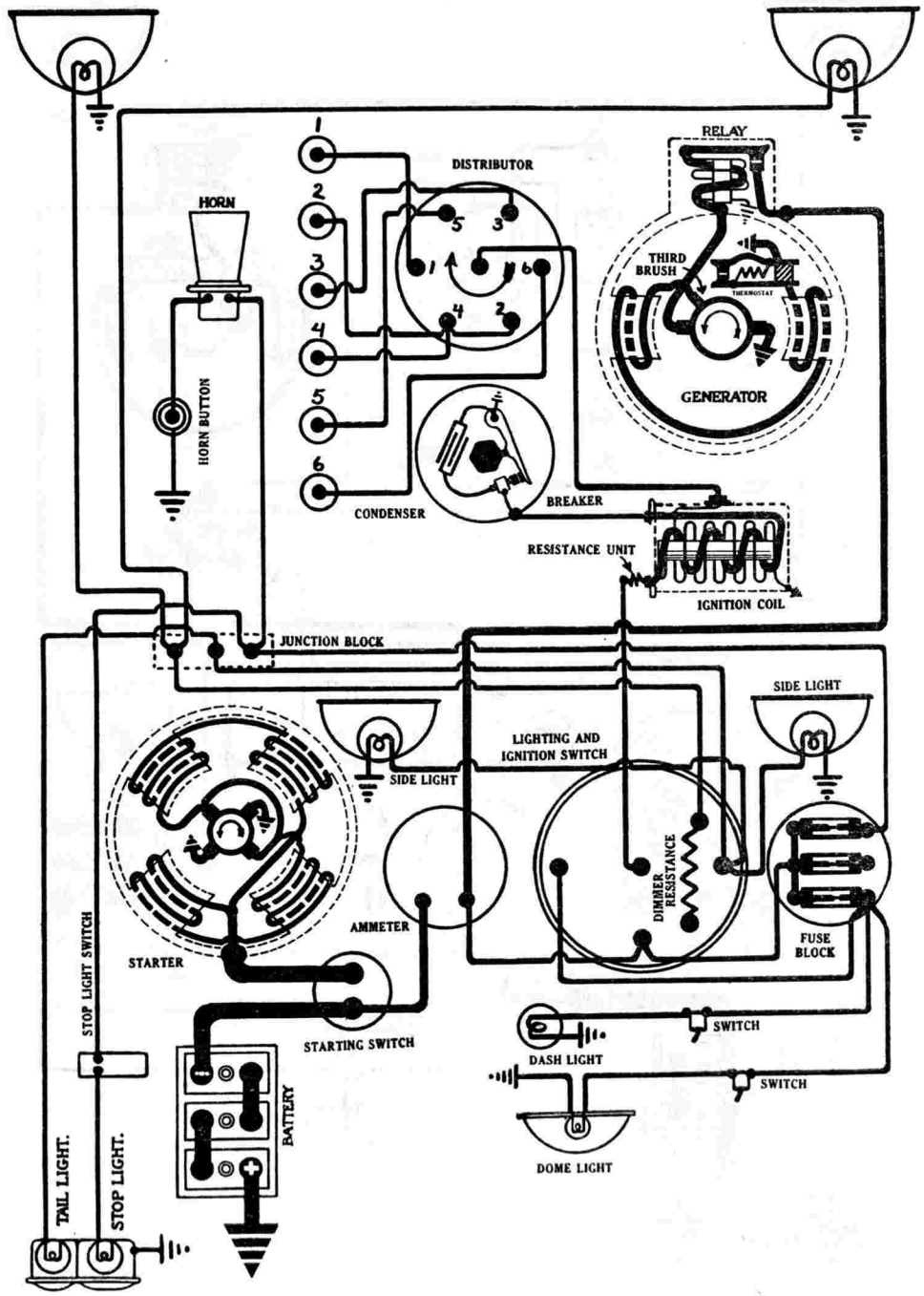
Shunt field current is 5 amperes at 6 volts. Generator brush tension should be 16 ounces each.

Oiling:—Put 5 or 6 drops of light engine oil into generator oilers every two weeks. If car is driven over 500 miles in two weeks, these attentions must be given each 500 miles.

RELAY:—Model 265-A. Relay contacts close at 675 R.P.M. of the generator when the voltage reaches 7.2 volts and open with a discharge current of 0-2.5 amperes. Contacts separate .014 inch. Air gap between relay armature and coil core is .014 inch, contacts closed.

LIGHTING:—Switch B. & S. Model 40042. Head lamps are each 6-8 volt, 21 cp. Dash lamp is 6-8 volt, 2 cp. Dome and tail lamps are each 6-8 volt, 6 cp.

FUSES:—All fuses are 20 ampere.

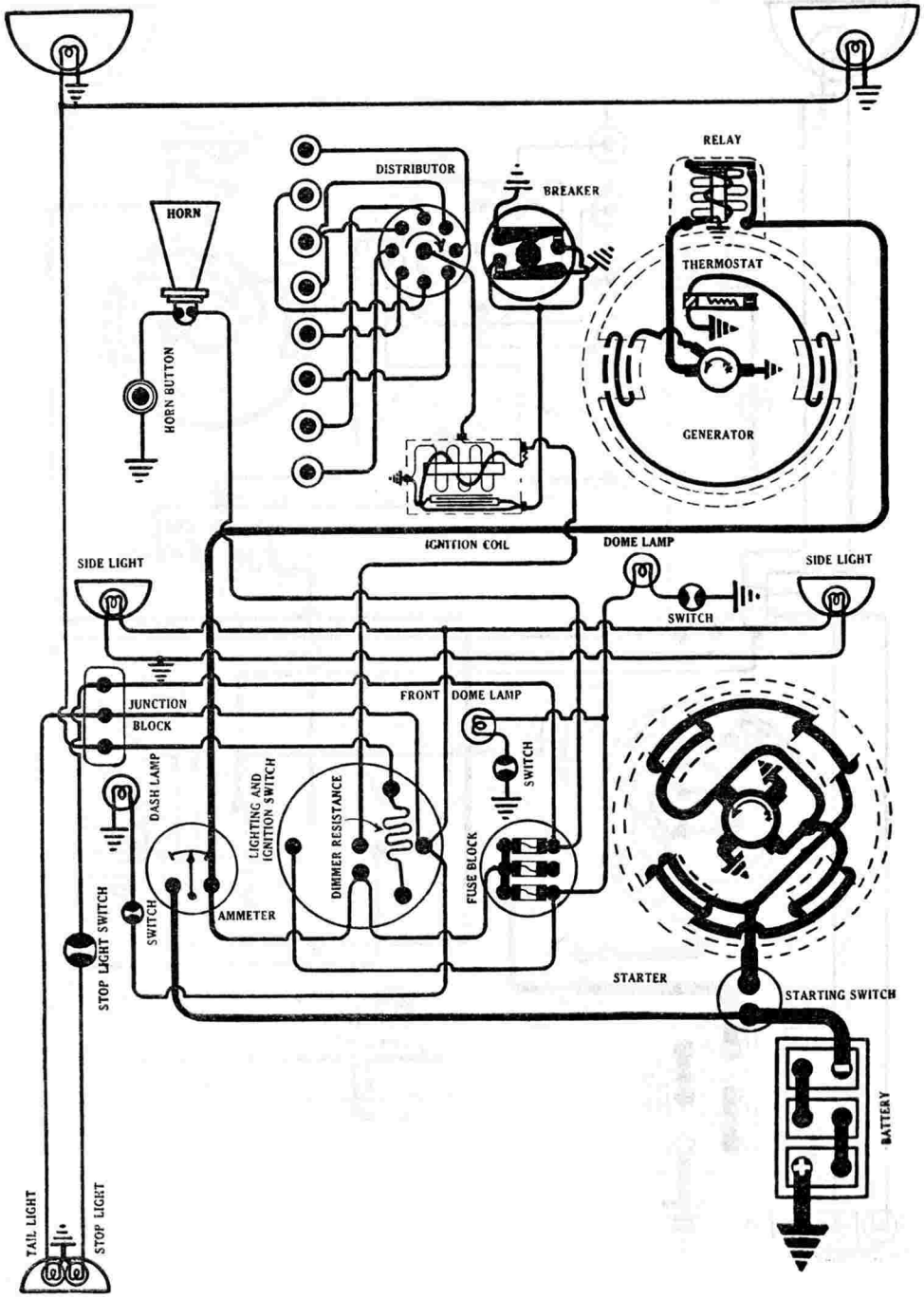


KISSEL

MODEL 75 (1925-26)

REMY GENERATING, STARTING AND LIGHTING SYSTEM.

REMY IGNITION



BATTERY:— Willard, Type SJR-4. 6 volt, 110 ampere hour. The starting capacity is 125 amperes for 20 minutes. The lighting capacity is 5 amperes for 22 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model No. 284-L. ..Distributor Model No. 648-B. Breaker contacts separate .023 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file or on a medium hard oilstone. The breaker uses two sets of contacts. They must be synchronized so that they open at the same instant. To adjust, set stationary contact and then move mounting plate until the other contacts begin to open. The gap must be kept the same on both contacts.

Oiling:—Turn down the grease cup on the side of the distributor housing two turns every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 10° past top dead center (measured on flywheel) with the spark lever fully retarded. Distributor is semi-automatic. Automatic advance is 15°. Manual advance is 20°. The tension of the contact arm spring should be 17-20 ounces.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .030 inch.

STARTER:—Model 720-J, Q. Starter is connected to the engine by means of a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 145 R.P.M. taking 175 amperes at 5.0 volts

Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4500-5000	5.5	65
2 "	1750	5.0	145
15 "	Lock	3.1	575

The starter brush tension should be 24 ounces each.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the end bracket of the starter every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

GENERATOR:—Model No. 917-V The direction of rotation is counter-clockwise looking at the commutator end. Current regulation is by the third brush system and a thermostat located in the field circuit. To adjust the charging rate loosen the screw at the commutator end of the generator and shift the third brush. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. Tighten the screw after making the adjustment. Maximum charging rate is 19 amperes reached at 1800 R.P.M. of the armature or 26 M.P.H. Thermostat contacts open at 175° and cut a resistance into the shunt field cutting down the output approximately 50%.

Generator Data.

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	575			
7	7.1	850	9-11	7.8	1900
19	8.4	1900			

Motoring freely at 450 R.P.M. generator draws 6 amperes at 6 volts. Shunt field current is 5 amperes at 6 volt. Each coil, tested separately draws 10 amperes at 6 volts. The brush tension of each of the generator brushes should be 16-22 ounces.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Model No. 265-B. Relay contacts close at 650 R.P.M. of the generator armature or 9 M.P.H. with a generator voltage of 7.0-7.5 volts and open at 500 R.P.M. or 7 M.P.H. with a discharge current of 0-1 ampere. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .016-.020 inch, contacts closed.

LIGHTING.—Briggs and Stratton Switch, Model No. 40042. Head lamps are volt, 21 cp.S.C. Dash, dome, stop and tail lamps are each 6-8 volt, 2 cp.S.C. Instrument lamp is 6-8 volt, 2 cp.D.C.

FUSES:—Lighting fuses are 20 ampere.

KISSEL

MODEL 6-55 (1927)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type SJWR-4, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours.

IGNITION:—Coil Model 284-A. Distributor Model 627-C. Breaker contacts separate .025 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-20 ounces. Manual advance is 20 degrees (engine). Automatic advance is 18 degrees (engine).

Timing:—Breaker contacts begin to separate when piston No. 1 reaches top dead center on the compression stroke, with the spark control lever and breaker assembly in the fully retarded position.

Oiling:—Fill the grease cup on the side of the distributor housing with medium cup grease and turn down two turns every two weeks or each 500 miles. Put a small bit of vaseline on the face of the breaker cam every month.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are .030 inch.

STARTER:—Model 720-V. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine drawing 150-180 amperes at 5.2 volts. Brush spring tension is 20-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0	6000	5	65
15 lb. ft.	Lock	3.15	570

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless.

GENERATOR:—Model 944-B. The direction of rotation is counter-clockwise, looking at the commutator end. Current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165 degrees F. reducing the generator output approximately 40%. To adjust the generator output, loosen the small round headed screw on the end plate and remove the commutator cover band. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Shunt field current is 4.75-5 amperes at 6 volts. Generator, motoring, draws 5-5.5 amperes at 6 volts. Brush spring tension is 22-28 ounces.

Generator Data

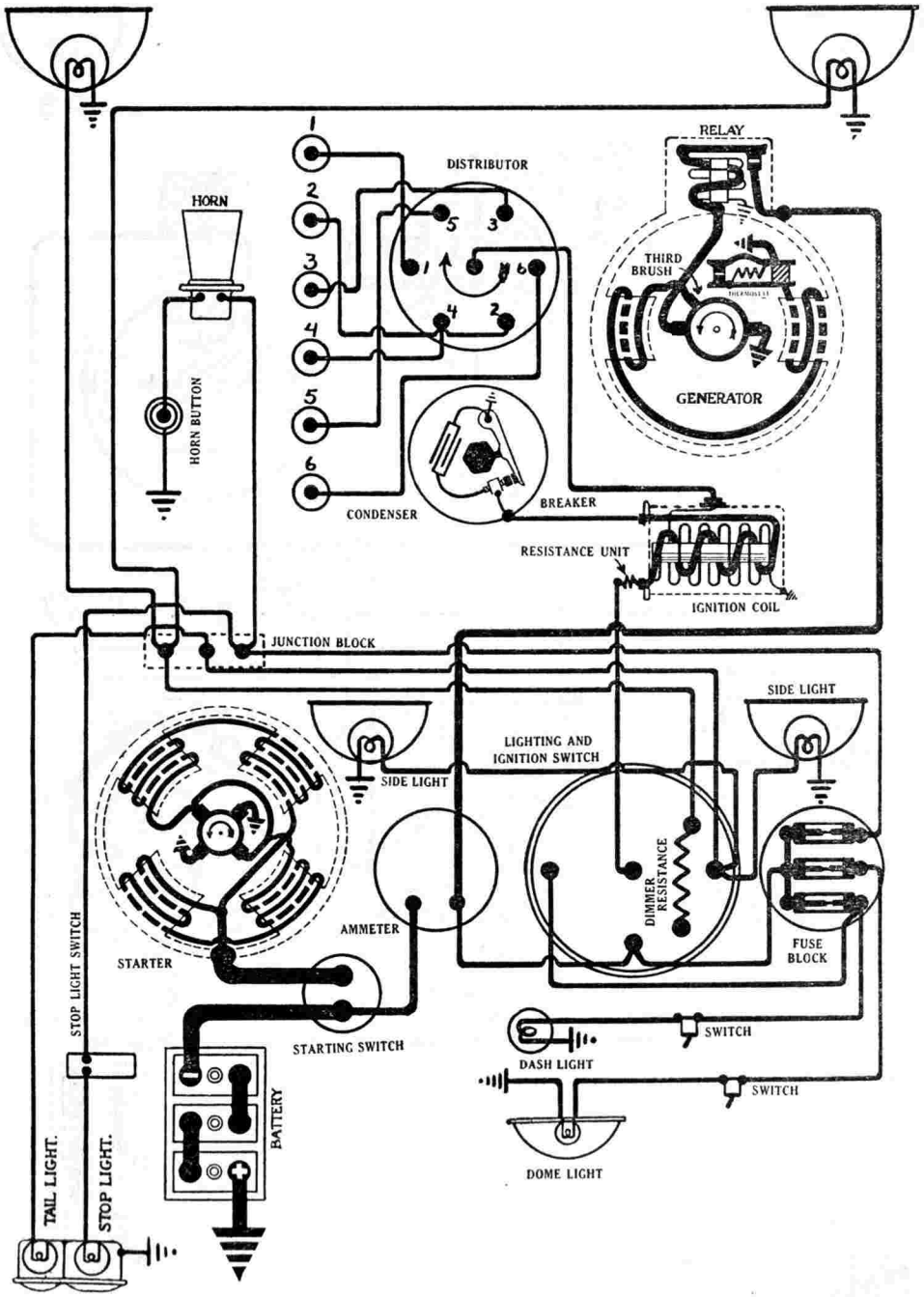
Amperes	R.P.M.	Volts
0	500	6.5
19	1300	8.3

Oiling:—Put 8 or 10 drops of light engine oil in each of the bearing oilers every month or each 1000 miles.

RELAY:—Model 265-B. Relay contacts close when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-3 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.018 inch with contacts closed.

LIGHTING:—Briggs & Stratton Switch Model 36560. Switch is mounted on the dash. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact). Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Side, dome, dash and tail lights are 6-8 volt, 3 cp. S.C. Mazda 63.

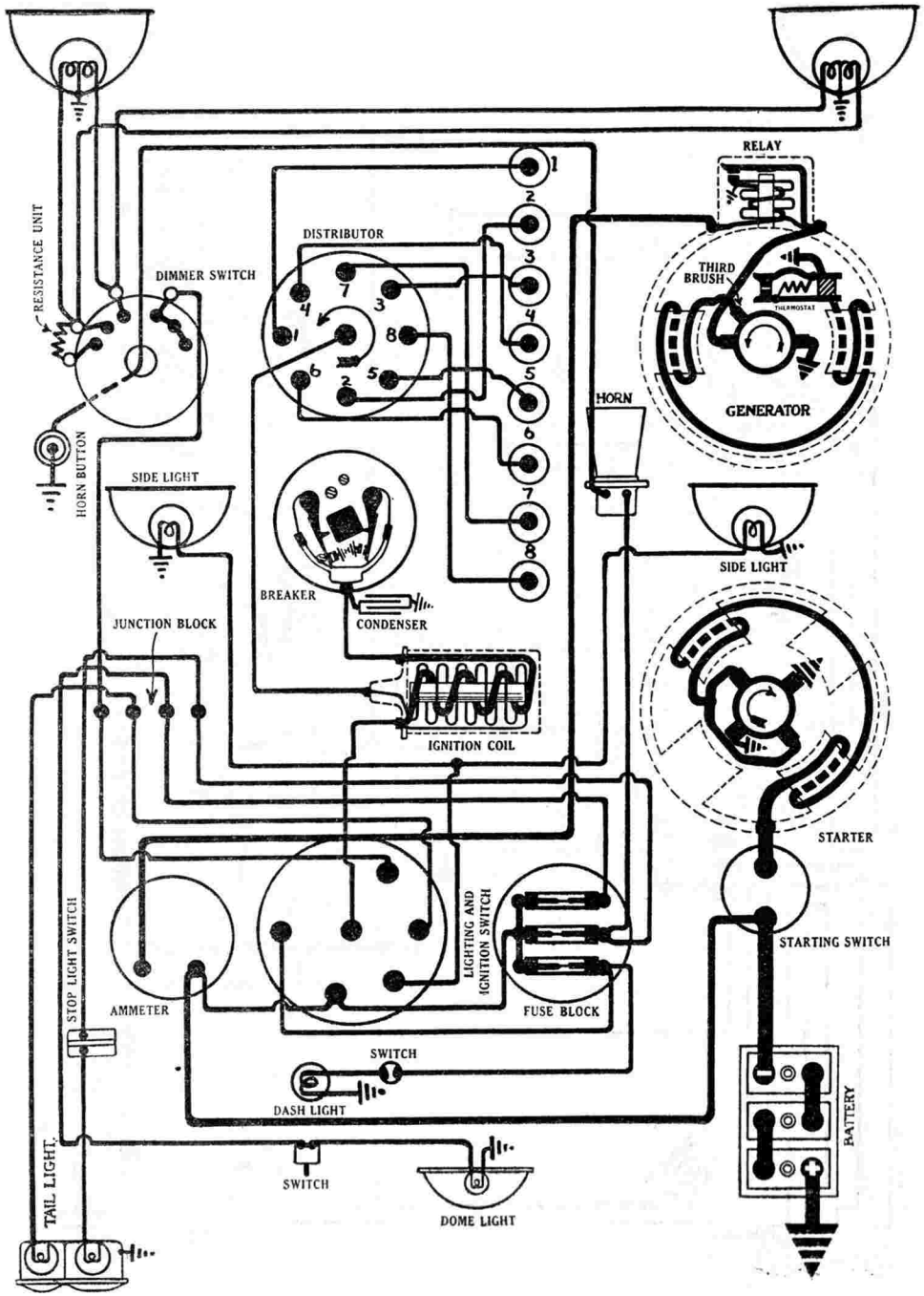
FUSES:—Lighting fuses are 10 ampere capacity.



KISSEL

MODEL 8-75 (1927)

DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION



BATTERY:—Willard, Type SJWR-4, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours.

IGNITION:—Coil Model 284-L. Distributor Model 648-A and B. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 20 degrees (engine). Automatic advance begins at 400 R.P.M. and reaches a maximum of 17 degrees at 1800 R.P.M. Spring tension is 17-21 ounces. Breaker has two sets of contacts which open at the same instant. To synchronize, see Timing.

Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down two turns every month or each 1000 miles. Put a small bit of vaseline on the face of the breaker cam every month.

Timing:—Both sets of breaker contacts should separate when the piston entering power stroke reaches top dead center with the spark control assembly in the fully retarded position. Set contacts on stationary plate by loosening locknut on top of breaker cam and rotating cam until contacts begin to separate. Reseat the cam and tighten the locknut. Set contacts on movable plate by loosening three lock screws and shifting breaker assembly until contacts begin to separate. Tighten the lock screws. Test lamps, connected across each set of contacts should light at the same instant when the contacts separate.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are .030 inch.

STARTER:—Model 720-Q. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine drawing 185-190 amperes at 4.1 volts Brush tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0	6000	5	65
15 lb. ft.	Lock	3.1	570

Oiling:—Put 4 or 5 drops of light oil on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless.

GENERATOR:—Model 944-B. The direction of rotation is counter-clockwise, looking at the commutator end. Current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165 degrees F. reducing the generator output approximately 40%. To adjust the generator output, loosen the small round headed screw on the end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Shunt field current is 4.75-5 amperes at 6 volts. Generator, motoring, draws 5-5.5 amperes at 6 volts. Brush spring tension is 22-28 ounces.

Generator Data

Amperes	R.P.M.	Volts
0	500	6.5
19	1300	8.3

Oiling:—Put 8 or 10 drops of light engine oil in each of the bearing oilers every month or each 1000 miles.

RELAY:—Model 265-B. Relay contacts close when the generator voltage reaches 7.25 volts and open with a discharge current of 0-2.5 amperes. Contact gap is .020 inch. Air gap is .016 inch with contacts closed.

LIGHTING:—Briggs & Stratton Switch Model 36560. Switch is mounted on the dash. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact) Mazda 1110. Side, dome, dash and tail lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dimmer switch is mounted at the foot of the steering column.

FUSES:—Lighting fuses are 10 ampere capacity.

KISSEL

MODEL 6-70 (1928)

DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type WR-13, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours.

IGNITION:—Coil Model 525-C. Distributor Model 636-S. Breaker contacts separate .025 inch. They are made of tungsten. When the condition of the contacts affects the ignition resurface with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 22 degrees (engine). Automatic advance is 21 degrees (engine). Breaker arm spring tension is 18-20 ounces. Ignition current is 3.5 amperes at 6 volts with engine running and 6 amperes at 6 volts with engine stopped.

Timing:—Breaker contacts begin to separate when piston No. 1 reaches top dead center on the compression stroke, with the spark control and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are ⅞ inch Long. Gaps are .025 inch.

STARTER:—Model 716-A. Starter is connected to the engine through a Bendix drive with gear reduction. The direction of rotation is clockwise, looking at the commutator end. Starter cranks the engine drawing 175-180 amperes at 4.5 volts. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	5	70
15 lb. ft.	Lock	3.7	450

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every 1000 miles. The drive end bearing is oilless.

GENERATOR:—Model 949-C. The direction of rotation of the generator is counter-clockwise, looking at the commutator end. Current regulation is by the third brush system combined with a thermostat. Thermostat contacts open at 150 degrees F. reducing the output approximately 40%. To adjust generator output, loosen the screw on the generator end plate and shift the third brush mounting plate in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.5	1450	9-12	7.5	2000

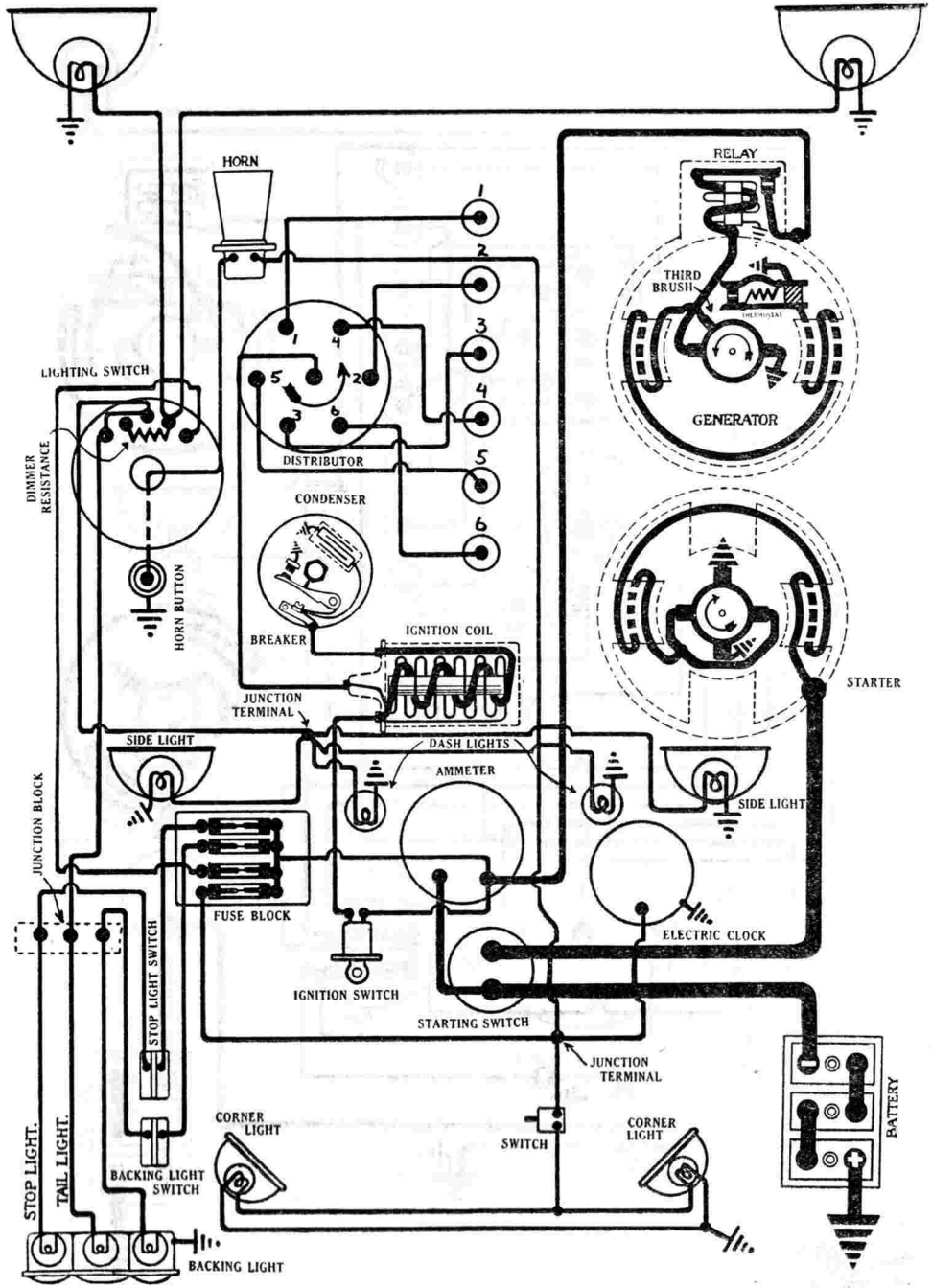
Generator, motoring, draws 5.5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Generator brush spring tension is 24-28 ounces.

Oiling:—Put 4 or 5 drops of light engine oil in the generator oilers every month or each 1000 miles.

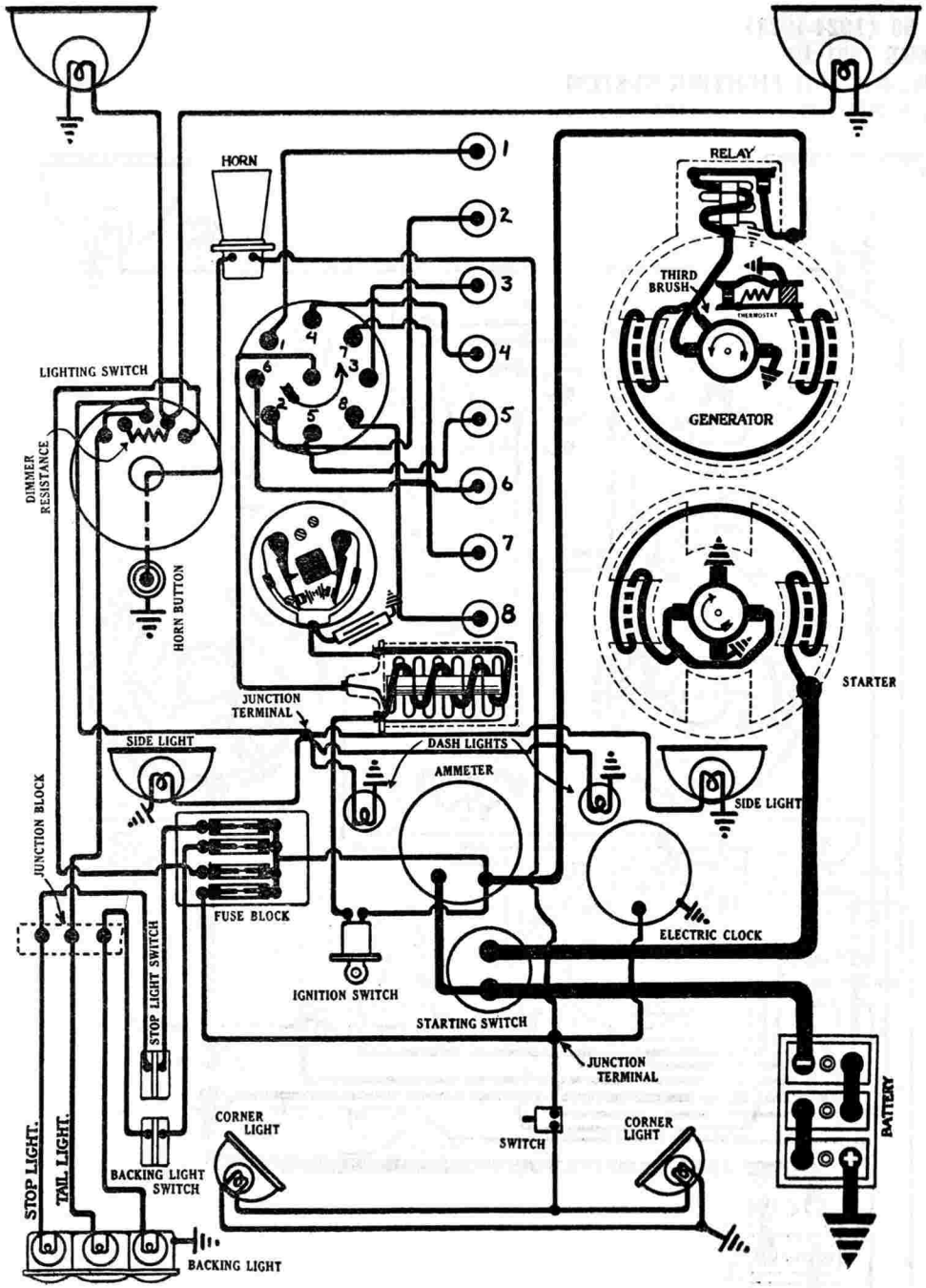
RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 675 R.P.M. of the generator armature or 6-7 M.P.H. when the generator voltage reaches 6.75 volts. Contacts open with a discharge current of 2.5 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch with contacts closed.

LIGHTING:—Clum Switch Model 10677. Lighting switch is mounted at the base of the steering column. Head lights are 6-8 volt, 21 cp. S.C. Mazda 1129. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop and backing lights are 6-8 volt, 15 cp. S.C. Mazda 87.

FUSES:—Lighting fuses are 10 amperes.



MODEL 8-80 (1928)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION



BATTERY:—Willard, Type SJWR-4, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours.

IGNITION:—Coil Model 525-C. Distributor Model 658-B. Breaker contacts separate .022 inch. Set contact gap by loosening lock screw on stationary contact plate and turning eccentric adjusting screw until proper setting is secured. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces.

Timing:—Breaker has two sets of contacts on a four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. To set timing, crank engine over until piston No. 1 reaches top dead center with the spark control and breaker assembly in the fully retarded position. Breaker contacts should separate at this point. If they do not, loosen the clamp screw on advance arm and rotate distributor until one set of contacts open. Tighten the screw. Then crank engine over until one set of contacts open. Tighten the screw. Then crank engine over 90 degrees from firing position of piston No. 1 when piston No. 6 will reach firing position. The second set of contacts should separate at this point. If they do not loosen lock screws and turn eccentric adjusting screw on breaker plate until contacts begin to open. Tighten the lock screws and check the contact gap with arm on lobe of cam. If gap is outside the limits of .020-.024 inch, reset at .022 inch and repeat synchronization.

Oiling:—Fill grease cup under distributor head with medium cup grease and turn down two turns every two weeks or each 500 miles. Every 5000 miles remove rotor and saturate wick oiler in center of shaft with light engine oil. Place a small bit of vaseline on the face of the breaker cam under the fiber bumper of the contact arm.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are ⅞ inch Standard. Gaps are .025 inch.

STARTER:—Model 716-A. Starter is connected to the engine through a Bendix drive with gear reduction. The direction of rotation is clockwise, looking at the commutator end. Starter cranks the engine drawing 175-180 amperes at 4.5 volts. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	5	70
15 lb. ft.	Lock	3.7	450

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every 1000 miles. The drive end bearing is oilless.

GENERATOR:—Model 949-C. The direction of rotation of the generator is counter-clockwise, looking at the commutator end. Current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 150 degrees F. reducing the output approximately 40%. To adjust the generator output, loosen the screw on the generator end plate and shift the third brush mounting plate in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.5	1450	9-12	7.5	2000

Generator, motoring, draws 5.5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Generator brush spring tension is 24-28 ounces.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 6.75 volts and open with a discharge current of 2.5 amperes. Contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Clum Switch Model 10677. Switch is mounted at the base of the steering column. Head lights are 6-8 volt, 21 cp. S.C. Mazda 1129. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop and backing lights are 6-8 volt, 15 cp. S.C. Mazda 87.

KLEIBER

TOURING MODEL 80 (1924-1928)
SERIAL NUMBERS 1001 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 613-SHK, 6 volt. Starting capacity (20 minute rate) is 130 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22.5 hours. The positive (+) terminal is grounded. Battery is mounted under the driver's seat on left side.

IGNITION:—Coil Model 2178. Distributor Model 5256 (1924) 5257 (1925-26-27-28). Breaker contacts separate .020-.025 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 30°. Automatic advance begins at 600 R.P.M. Maximum automatic advance is 17-21° at 2000 R.P.M. Breaker arm spring tension is 13-16 ounces.

Mounting:—Ignition coil is mounted on the engine side of the dash. Distributor is mounted at front of engine between timing gear case and pump. To remove distributor, disconnect primary lead and manual advance rod and remove head with cables attached. Then remove manual advance stop screw and lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles. Every month put a small bit of heavy grease on the face of the breaker cam under the fiber bumper of the contact arm.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 5° (on the flywheel) past top dead center with the manual advance lever in the fully retarded position. To set timing, crank engine until piston No. 1 reaches this position. Then loosen advance lever clamp screw and rotate distributor cup until contacts begin to separate. Tighten the clamp screw and make certain that rotor is under segment connected to spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Gaps are .022 inch.

STARTER:—Model 181 (1924) 339 (1925-26-27-28). Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 125 R.P.M. drawing 80 amperes at 4.5 volts. Starter switch is Model 1953. Brush spring tension is 2¼-2½ pounds each.

Starter Data (Model 181)

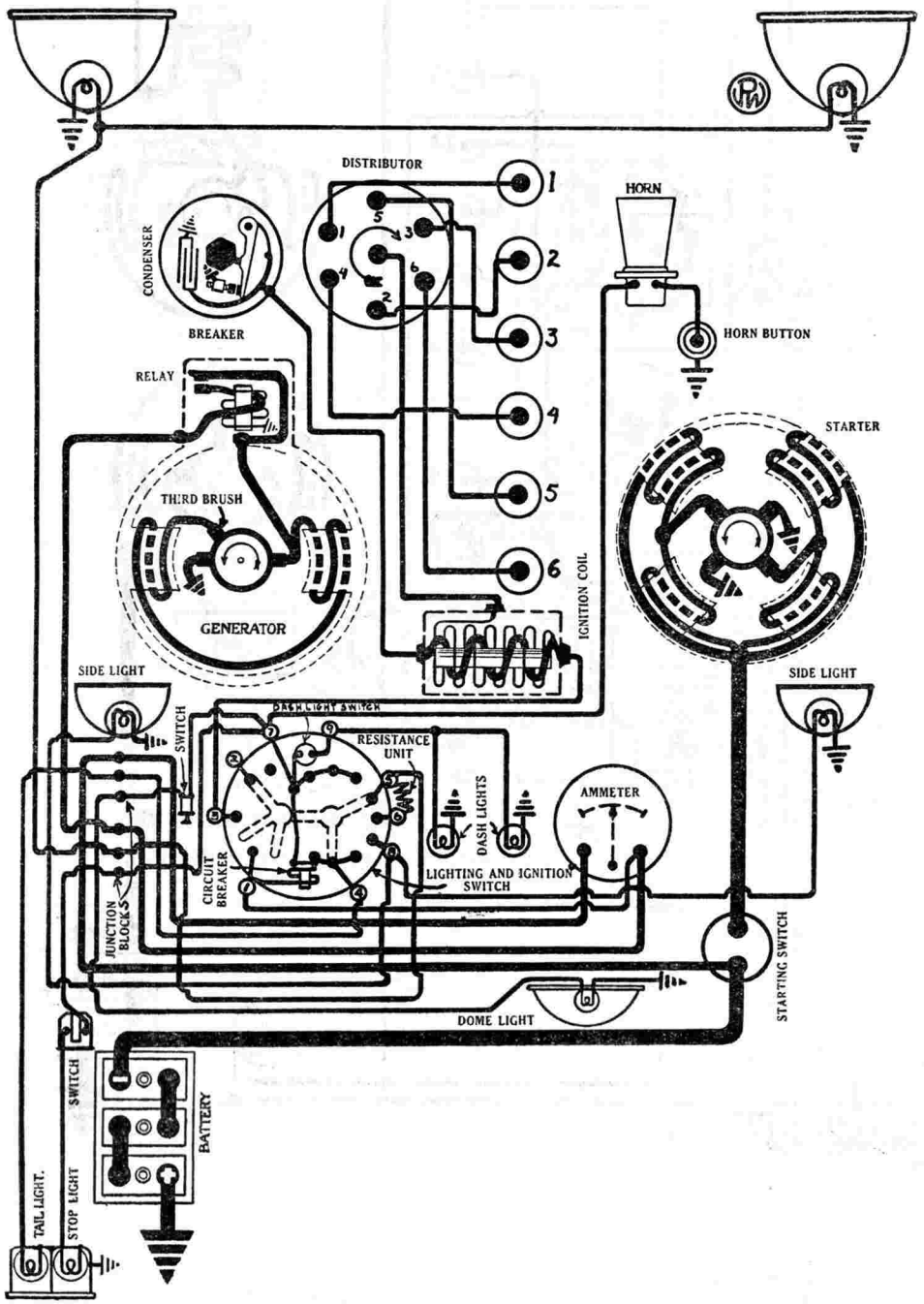
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	36
27 "	Lock	2.75	500

Starter Data (Model 339)

Torque	R.P.M.	Volts	Amperes
4.5 lb. ft.	700	5	200
19 "	Lock	3	500

Mounting:—Starter is sleeve mounted at right of engine on forward side of flywheel case. To remove starter, disconnect cable and remove large pilot set screw from flywheel case directly above starter sleeve. Then pull starter forward and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in starter oilers every month or each 1000 miles. Every six months remove grease plug in reduction gear case and repack gears with medium heavy cup grease. Once each year withdraw starter from mounting and saturate wick oiler in end of Bendix gear case.



KLEIBER

TOURING MODEL 80 (1924-1928)
SERIES NUMBERS 1001 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

GENERATOR:—Model 258. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen commutator cover band and shift third brush mounting bracket by means of the handle on the mounting plate. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The mounting plate is held in any position by friction clamp washers. Maximum charging rate is 15-17 amperes at 8 volts reached at 1600 R.P.M.

Generator Data

Amperes	R.P.M.
0	300
4	800
15-17	1600

Running as a motor, generator draws 5 amperes at 6 volts. Shunt field current is 3 amperes at 6 volts. Brush spring tension is 1¼-1¾ pounds each.

Mounting:—Generator is mounted at left of engine and is driven by extension of water pump shaft. To remove generator, disconnect lead and flexible hose coupling. Then remove four base mounting bolts and lift generator from place.

Oiling:—Put 8 to 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Relay is mounted on the generator. Relay closes at 300 R.P.M. when the generator voltage reaches 6.75-7.5 volts and opens with a discharge current of 0-3 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .015-.020 inch, contacts closed.

LIGHTING:—Delco-Remy Switch Model 1244. Head lights are 6-8 volt, 21 cp. S.C. Mazda No. 1129. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Side, dome, dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63. Dimming is through resistance on switch.

CIRCUIT BREAKER:—A vibrating circuit breaker on the back of the switch protects the lighting circuits. Circuit breaker begins to vibrate with a current of 25-30 amperes and limits the current to 10-15 amperes.

KLEIBER

NEW SEDAN MODEL (1928)
CONTINENTAL 15-S ENGINE
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite 613-SHK, 6 volt, 13 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 130 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22.5 hours. Battery is mounted on the left side under the driver's seat.

IGNITION:—Coil Model 525-C. Ignition coil is mounted on the generator at right of engine. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

Distributor Model 658-H. Breaker contacts separate .022 inch. Set contact gap by loosening the lock nut on stationary contact plate and turning eccentric adjusting screw until contact gap is .022 inch with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. There are two sets of breaker contacts on a single four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval for the Kleiber engine and contacts must be synchronized to secure correct ignition performance. See Timing. Distributor is semi-automatic. Maximum manual advance is 22 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 18 degrees at 3200 R.P.M.

Mounting:—Distributor is mounted at right of engine on rear of generator. To remove distributor, disconnect manual advance rod and primary lead. Remove head with cables intact. Then loosen mounting clamp directly under advance arm clamp screw and lift distributor from place.

Oiling:—Refill the grease cup under the distributor head and turn down two turns every 1000 miles. Every 5000 miles remove the head and rotor and saturate the wick oiler in the center of the shaft with light engine oil. Put a small amount of heavy grease on the face of the breaker cam.

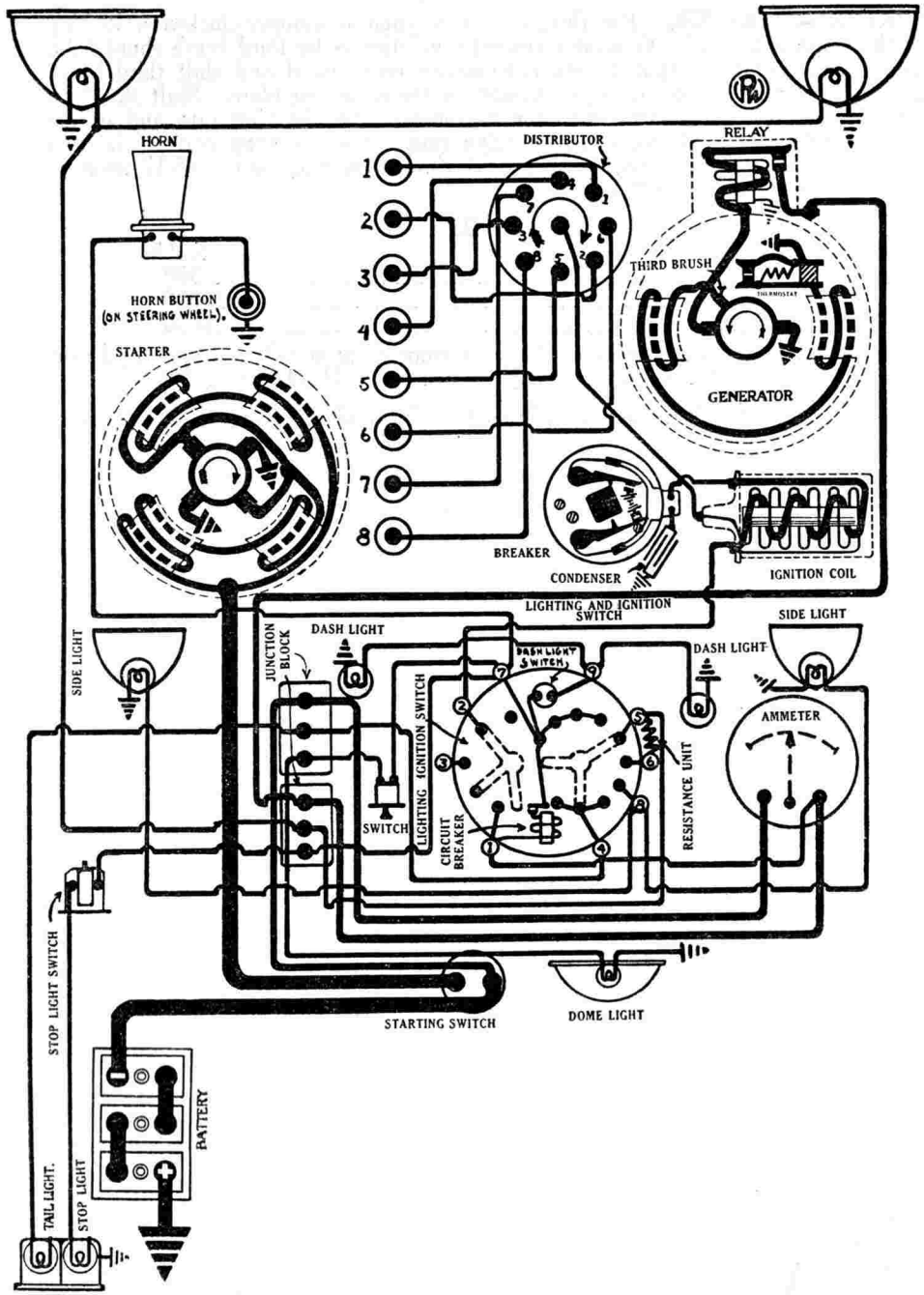
Timing:—Synchronization of Contacts. To synchronize contacts, use Delco-Remy Tool, Part No. 820738, and follow directions given on Page S-2 of Reed Service Manual. Contacts can be synchronized without tool after distributor has been timed to engine by turning over engine 90 degrees from firing position of piston No. 1 when piston No. 6 will read top dead center entering firing stroke. Make certain that manual spark control is fully retarded. If one set of breaker contacts are not separating, loosen lock screws on breaker plate and turn eccentric adjusting screw until contacts begin to separate. Tighten the lock screw and check contact gap. If it is outside limits of .018-.024 inch, reset at .022 inch and repeat synchronizing operation.

Timing Distributor to Engine:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully retard spark lever. Continue to crank engine until piston reaches top dead center. If one set of contacts is not opening, loosen advance arm clamp screw and rotate distributor until contacts open. Tighten the clamp screw. Connect the segment opposite the rotor to the spark plug in cylinder No. 1 and connect remaining spark plugs in order 6-2-5-8-3-7-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1 3/8 inches; stem diameter, 5/16 inch; valve lift, 5/16 inch. Tappet clearance, .004 inch (hot). Inlet valves open 8 degrees after top dead center and close 40 degrees after lower dead center.



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KLEIBER

NEW SEDAN MODEL (1928)
CONTINENTAL 15-S ENGINE
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

EXHAUST VALVES:—Head diameter, 1¼ inches; stem diameter, 5/16 inch; valve lift, 5/16 inch. Tappet clearance, .006 inch (hot). Exhaust valves open 40 degrees before lower dead center and close 8 degrees after top dead center.

STARTER:—Model 724-J. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, looking at the commutator end. Starter brush spring tension is 24-28 ounces. Starter switch is Model 406-A.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3500	5	70
22 "	Lock	3	600

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove 3 flange mounting cap screws. Then pull starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the starter oiler every 1000 miles.

GENERATOR:—Model 940-K. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165 degrees F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the commutator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, maximum charging rate is 20 amperes reached at 1450 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
20	8.5	1450	9-12	7.5	2000

Generator motoring draws 5.5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is flange mounted at right of engine on the rear of timing chain case. To remove generator, take off ignition coil and distributor. Then loosen timing chain adjustment screw and take out 2 flange mounting cap screws. Pull generator to rear and lift from place, taking care not to disturb mesh of timing chain on generator sprocket.

Timing Chain Adjustment:—Timing chain tension is adjusted by shifting generator. To adjust chain, loosen the 2 flange mounting cap screws and turn up chain adjusting set screw on side of generator flange until chain begins to hum with engine running. Then back off adjusting set screw until noise stops and tighten flange mounting cap screws. With proper adjustment chain will run without noise.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay closes when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 3 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 1244. Lighting switch is mounted on instrument board. Head lights are 6-8 volt, 21 cp. S.C. Mazda No. 1129. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Side, dome, dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63. Dimming is through resistance on switch.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the back of the switch. It begins to vibrate when the current reaches 25-30 amperes and continues to operate limiting the current to 10-15 amperes until the cause of the excessive current flow is removed.

KLINE

MODEL 6-36, 38, 42 (1915-16-17-18)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WESTINGHOUSE IGNITION

Battery.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate .006 inch to .008 inch. Should they become burned or pitted, resurface them with a fine, flat jeweler's file. The springs should exert just enough pressure on the distributor brushes to force them ¼ inch past the top of holder when the distributor cap is removed, but should retain them firmly so that they do not tend fo fall out. Brushes must move freely in their holders. Be sure that both brushes are in place when replacing the rotor. (There is a brush on both the top and bottom side of the rotor.)

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever about 1 inch from the fully retarded position. (First see that breaker assembly is fully retarded when spark control lever is in the fully retarded position).

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be about .025 inch.

Ballast Resistor.—There is a ballast resistor in the ignition switch. A fuse must not be permanently substituted for this resistor. In case it is necessary to operate the car with the ballast defective, a 5 ampere fuse may be used temporarily but the ballast must be replaced as soon as possible, as continued operation without it will result in serious burning of the timer contacts.

Oiling.—Put several drops of light machine oil in oiler at the side of breaker assembly unit every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

Starter.—Starter is connected to the engine through a Bendix drive. It should run at 1500 R. P. M., when delivering a 2 pound-feet torque. It should develop 11.5 pound-feet lock torque, taking about 400 amperes.

Oiling.—Refill the oil cup under the bearings every month.

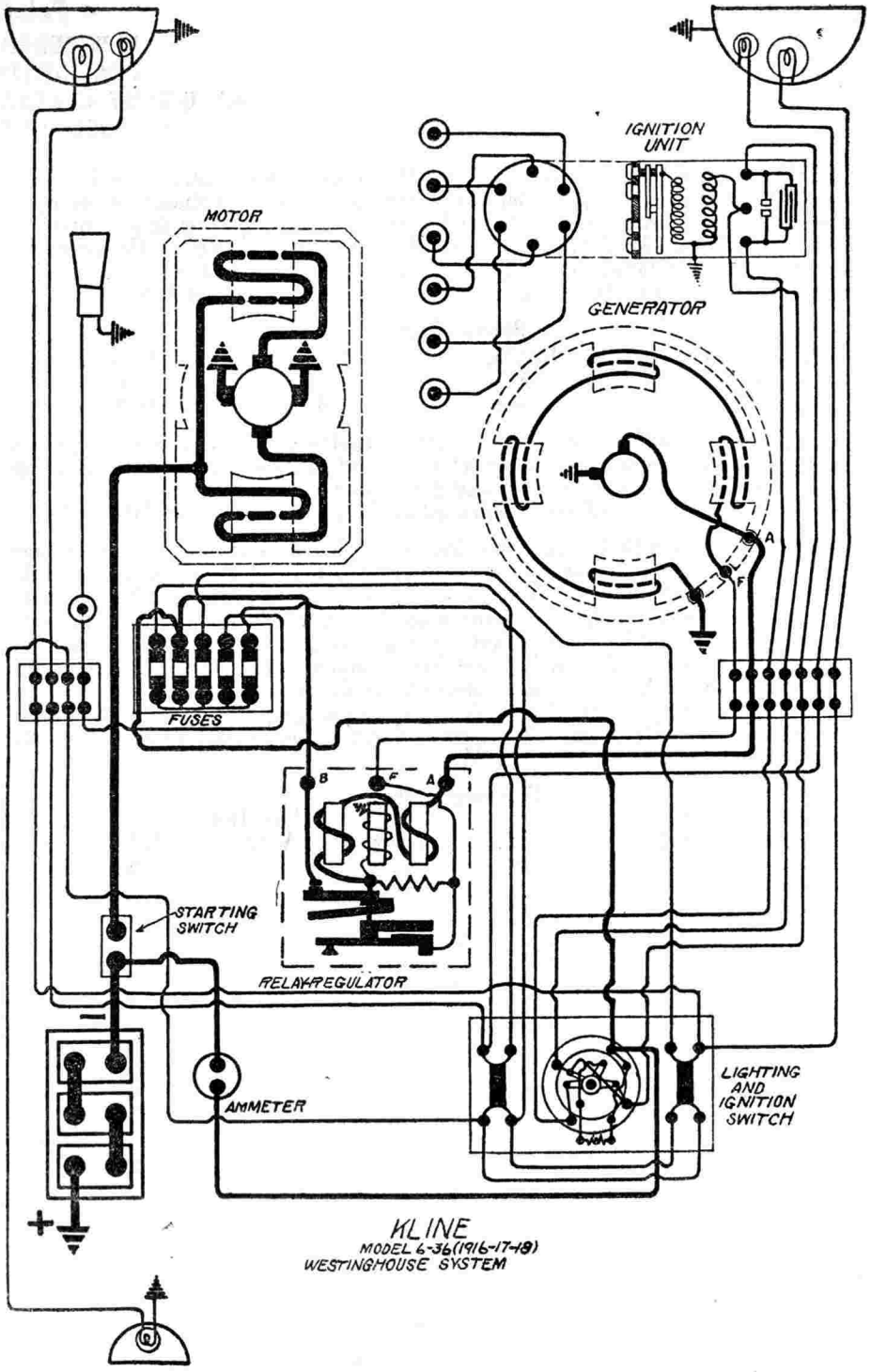
Generator.—Generator voltage regulation is by a vibrating regulator. Relay is combined with regulator. Charging current should be 1 to 1.5 amperes at closing and the discharge current .75 to 1.25 amperes at opening of relay. Relay contacts should separate .013 inch to .018 inch. The air gap between relay armature (moving member) and coil core should be .027 inch to .031 inch. Adjust relay by bending the brass prongs. Clean relay and regulator contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a piece of well worn No. 00 sand paper, drawing a piece of unglazed paper between them to remove all grit before again putting into service. Generator should deliver 14 amperes at 7.5 volts.

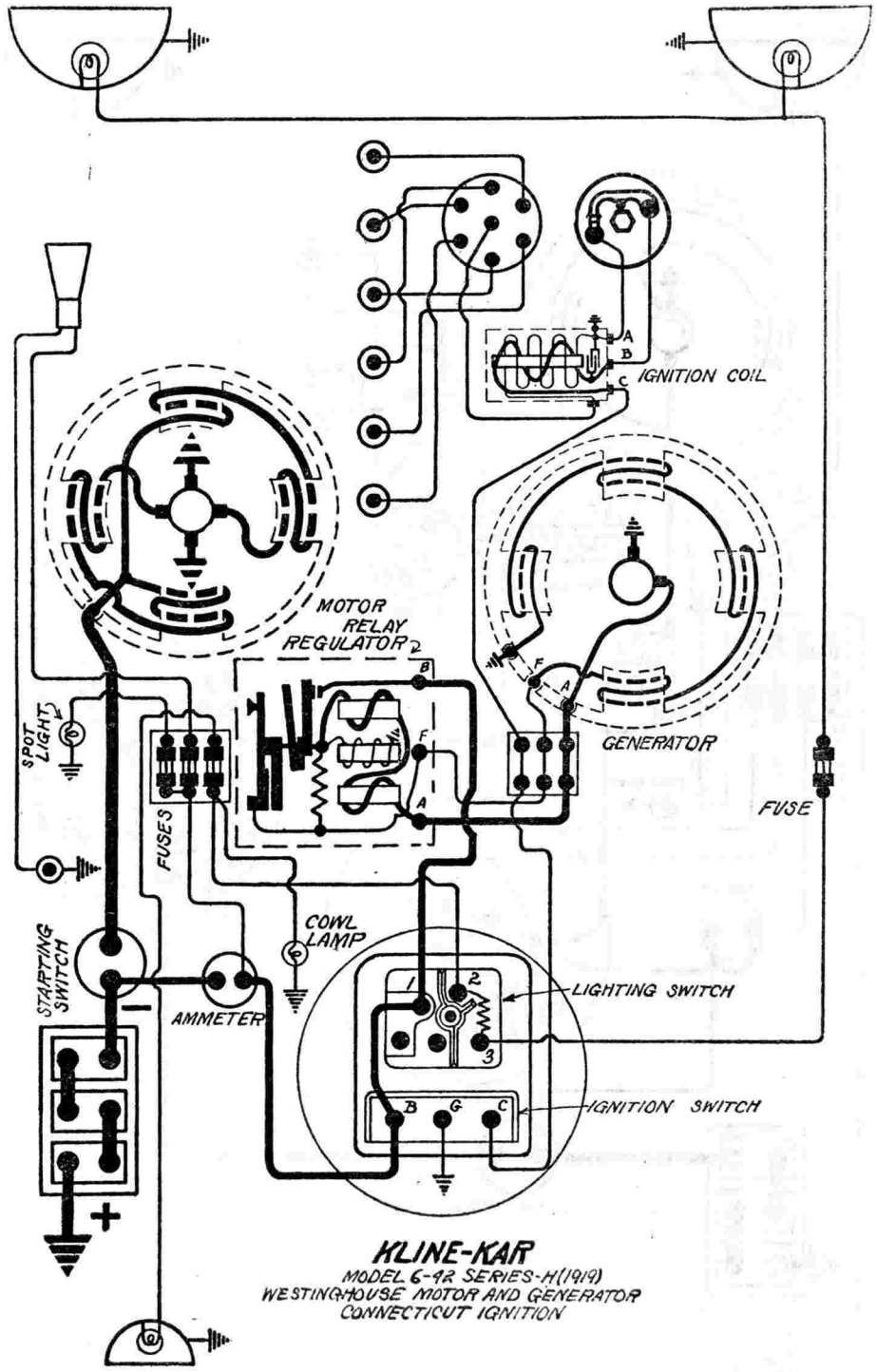
Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 15-18 cp. Dimmer lamps are 6-8 volts, 4 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.

Fuses.—Fuses are 15 ampere.

Model Numbers.—Generator is Frame No. 400. Motor is Frame No. 318.





KLINE-KAR

MODEL 6-42-H (1918-19). SERIAL NOS. 6000 TO 7000
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Model 17 Igniter. Type M Coil. Type 96-Y Switch. Breaker contacts separate .020 to .025 inch. When the condition of the contacts affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Frame 710. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes
0 lb. ft.	4000	40
2 lb. ft.	1400	120
4 lb. ft.	1000	180
8 lb. ft.	700	280
14 lb. ft.	Lock	450

OILING.—Put 5 or 6 drops of light engine oil in each of he starter oilers every month.

GENERATOR.—Frame 400-R. Generator voltage regulation is by vibrating regulator. Maximum generator output is 15 amperes at 6.8 volts, reached at 1400 R.P.M. of the armature or 25 miles per hour.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is drven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY-REGULATOR.—Relay and regulator are combined into one unit. Relay closes at 550-600 R.P.M. of armature or 8-10 miles per hour, and opens at 500-550 R.P.M. of armature or 6-8 miles per hour. Charging current is .5 to 1 ampere at closing and the discharge current 1-3 amperes at opening of relay contacts. Relay is adjusted by bending the two brass prongs at the end of the moving member. To adjust regulator, connect a voltmeter between the "A" generator terminal and ground. Operate the generator at 1400 R.P.M., charging a battery of 1.250 solution. Then adjust the regulator spring tension by means of the thumb screw, until the voltmeter indicates 7 volts. Air gap between regulator armature (moving member) and coil core is .045 to .055 inch. Air gap between relay armature and coil core is .055 to .060 inch. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Fuses are 15 ampere.

KLINE KAR

MODEL 55. SERIES K, KA, L (1920-21-22-23)
WAGNER GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—Prest-O-Lite, Type 613-RHN, 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model 225-Y. Distributor Model No. 16. Breaker contacts separate .020 to .022 inch. They are made of tungsten. When the condition of the contacts affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Timing.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plugs.—Diameter, 7/8 inch. Spark gaps are .022 inch.

STARTER.—Model EM-320, 36-T. The direction of rotation is clockwise, looking at the commutator end. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 100 R.P.M., taking 200 amperes. Lock torque is 11.5 pound-feet, current being 475 amperes. The brush tension is 1200 grams.

Oiling.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

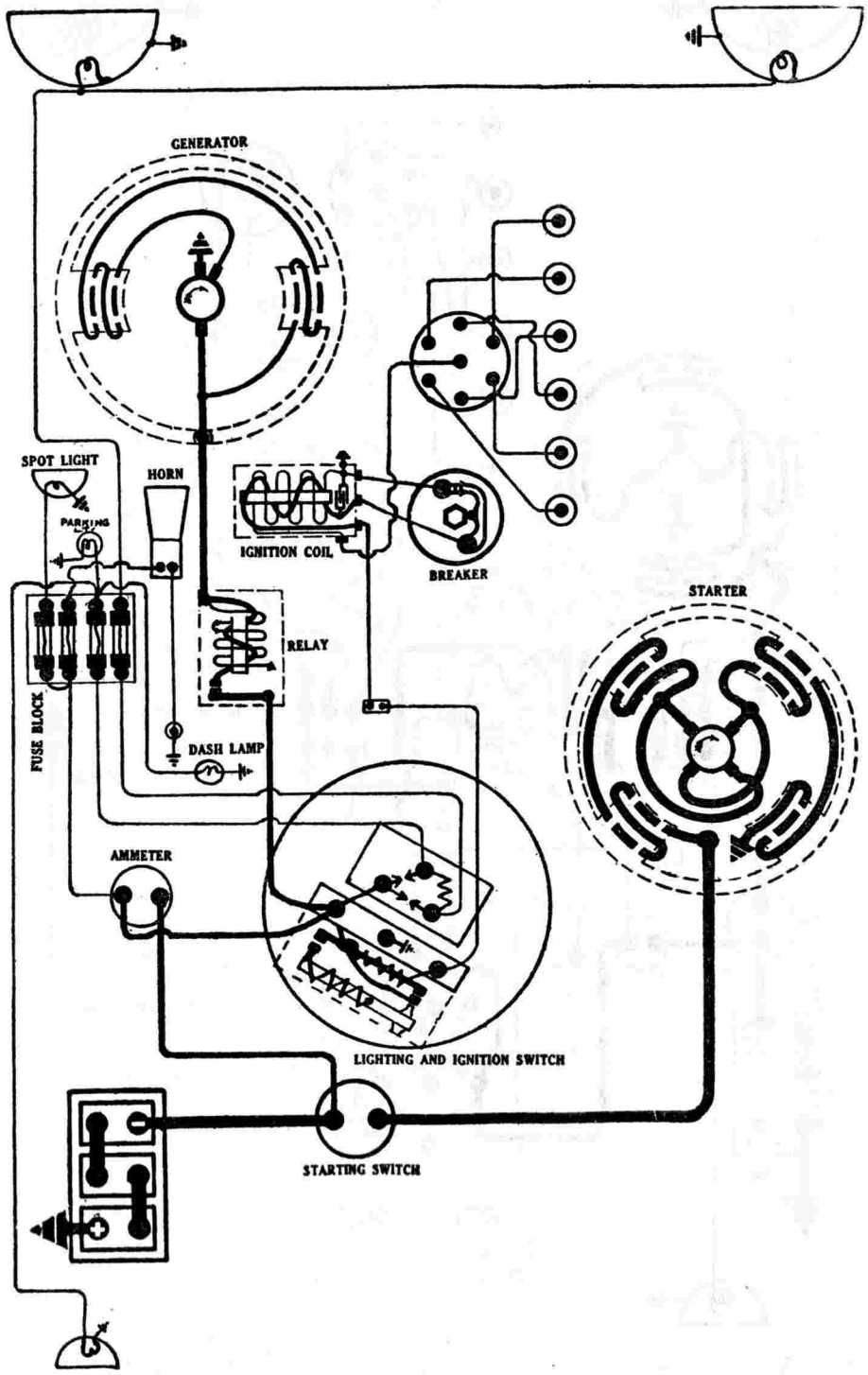
GENERATOR.—Model EM-305, 45-W. The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Maximum current output is 16 amperes, reached at 1400 R.P.M. of the armature or 20-24 miles per hour. The tension of all of the brushes is 450 grams.

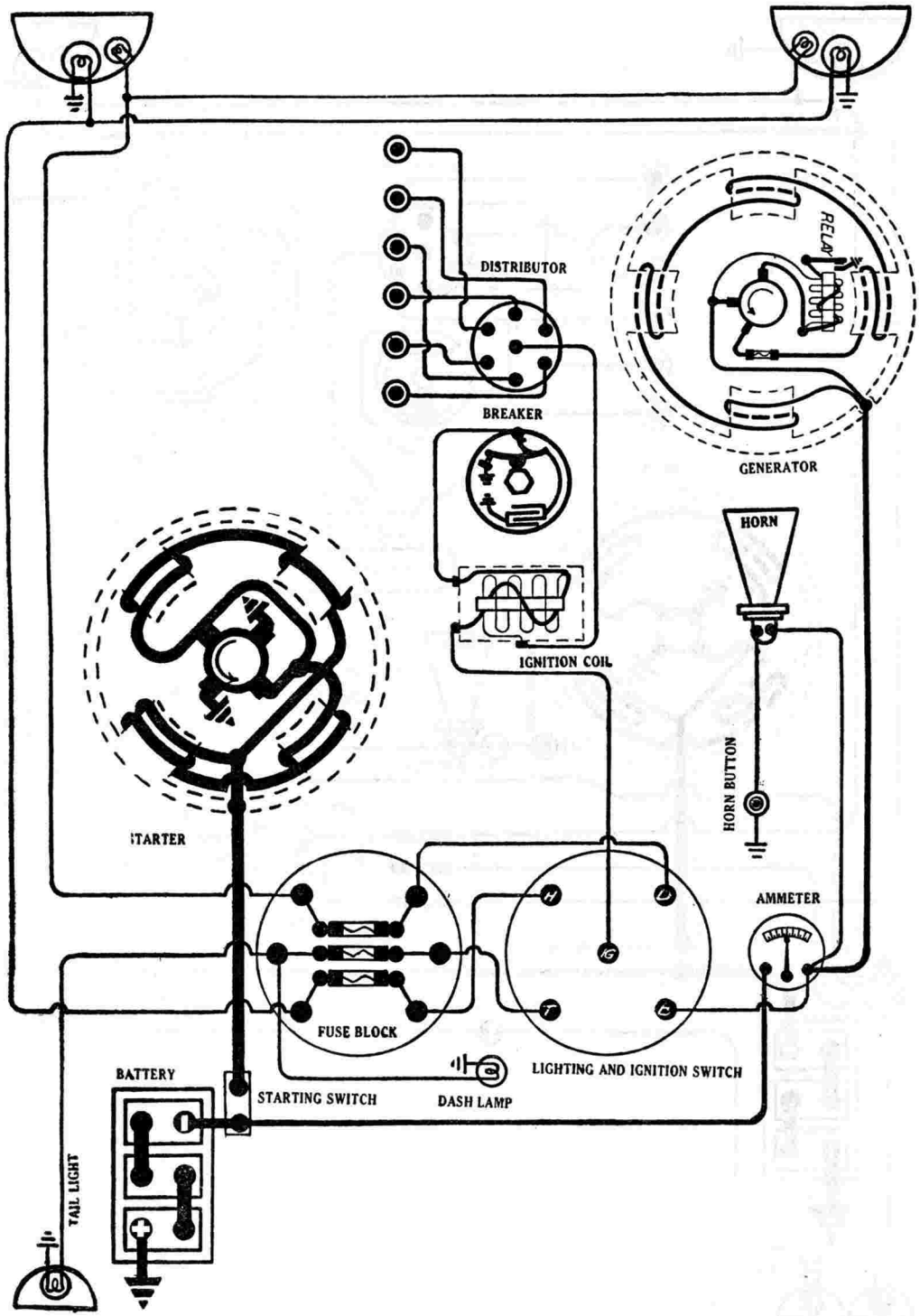
Oiling.—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Model K-44. Relay closes at 5 miles per hour and opens at 3 miles per hour. Charging current is 2 amperes at closing, and the discharge current 0-4 amperes at the opening of relay contacts. Contacts separate .035 to .065 inch. Air gap between relay armature and coil core is .025 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6 volt, 21 cp. Dash and tail lamps are 6 volt, 2 cp.

FUSES.—Head-lamp fuse is 15 ampere. Horn fuse is 10 ampere. Tail lamp fuse is 5 ampere.





MODEL A (1921-22)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WESTINGHOUSE IGNITION

BATTERY.—Prest-O-Lite, Type 617-SHC, 6 volts, 160 ampere-hour capacity. The starting capacity is 170 amperes for 20 minutes, and the lighting capacity is 5 amperes for 32 hours. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .012-.016 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone or with a flat jeweler's file. The bumper on the contact spring is 1/8 inch off center from the line through the center of the shaft and terminal screw, this offset being opposite to the direction of rotation of the cam. The above adjustment is made by bending the solid stem at the terminal block. A pull of 20-25 ounces, applied to the movable contact, is required to separate the contacts .020 inch. The spring pressure is adjusted by bending the solid stem at the point of contact with the contact spring. Resistance of the primary winding of the ignition coil is 1 ohm. Resistance of the secondary winding is 3700-4700 ohms.

Oiling.—Put 4 or 5 drops of light engine oil into the distributor oiler on the side of the distributor housing once every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

Timing.—Breaker contacts begin to separate when piston No. 1 on compression stroke is at top dead center, spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plugs.—The spark plug diameters are 7/8 inch, and the gaps are .030 inch.

STARTER.—Frame No. 100. The direction of rotation is counter-clockwise, looking at commutator end. The starter is connected to the engine by a Bendix drive. Cranks the engine at 1600 R.P.M. of armature, taking a current of 145 amperes at 5.5 volts.

Starter Test Data

Amperes	Volts	R.P.M.	Torque
35-45	5.5	4100-7000	0
475	4	Lock	12 lb. ft.

The brush tension should be 1 1/4 to 1 3/4 pounds on each brush.

Oiling.—Put 4 or 5 drops of light engine oil into each starter oiler once a month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles.

GENERATOR.—Frame No. 760. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. To adjust the charging rate, loosen the nut inside of the generator end bracket opposite the third brush. Move the third brush in the direction of rotation (counter-clockwise) to increase the charging rate. To decrease the charging rate, move the third brush in the opposite direction (clockwise). The maximum charging rate is 14 amperes, reached at 1250 R.P.M. of armature, when the generator is hot.

Generator Test Data

Amperes	R.P.M.
6	725
11-14 (Max.)	1250
7-8	2000

Generator motoring freely takes a current of 3.5-5.0 amperes at 6.0-6.3 volts. The field draws a current of 2.5 amperes at 6.0-6.3 volts.

Oiling.—Put 4 or 5 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Relay closes at 7 M.P.H. or 575 R.P.M. of armature, at 6.2-6.5 volts, and opens at 5 M.P.H. or 525-575 R.P.M. of armature. Adjust the spring tension on the relay armature so that the contacts open with a current discharge of 0-3 amperes. Adjust the air gap between the relay armature and coil core so that the contacts close when the voltage of the generator reaches 6.2-6.5 volts. The contact gap is .030-.035 inch, and the air gap between the relay armature and coil core is.005 inch, contacts fully closed. Resistance of the shunt coil is 68 ohms. Clean the relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before putting into service again.

LIGHTING:—Briggs & Stratton Switch, Model 1732. Head lamps are 6-8 volt, 21 cp. Auxiliary head lamps are 6-8 volt, 4 cp. Dash, tail, side and dome lamps are each 6-8 volt, 2 cp. Stop light is 6-8 volt, 21 cp. All lamps have single contact base.

KURTZ

MODEL 65 (1923-24)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WESTINGHOUSE IGNITION

BATTERY.—Prest-O-Lite, Type 613-SHC, 6 volt, 100 ampere-hour. The starting capacity is 120 amperes for 20 minutes. The lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION:—Breaker contacts separate .012-.016 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone or with a flat jeweler's file. The bumper on the contact spring is 1/8 inch off center from the line through the center of the shaft and terminal screw, this offset being opposite to the direction of rotation of the cam. The above adjustment is made by bending the solid stem at the terminal block. A pull of 20-25 ounces, applied to the movable contact, is required to separate the contacts .020 inch.

Oiling:—Put 4 or 5 drops of light engine oil into the distributor oiler on the side of the distributor housing once every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

Timing:—Breaker contacts begin to separate when piston No. 1 on compression stroke is at top dead center, spark control lever and breaker assembly fully retarded.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—The spark plug diameters are 7/8 inch, and the gaps are .030 inch.

STARTER:—Frame No. 100. The direction of rotation is counter-clockwise, looking at commutator end. The starter is connected to the engine by a Bendix drive. Cranks the engine at 1600 R.P.M. of armature, taking a current of 145 amperes at 5.5 volts.

Starter Data

Amperes	Volts	R.P.M.	Torque
35-45	5.5	4100-7000	0
475	4	Lock	12 lb. ft.

The brush tension should be 1¼ to 1¾ pounds on each brush.

Oiling:—Put 4 or 5 drops of light engine oil into each starter oiler once a month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles.

GENERATOR:—Frame No. 760. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. To adjust the charging rate, loosen the nut inside of the generator end bracket opposite the third brush. Move the third brush in the direction of rotation (counter-clockwise) to increase the charging rate. To decrease the charging rate, move the third brush in the opposite direction (clockwise). The maximum charging rate is 14 amperes, reached at 1250 R.P.M. of armature, when the generator is hot.

Generator Data

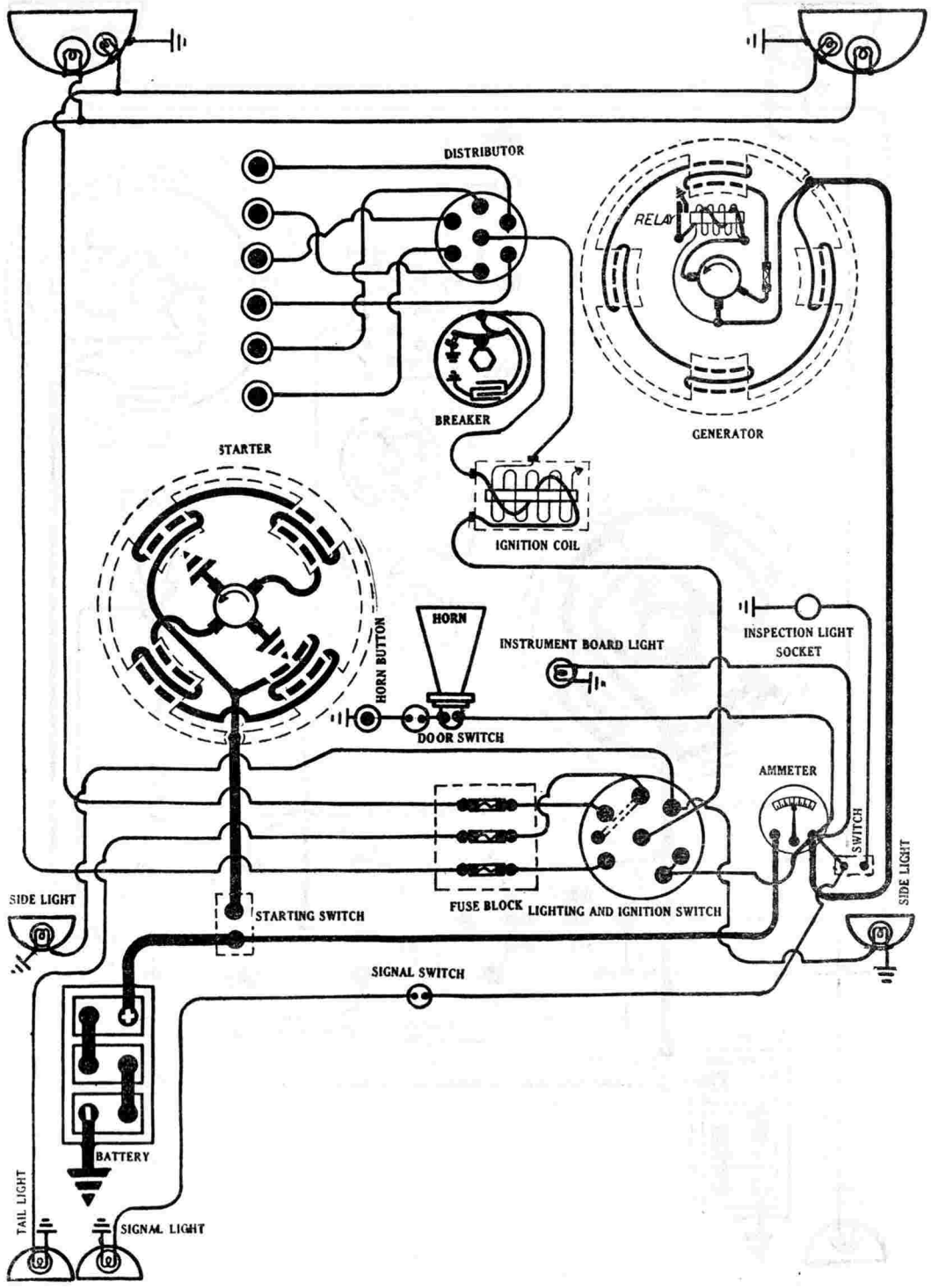
Amperes	R.P.M.
6	725
11-14 (Max.)	1250
7-8	2000

Generator motoring freely takes a current of 3.5-5.0 amperes at 6.0-6.3 volts. The field draws a current of 2.5 amperes at 6.0-6.3 volts.

Oiling:—Put 4 or 5 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY:—Relay closes at 7 M.P.H. or 575 R.P.M. of armature, at 6.2-6.5 volts, and opens at 5 M.P.H. or 525-575 R.P.M. of armature. Adjust the spring tension on the relay armature so that the contacts open with a current discharge of 0-3 amperes. Adjust the air gap between the relay armature and coil core so that the contacts close when the voltage of the generator reaches 6.2-6.5 volts. The contact gap is .030-.035 inch, and the air gap between the relay armature and coil core is .005 inch, contacts fully closed.

LIGHTING:—Briggs & Stratton Switch, Model 2367. Head lamps are 6-8 volt, 21 cp. Auxiliary head lamps are 6-8 volt, 4 cp. Dash, tail, side and dome lamps are each 6-8 volt, 2 cp. Stop light is 6-8 volt, 21 cp. All lamps have single contact base.

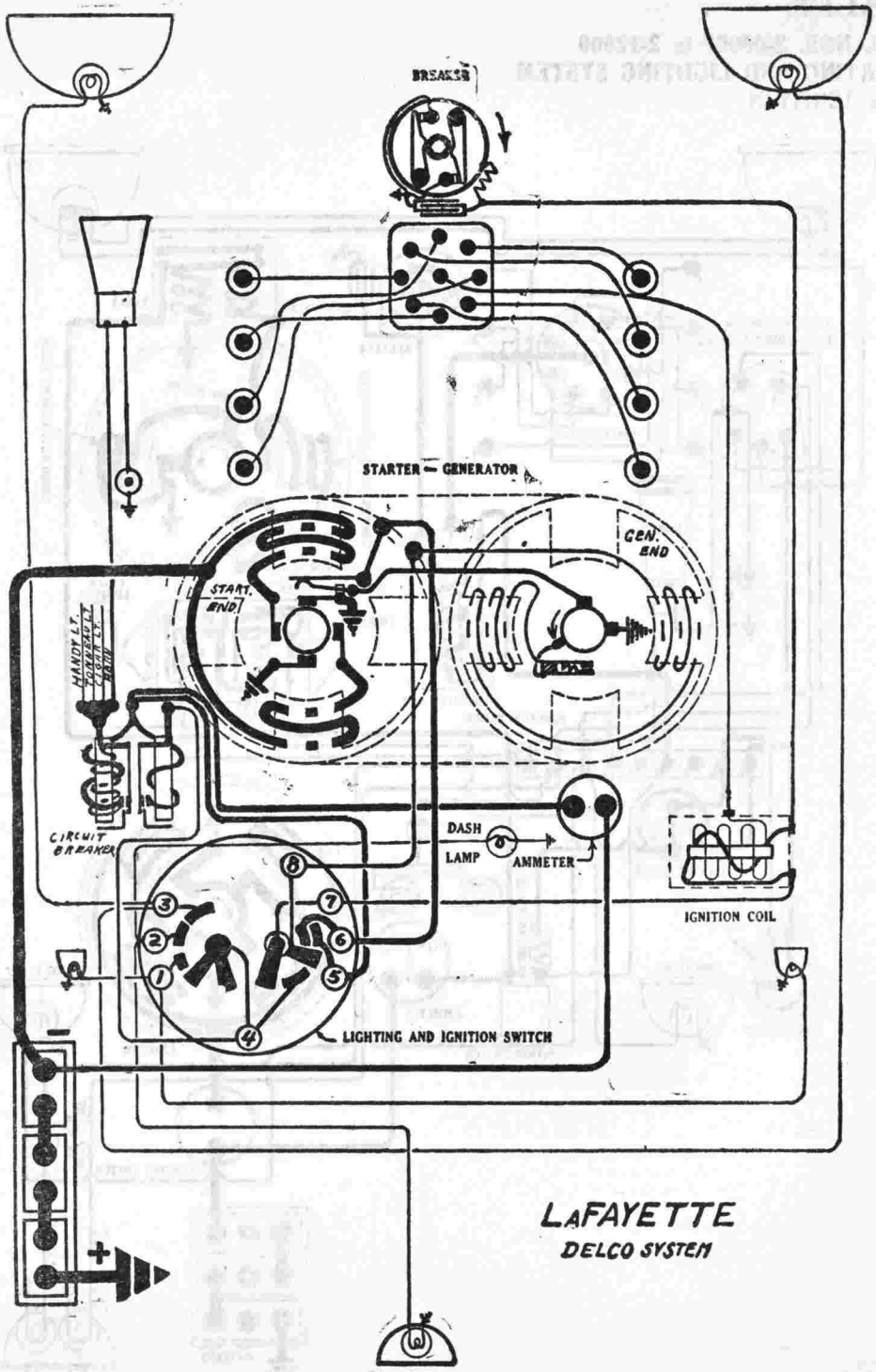


LAFAYETTE

MODEL 134 (1921-22-23-24)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION



BATTERY.—Exide, Type 3-LXRV-15-2, 6 volt, 130 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model No.2115. Distributor Model No. 5221. Breaker contacts separate .018 inch. Both sets of contacts open at the same instant. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Put several drops of light engine oil in timer bearing every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Timing.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever advanced one-third.

Firing Order.—The firing order is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

Spark Plug Gaps.—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

STARTER-GENERATOR.—Model No. 187. Starter and generator are combined into one unit but are electrically separate. The starter is connected to the engine by a set of reduction gears and a pinion shifted by the operator. Two overrunning clutches are provided. Depressing the starting pedal opens the generator circuit, meshes the reduction gears and allows the motor brushes to come in contact with the commutator, closing the starter circuit and cranking the engine. When the pedal is released, a spring reverses these operations. Lock torque is 10 pound-feet at 3 volts. The motor running free takes 60 amperes at 6 volts. The brush tension of the motor brushes should be 2¼ to 2¾ pounds each.

GENERATOR.—Generator current regulation is by the third brush system. Thermostat opens at 195-200° F., cutting in a resistance, reducing the charging rate about 50 per cent. The maximum charging rate of 18 amperes is reached at 1400 R.P.M. of the armature or 35 M.P.H., car speed in high gear.

Amperes	Motor-Generator Data. No. 187	R.P.M.
Neutral		400
6		800
10-12		1000
18		1400

When generator is operating freely as a motor, with overrunning clutch as the only retarding force, the current is 5.5 amperes. To increase the charging rate, move the third brush in the direction of armature rotation. To decrease charging rate, move the third brush in the opposite direction. Reseat the brush after adjusting the position. The tension of the generator brushes should be 1½ to 1¾ pounds each.

Oiling.—Put 4 or 5 drops of light engine oil in each of the starter-generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Side lamps are 6-8 volt, 4 cp. S.C. Dash and tail lamps are each 3-4 volt, 2 cp. S.C. Dome lamp is 6-8 volt, 4 cp. S.C.

CIRCUIT BREAKERS.—There is a vibrating breaker in the circuit to the head, side, dash and tail lamps, which takes the place of fuses. It requires a current of 25 amperes to start this device vibrating, but when vibrating a current of 3 to 5 amperes will cause it to continue. There is a lockout circuit breaker in the circuit to the horn, tonneau lamp and handy lamp socket. A current of 25 amperes will cause this device to open the circuit.

LA SALLE

SERIES 303 (1927), SERIAL NOS. 2-00001 to 2-12000
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Exide, Type 3-XC-15-I-G, 6 volt. Starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 minutes. The positive (+) terminal is grounded. Battery is mounted under the front seat on the right hand side.

IGNITION:—Coil Model 2195. Distributor Model 4023. Breaker contacts separate .022-.027 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 38° (engine). Automatic advance starts at 600 R.P.M. (engine). Maximum automatic advance is 20° (engine) at 2800 R.P.M. Breaker arm spring tension is 16-20 ounces. There are two breakers on a four sided cam opening alternately at intervals of 45° corresponding to 90° of crankshaft rotation which is the correct firing interval for this engine. The firing interval must be accurately set. (See Timing.)

Mounting:—Ignition coil is mounted on side of distributor support. Distributor is mounted at front of engine between the cylinder banks. To remove distributor, disconnect manual advance rod and primary lead and remove distributor head with cables attached. Then remove hold-down screw and lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every month or each 1000 miles.

Timing:—Synchronizing of breaker contacts to secure firing interval must be done before ignition timing is set. To set firing interval, use Delco-Remy Part No. 822572. Loosen taper screw in center of breaker cam and remove regular firing cam. Place synchronizing tool on shaft so that fiber bumper of contact arm mounted on stationary plate rests in notch of tool. If the fiber bumper of the other contact arm does not rest in the other notch, loosen the two lockscrews on the mounting plate and turn the eccentric adjusting screw until the proper adjustment is reached. Tighten the lockscrews and replace the regular firing cam. To set timing, crank engine until piston No. 1 entering power stroke reaches a position 7/8 inch (on the flywheel) before top dead center. At this point the flywheel mark 'IG/A-1-5' will be opposite the indicator on the flywheel case. The manual spark control lever must be in the fully advanced position.

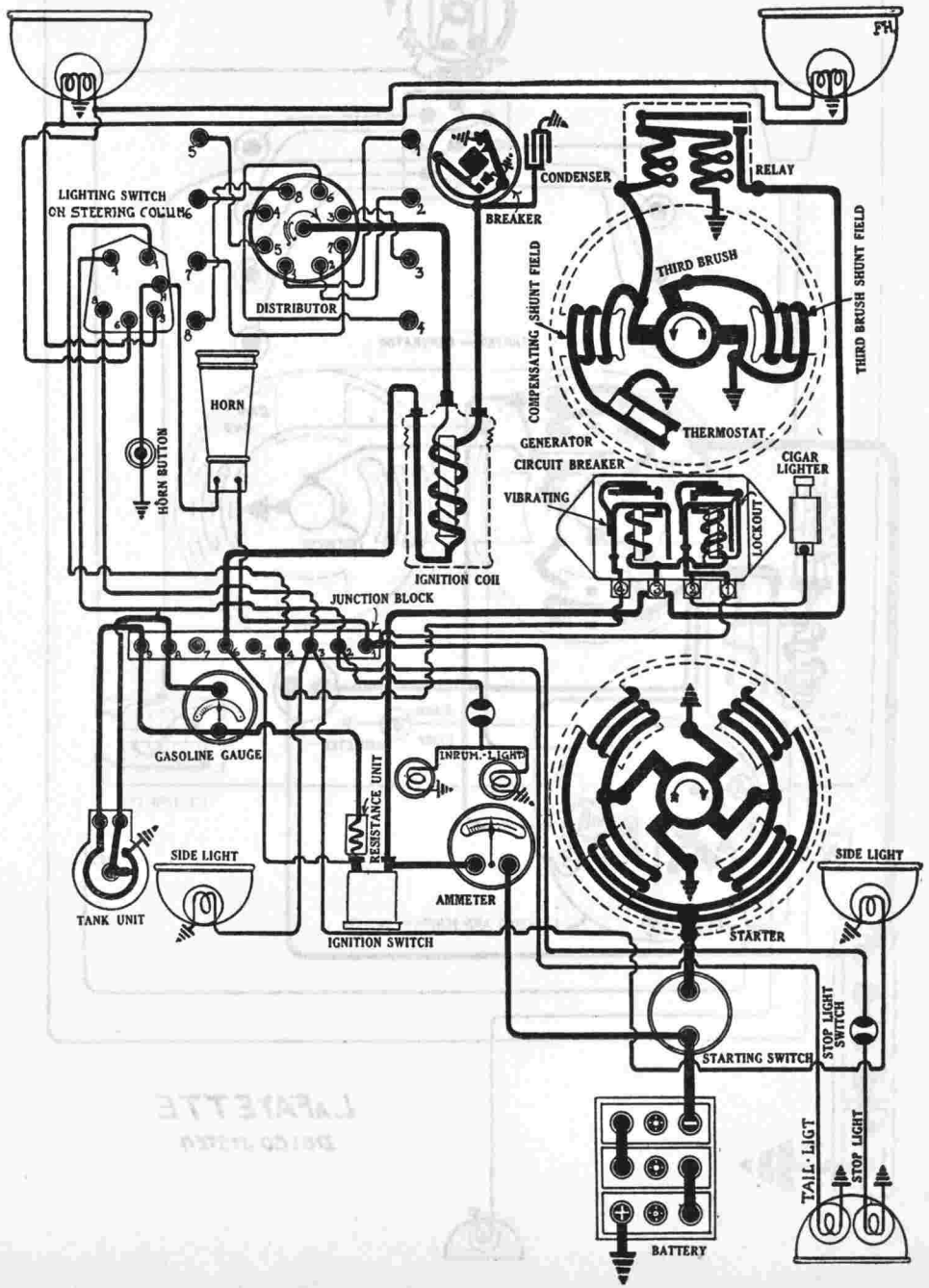
NOTE:—A few of the first La Salle engines had the ignition mark 'IG/A-1-5' placed 1 3/16 inches before top dead center. On these engines the mark should be disregarded and the breaker contacts timd to separate 7/8 inch before top dead center.

Valve Timing:—INLET VALVES:—Head diameter, 1½ inches; stem diameter, 3/8 inch; stem length, 6 17/64 inches; valve lift, 25/64 inch; tappet clearance, .004 inch (cold); spring pressure, 133 pounds (compressed to 2 9/64 inches). Inlet valves open 11° 2′ before top dead center and close 58° 38′ after lower dead center.

EXHAUST VALVES:—Head diameter, 1½ inches; stem diameter, 3/8 inch; stem length, 6¼ inches (over all); valve lift, 25/64 inch; tappet clearance, .006 inch (cold); spring pressure, 133 pounds (compressed to 2 9/64 inches). Exhaust valves open 38° 12′ before lower dead center and close 7° 38′ after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

Firing Order:—The firing order is 1L-4R-4L-2L-3R-3L-2R-1R. No. 1 cylinder is nearest the radiator. Right hand block is right viewed from driver's seat.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Gaps are .032 inch.



LA SALLE

SERIES 303 (1927) SERIAL NOS. 2-00001 to 2-12000
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

STARTER:—Model 725-B. Starter is connected to the engine through a mechanical gear shift connected to the starter pedal. The direction of rotation is clockwise, looking at the commutator end. Starter brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15.5 "	Lock	3	600

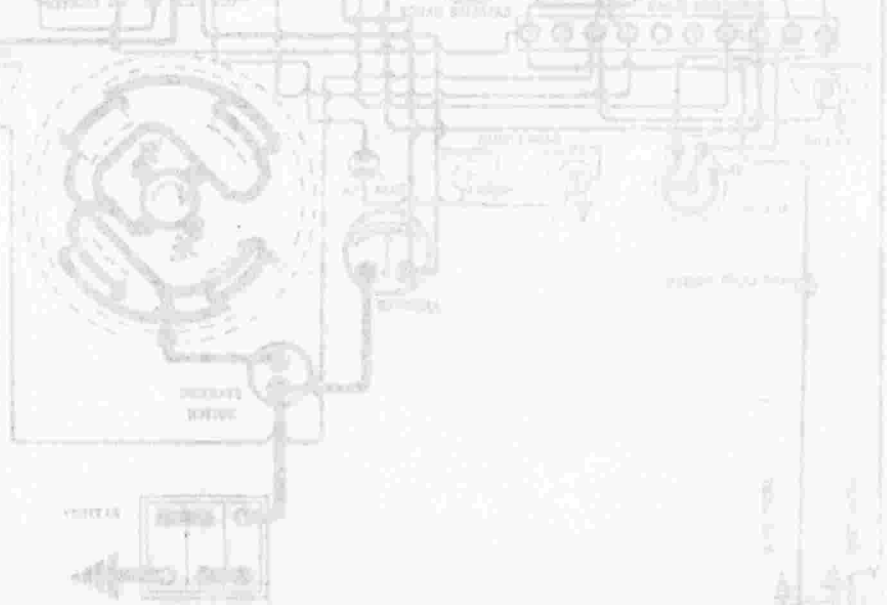
Mounting:—Starter is mounted on rear of flywheel housing on right side. To remove starter, disconnect cable and starter pedal linkage and remove three flange mounting cap screws. Then slide starter to rear and lift from place.

Oiling:—Starter is equipped with oilless bearings. They require no attention.

GENERATOR:—Model 370. The direction of rotation is counter-clockwise, looking at the commutator end. Generator is of split field type. A straight shunt field is wound on one pole piece with a thermostat in circuit. Thermostat contacts open at 175°F. opening the field circuit and rendering this field inoperative. A third brush shunt field is wound on the other pole. Generator output is adjusted by shifting the third brush. To adjust generator output, loosen the commutator cover band and shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any position by spring washers. The maximum charging rate of 18-22 amperes is reached at 1600 R.P.M. or 22-25 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
18-22	8.6	1600	12	7.4	1200



Third brush shunt field draws 4.25 amperes at 6 volts. Straight shunt field draws .75 amperes at 6 volts. Brush spring tension is 16-20 ounces.

Mounting:—Generator is mounted at right of engine and is driven in tandem with the water pump. To remove generator, disconnect battery wire and remove three mounting nuts. Then pull generator to rear.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Model 266-N. Relay is mounted on the generator. Relay closes at approximately 8 M.P.H. when the generator voltage reaches 7.75 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch, contacts closed.

LIGHTING:—Head lamps are 6-8 volt, 21 cp. double filament using lower 21 cp. filament instead of dimming system. Stop lamp is 6-8 volt, 21 cp. S.C. Side, dash, tail and dome lamps are each 6-8 volt, 3 cp. S.C.

Switches:—Delco-Remy Lighting Switch Model 1313 is mounted at the foot of the steering column. Ignition switch is Model 1285.

CIRCUIT BREAKER:—Model 5759. A combined vibrating and lockout circuit breaker is mounted on the dash. The vibrating unit protects the lighting circuits. It begins to operate with a current of 25-30 amperes and limits the current flow to 10-15 amperes. The lockout circuit breaker protects the horn, cigar lighter, stop light and body light circuits. It opens the circuit when the current reaches 25-30 amperes.

LA SALLE

SERIES 303 (1927), SERIAL NOS. 2-12001 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Exide, Type 3-XC-15-I-G. 6 volt. Starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The positive (+) terminal is grounded. Battery is mounted under the front seat on the right side.

IGNITION:—Coil Model 2195. Distributor Model 4032. Breaker contacts separate .022-.027 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 38° (engine). Automatic advance begins at 600 R.P.M. (engine). Maximum automatic advance is 20° at 2800 R.P.M. Breaker arm spring tension is 16-20 ounces. There are two breakers on a four sided cam opening alternately at intervals of 45° corresponding to 90° of crankshaft rotation which is the correct firing interval for the La Salle engine. The firing interval must be accurately set (see Timing).

Mounting:—The ignition system is equipped with an Electrolock switch. This must be removed from the car with the distributor when the distributor is to be taken from its mounting. To remove distributor, disconnect manual advance rod and remove head with high tension cables attached. Then remove hold-down screw and lift unit from place. The distributor is mounted at the front of the engine between the cylinder banks. The coil is mounted on the side of the distributor support.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every month or each 1000 miles.

Timing:—The breaker contacts must be synchronzed to secure correct firing interval before the ignition timing is set. To set firing interval use Delco-Remy Part No. 822572. Loosen taper screw in center of breaker cam and remove regular firing cam. Place synchronizing tool on shaft so that fiber bumper of contact arm mounted on stationary plate rests in notch on tool. If the fiber bumper of the second contact arm does not rest in the other notch, loosen the two lockscrews on the mounting plate and turn the eccentric adjusting screw until the proper adjustment is reached. Tighten the lockscrews and replace the regular firing cam. To set timing, crank engine until piston No. 1 entering power stroke reaches a position 7/8 inch (on the flywheel) before top dead center. The flywheel mark 'IG/A-1-5' will be opposite the indicator on the flywheel housing. Breaker contacts separate at this point. The manual spark control lever must be in the fully advanced position.

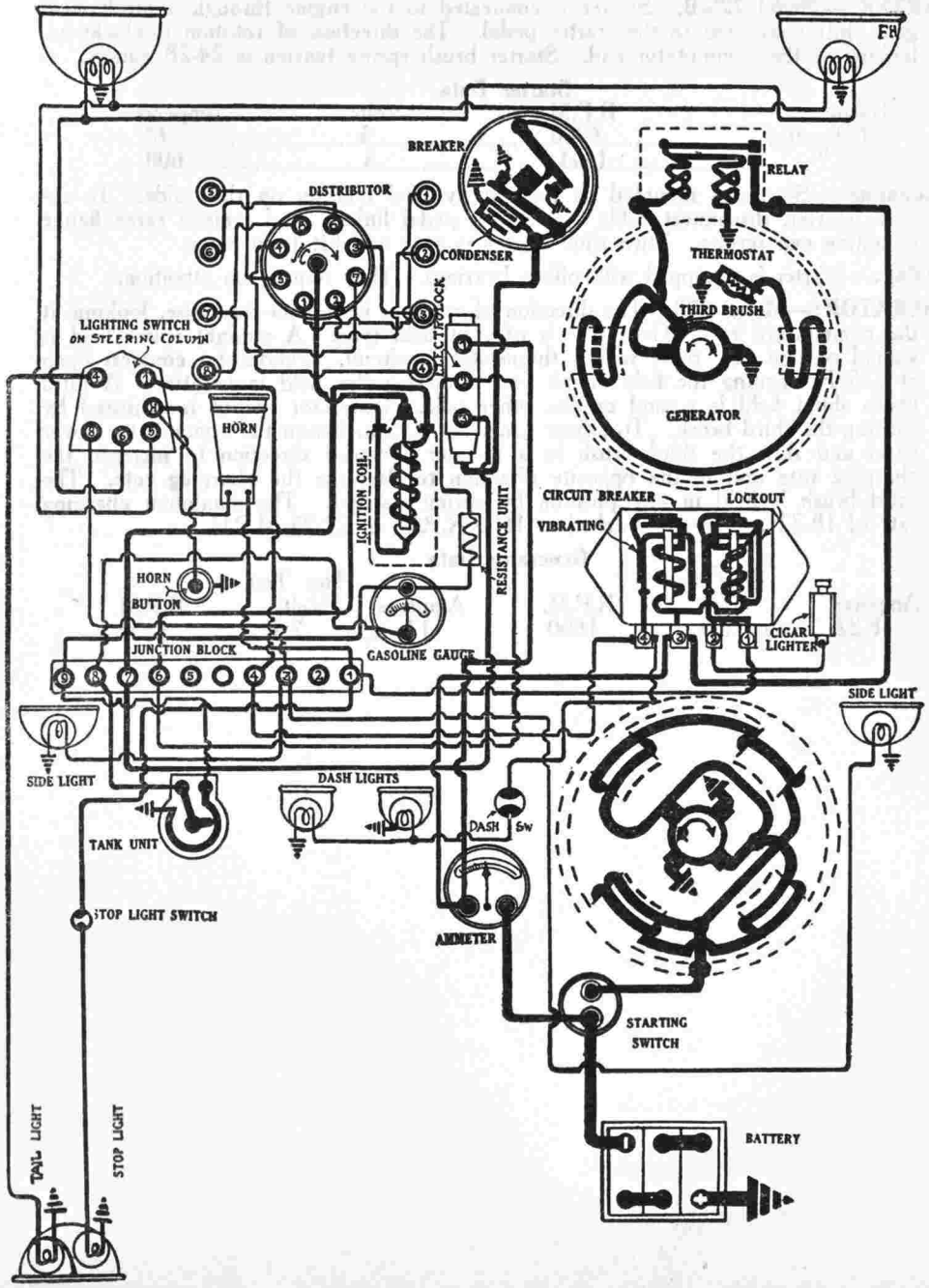
Firing Order:—The firing order is 1L-4R-4L-2L-3R-3L-2R-1R. No. 1 cylinder is nearest the radiator. Right hand block is right viewed from the driver's seat.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Gaps are .032 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1½ inches; stem diameter, 3/8 inch; stem length, 6 17/64 inches; valve lift, 25/64 inch; tappet clearance, .004 inch (cold) spring pressure, 133 pounds compressed to 2 9/64 inches. Inlet valves open 11° 2′ before upper dead center and close 58° 38′ after lower dead center.

EXHAUST VALVES:—Head diameter, 1½ inches; stem diameter, 3/8 inch; stem length, 6¼ inches (over all); valve lift, 25/64 inch; tappet clearance, .006 inch (cold); spring pressure, 133 pounds compressed to 2 9/64 inches. Exhaust valves open 38° 12′ before lower dead center and close 7° 38′ after upper dead center. Valve stem guides are removable. Oversize valves are not made.

STARTER:—Model 725-C. Starter is connected to the engine through a mechanical gear shift connected to the starting pedal. The direction of rotation is clockwise, looking at the commutator end. Starter brush spring tension is 24-28 ounces.



LA SALLE

SERIES 303 (1927) SERIAL NUMBERS 2-12001 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	60
16 "	Lock	3	600

Mounting:—Starter is mounted on rear of flywheel housing on right side. To remove starter, disconnect cable and starter pedal linkage and remove three flange mounting capscrews. Then slide starter to rear and lift from place.

Oiling:—Starter is equipped with oilless bearings. They require no attention.

GENERATOR:—Model 384. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting a resistance in the field circuit and reducing the output approximately 40%. Generator output is adjusted by shifting the third brush. To make this adjustment, loosen the commutator cover band and shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any position by springs. The maximum charging rate is 18-20 amperes reached at 1600 R.P.M. or 22-25 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
18-20	8.6	1400	10-12	7.3-7.7	1600

Third brush shunt field draws 1.8-2.3 amperes at 6 volts. Brush spring tension is 16-20 ounces.

Mounting:—Generator is mounted at right of engine and is driven in tandem with water pump. To remove generator, disconnect battery wire and remove three mounting nuts. Then pull generator to rear.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Model 266-N. Relay is mounted on the generator. Relay closes at approximately 8 M.P.H. when the generator voltage reaches 7.75 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch, contacts closed.

LIGHTING:—Lighting Switch Model 1313 is mounted at the foot of the steering column. Head lamps are 6-8 volt, 21 cp. double filament using lower 21 cp. filament instead of dimmers. Stop lamp is 6-8 volt, 21 cp. S.C. Side, dash, tail and dome lamps are each 6-8 volt, 3 cp. S.C.

CIRCUIT BREAKER:—Model 5759. A combined vibrating and lockout circuit breaker is mounted on the dash. The vibrating circuit breaker protects the lighting circuits. It begins to operate with a current of 25-30 amperes and limits the current to 10-15 amperes. The lockout circuit breaker protects the horn, cigar lighter, and stop lamp circuits. It begins to operate at 25-30 amperes. Current while operating is less than 1 ampere.

LA SALLE

SERIES 303 (1928)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—Exide, Type 3-XC-15-I-G, 6 volt. Starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The positive (+) terminal is grounded. Battery is mounted under the front seat on the right side.

IGNITION:—Coil Model 2195. Distributor Model 4032. Breaker contacts separate .022-.027 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 38° (engine). Automatic advance begins at 600 R.P.M. (engine). Maximum automatic advance is 20° at 2800 R.P.M. Breaker arm spring tension is 16-20 ounces. There are two breakers on a four sided cam opening alternately at intervals of 45° corresponding to 90° of crankshaft rotation which is the correct firing interval for the La Salle engine. The firing interval must be accurately set (see Timing).

Mounting:—The ignition system is equipped with an Electrolock switch. This must be removed from the car with the distributor when the distributor is to be taken from its mounting. To remove distributor, disconnect manual advance rod and remove head with high tension cables attached. Then remove hold-down screw and lift unit from place. The distributor is mounted at the front of the engine between the cylinder banks. The coil is mounted on the side of the distributor support.

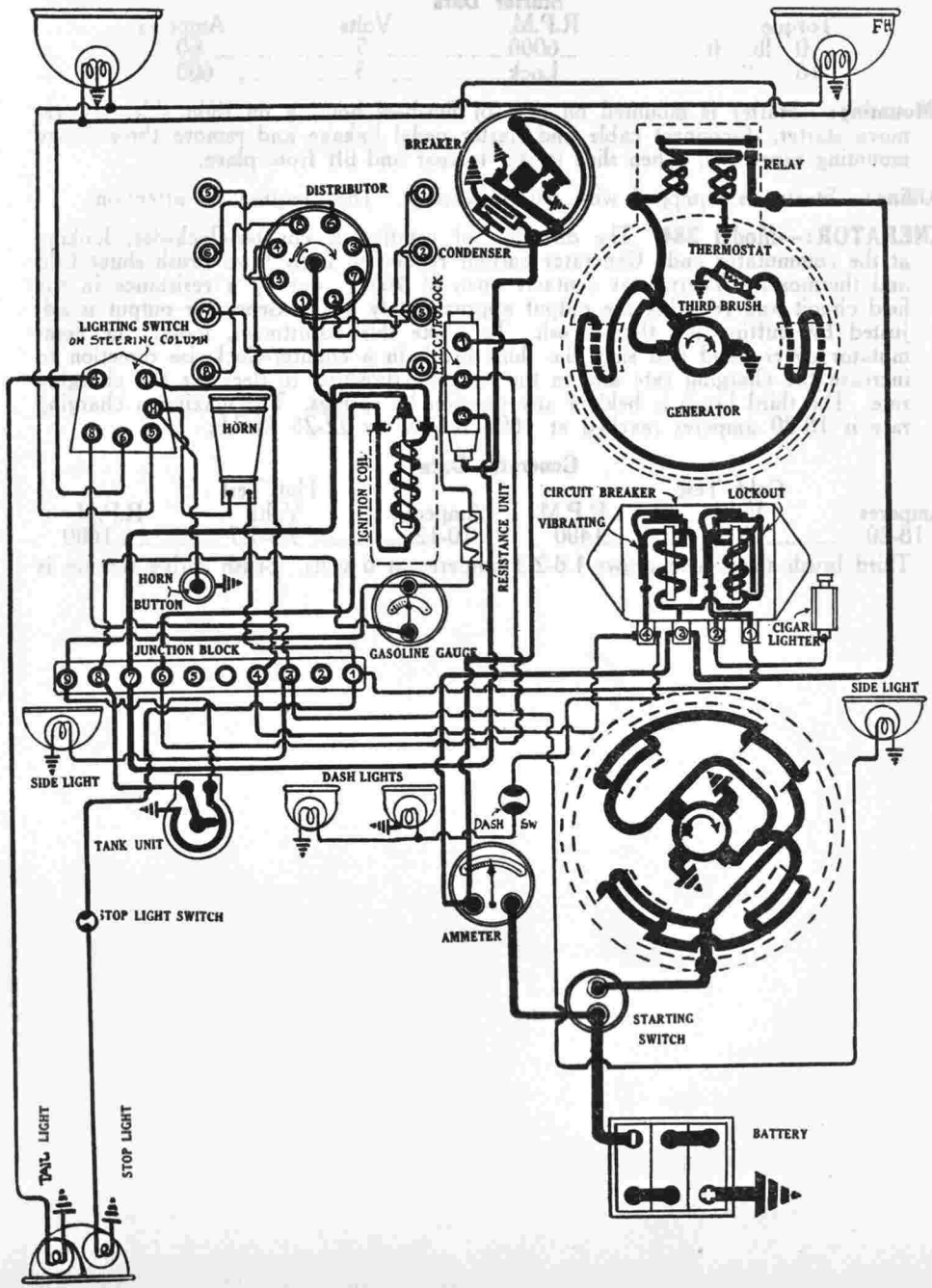
Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every month or each 1000 miles.

Timing:—Synchronization of Contacts:—Use Delco-Remy Tool, Part No. 822572, and follow directions on Page S-1. Synchronizing of contacts is important and synchronization must be checked whenever distributor timing is checked.

Timing Distributor to Engine:—One set of breaker contacts begin to separate when the piston entering power stroke reaches a position 7/8 inch on the flywheel before top dead center with the spark lever fully advanced. With piston No. 1R in firing position the flywheel mark 'IG/A-1-5' will be opposite the indicator on the flywheel case. This mark is 7/8 inch before the top dead center mark. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark lever. Continue to crank engine until the flywheel mark 'IG/A-1-5' is opposite the indicator on the case. If contacts do not separate at this point, loosen taper screw in center of breaker cam and rotate cam until contacts open. Tighten the screw. The second set of contacts will be open but just closing. They will break 45 degrees (distributor) after this point with the flywheel mark 'IG/A-2-6' opposite the indicator. These directions apply only to standard compression engines. For special direction on high compression engines see following paragraph.

Special Directions for Timing High Compression Engines:—On La Salle engines with high compression heads (with letters 'H.C.' cast in head) contacts separate with the piston entering power stroke 1/2 inch on the flywheel before top dead center with the spark lever fully advanced. Crank enegine over until a point on the flywheel approximately half way between the ignition mark 'IG/A-1-5' and the top dead center mark is opposite the indicator. Set distributor so one set of contacts is beginning to separate. With engines using high compression heads it is important that the spark plug gaps be set at .026 inch.

Valve Timing:—INLET VALVES:—Head diameter, 1 1/2 inches; stem diameter, 3/8 inch; stem length, 6 17/64 inches; valve lift, 25/64 inch; tappet clearance, .004 inch (cold); spring pressure, 133 pounds compressed to 2 9/64 inches. Inlet valves open 11° 2′ before upper dead center and close 58° 38′ after lower dead center.



LA SALLE

SERIES 303 (1928)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

EXHAUST VALVES:—Head diameter, 1½ inches; stem diameter, ⅜ inch; stem length, 6¼ inches (over all); valve lift, 25/64 inch; tappet clearance, .006 inch (cold); spring pressure, 133 pounds compressed to 2 9/64 inches. Exhaust valves open 38° 12′ before lower dead center and close 7° 38′ after upper dead center. Valve stem guides are removable. Oversize valve stems are not made.

Firing Order:—The firing order is 1L-4R-4L-2L-3R-3L-2R-1R. No. 1 cylinder is nearest the radiator. Right hand block is right viewed from drivers' seat.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Spark plug gaps on standard compression engines are .032 inch. On engines with high compression heads gaps must be set at .026 inch.

STARTER:—Model 725-C. Starter is connected to the engine through a mechanical gear shift connected to the starting pedal. The direction of rotation is clockwise, looking at the commutator end. Starter brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	60
16 "	Lock	3	600

Mounting:—Starter is mounted on rear of flywheel housing on right side. To remove starter, disconnect cable and starter pedal linkage and remove three flange mounting capscrews. Then slide starter to rear and lift from place.

Oiling:—Starter is equipped with oilless bearings. They require no attention.

GENERATOR:—Model 384. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting a resistance in the field circuit and reducing the output approximately 40%. Generator output is adjusted by shifting the third brush. To make this adjustment, loosen the commutator cover band and shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any position by springs. The maximum charging rate is 18-20 amperes reached at 1600 R.P.M. or 22-25 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
18-20	8.6	1400	10-12	7.3-7.7	1600

Third brush shunt field draws 1.8-2.3 amperes at 6 volts. Brush spring tension is 16-20 ounces.

Mounting:—Generator is mounted at right of engine and is driven in tandem with water pump. To remove generator, disconnect battery wire and remove three mounting nuts. Then pull generator to rear.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Model 266-N. Relay is mounted on the generator. Relay closes at approximately 8 M.P.H. when the generator voltage reaches 7.75 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch, contacts closed.

LIGHTING:—Lighting Switch Model 1313 is mounted at the foot of the steering column. Head lamps are 6-8 volt, 21 cp. double filament using lower 21 cp. filament instead of dimmers. Stop lamp is 6-8 volt, 21 cp. S.C. Side, dash, tail and dome lamps are each 6-8 volt, 3 cp S.C.

CIRCUIT BREAKER:—Model 5759. A combined vibrating and lockout circuit breaker is mounted on the dash. The vibrating circuit breaker protects the lighting circuits. It begins to operate with a current of 25-30 amperes and limits the current to 10-15 amperes. The lockout circuit breaker protects the horn, cigar lighter, and stop lamp circuits. It begins to operate at 25-30 amperes. Current while operating is less than 1 ampere.

LEACH
MODEL A (1920), B (1921-22)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Prest-O-Lite, Type 619-RHN, 6 volt, 102 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Distributor Model 5215. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface wth fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 4 or 5 drops of light engine oil in the ignition unit oilers every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1⅜ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model No. 179. Starter is connected to the engine through a Bendix drive. Lock torque is 27 pound-feet, current being 450 amperes at 2.75 volts.

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR.—Model No. 180. Rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Maximum charging rate is 11-15 amperes, reached at 1200 R.P.M. of the armature, or 16-20 miles per hour.

Generator Data

Amperes	R.P.M.
Neutral	550
4	800
8	1000
11-15	1200
11-14	2000

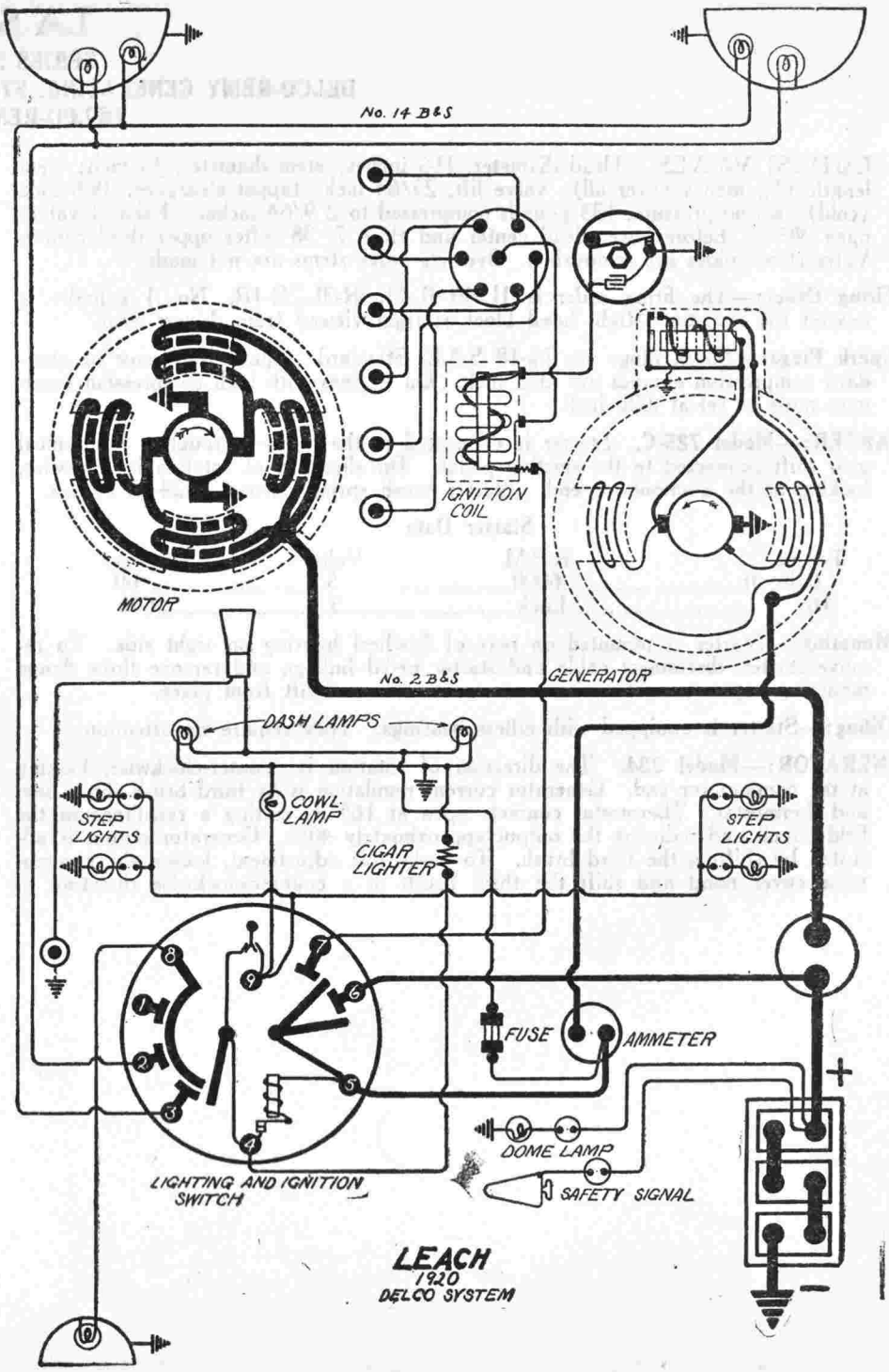
Charging rate is varied by adjustment of the third brush setting. To move the third brush, loosen the three screws holding the bearing retainer plate on the commutator end and shift the plate. Move in a counter-clockwise direction to increase the charging rate, or in the opposite direction to decrease the charging rate. Tighten the adjusting screws and reseat the brush after making the adjustment. Maximum charging rate must not exceed 16 amperes.

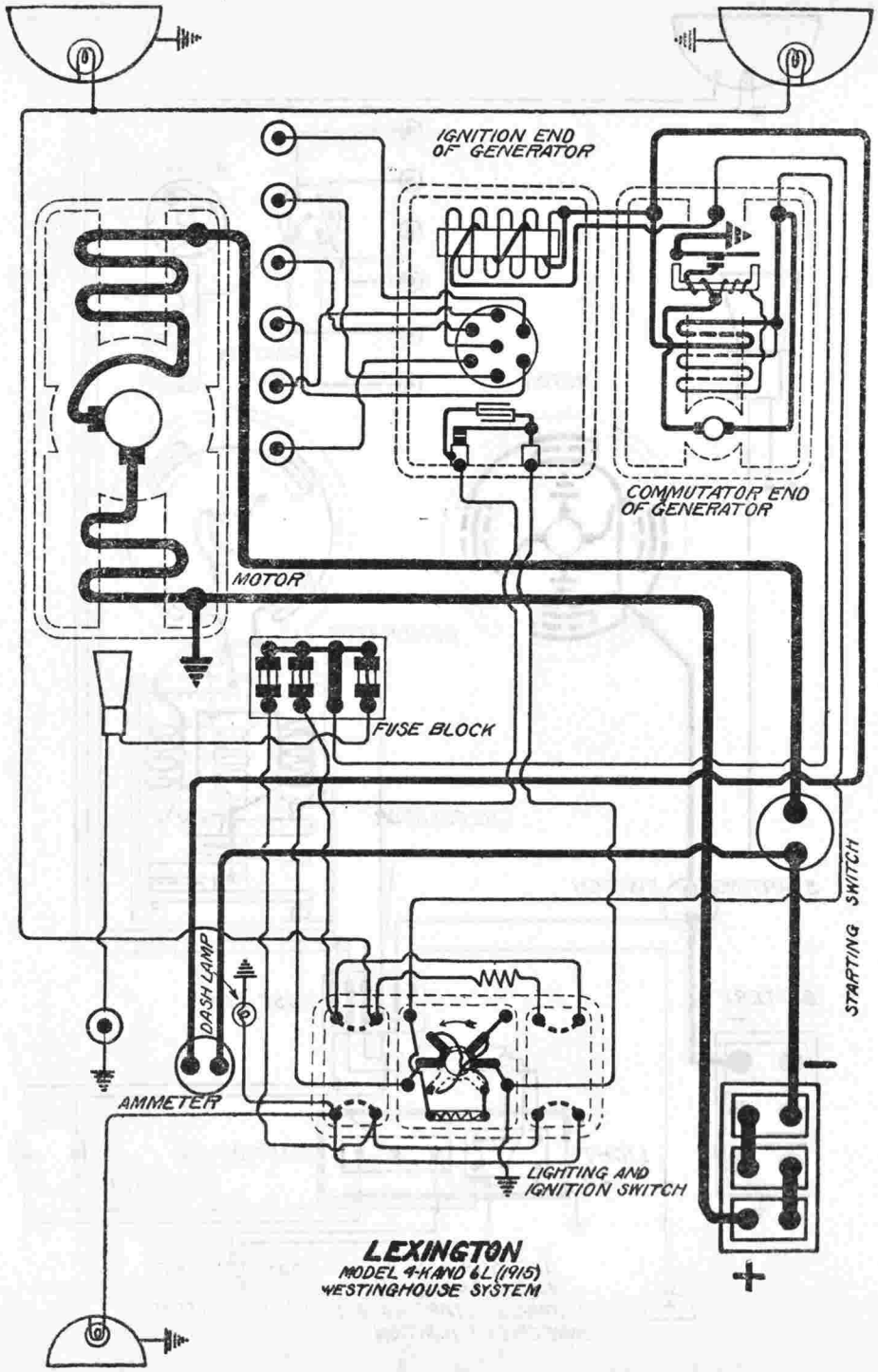
OILING.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes at 550-600 R.P.M. of the armature or 7-8 miles per hour, and opens at 500-550 R.P.M. of the armature or 5 6 miles per hour. Relay contacts separate .046 to .062 inch. Air gap between relay armature and coil core is .020 to .035 inch, contacts closed. To adjust relay, connect a voltmeter between the positive (+) generator brush and the ground. Then slowly speed up the generator and adjust the relay spring tension by turning the thumb nut, until the contacts close when the voltmeter indicates 7.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are 6-8 volt, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start the vibrator, but 3-5 amperes will cause it to continue.





LEXINGTON

MODELS 4-K AND 6-L (1915)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM

WESTINGHOUSE IGNITION

BATTERY.—Battery is 6 volt, 100-ampere-hour. The positive (+) terminal is grounded at the starting motor.

IGNITION.—The ignition system and generator are combined into one unit. The breaker is operated directly from the armature shaft. The centrifugal weights perform the double duty of closing the breaker contacts and automatically advancing and retarding the spark in relation to the engine speed. When the engine is not running and one of these weights is depressing the fiber bumper, the air gap between the bumper lever and stop is 3/64 inch. This distance must be correct before the contact gap is adjusted. Breaker contacts separate .005 to .006 inch when the contact arm or bumper lever is resting on the stop. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

TIMING.—To time the generator to the engine, first turn the engine until the piston in No. 1 cylinder is on top dead center entering power stroke. Then remove the distributor plate and turn the generator armature back until the mark on the distributor brush holder lines up with the mark on the end bracket. Connect to engine in this position and wire spark plugs to distributor in accordance with the firing order.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .020 to .025 inch.

STARTER.—Frame 300 or 310. Starter is connected to the engine through a Bendix drive. Running freely, starter takes 30-40 amperes at 5.25 volts, armature revolving at 8000 R.P.M.. Frame 300 starter delivers 1¼ pound-feet torque at 2000-2350 R.P.M., taking 110 amperes at 5.25 volts. Frame 310 starter delivers 2 pound-feet torque at 2100-2425 R.P.M., taking 160 amperes at 5.25 volts. Lock torque of Frame 300 is 4 pound-feet, current being 250 amperes. Lock torque of Frame 310 is 6 pound-feet, current being 375 amperes.

OILERS.—Put 4 or 5 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Frame 230 or 240. Generator current regulation is by reverse series field. The current taken by the lamps flows through the series field and automatically increases the generator output.

Generator Data

Frame 230		Frame 240	
Amperes	R.P.M.	Amperes	R.P.M.
0	400	0	425
8	625	8	650
13-16.5	1500	10-13.5	1500
Hot Test			
12-15.0	1500	8.5-11.5	1500

OILING.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 mies in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 400-450 R.P.M. of the armature or 8-10 miles per hour and opens at 350-400 R.P.M. of the armature or 6-8 miles per hour. Relay closes when the voltage of the generator reaches 7-7.5 volts, with the battery disconnected. Relay opens with a discharge current of 0-2 amperes. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15-17 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 4 cp.

FUSES.—Lighting fuses are 15 ampere.

LEXINGTON

MODEL 0, 6-0, 600 (1916-17)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM

CONNECTICUT IGNITION

BATTERY.—Willard Type LBA., No. 5-6, 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .023 inch. They are made of tungsten. When the condition of the points affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts begin to separate when mark "DC 1-6" on flywheel is at indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .027 to .030 inch.

STARTER.—Starter is connected to engine through a Bendix drive. Torque is 2 pound-feet, armature revolving at 1500 R.P.M. Lock torque is 11.5 pound-feet, current being 400 amperes.

OILING.—Refill starter oil wells with light engine oil once a month.

GENERATOR.—Frame No. 400-R. Generator voltage regulation is by vibrating regulator. Maximum charging rate is 16-20 amperes, decreasing to 5-6 amperes as battery becomes fully charged. Maximum voltage is reached at 15 miles per hour.

Generator Data. Frame No. 400

Battery Charging Current Without Lamp Load			Battery Charging Current With 7 Ampere Lamp Load		
Volts	Amperes	M.P.H.	Volts	Amperes	M.P.H.
6.5	2	10	6.3	0	12
6.5	8	15	6.5	4	15
7.0	12	20	6.6	6	20
7.0	12	25	6.7	7	25
			6.7	7	30

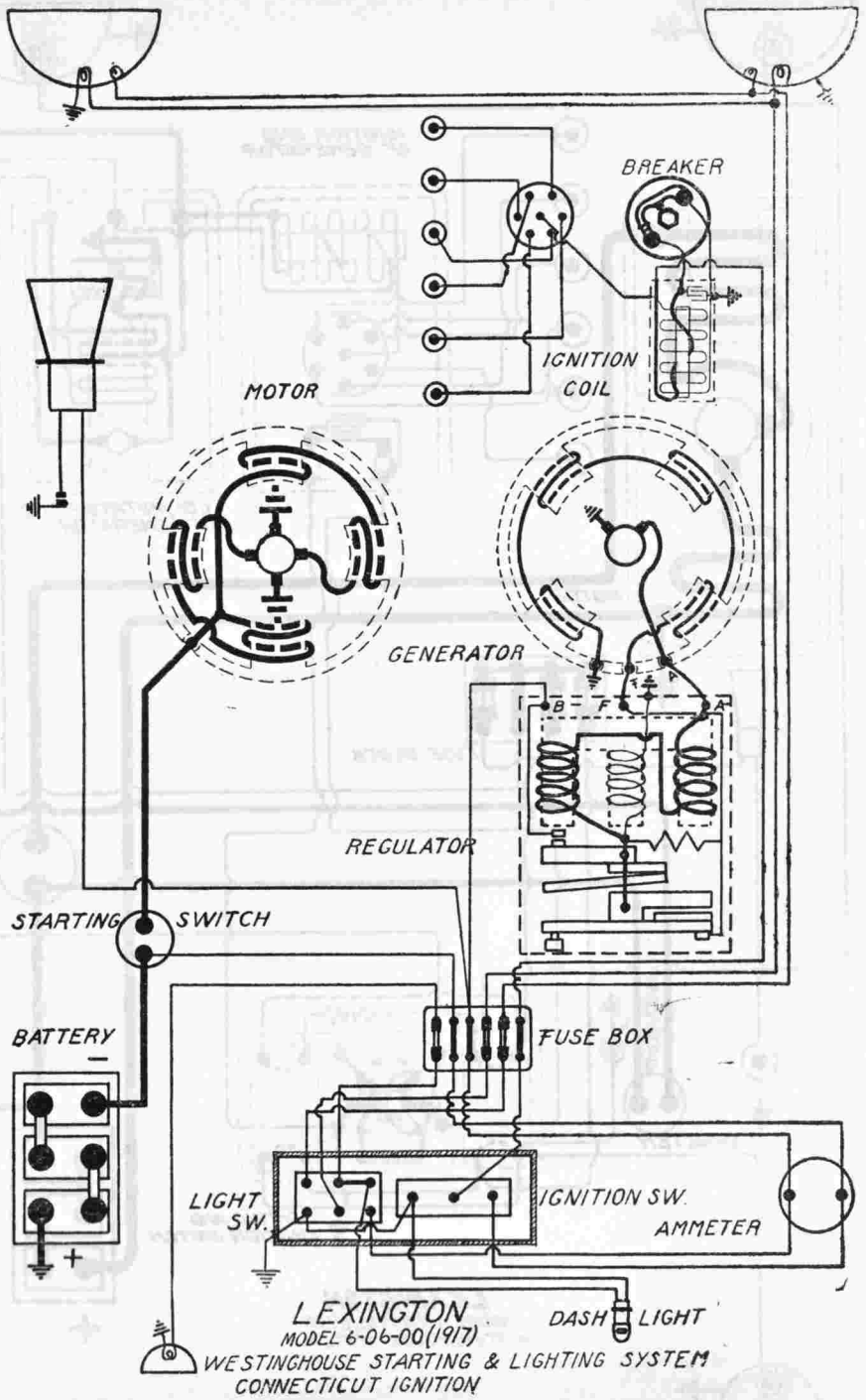
Above rates are with battery solution of 1.250.

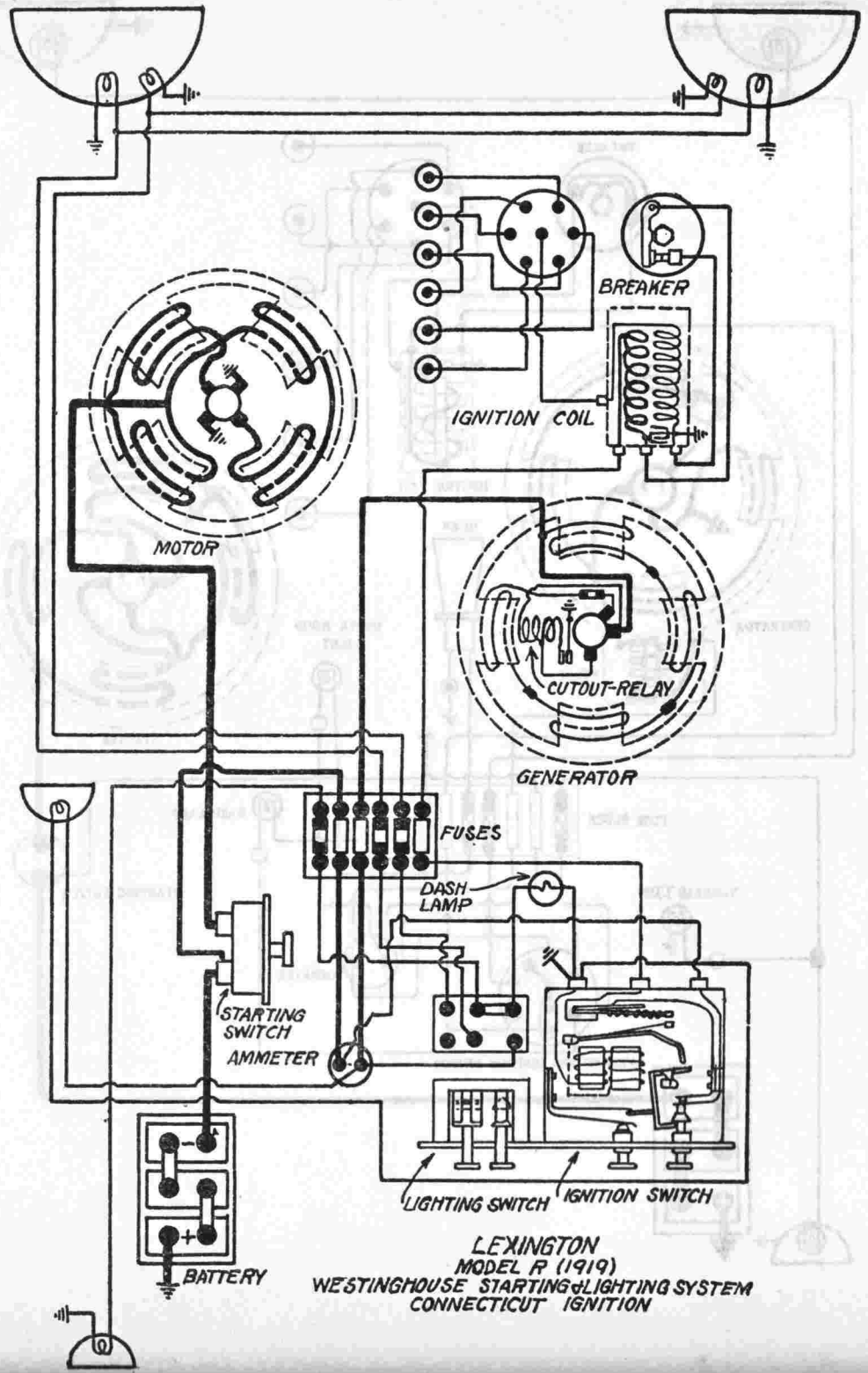
OILING.—Put several drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY-REGULATOR.—Relay and regulator are combined into one unit. Relay closes at 7-10 and opens at 5-7 miles per hour. Charging current is 1 to 3 amperes at closing, and the discharge current is 0 to 1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly worn or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp., gas filled. Dimmer lamps are 6-8 volt, 8 cp. Dash lamp is 6-8 volt, 4 cp. Tail lamp is 6-8 volt, 4 cp.

FUSES.—Head lamp fuses are 15 ampere. Tail lamp fuse is 5 ampere.





LEXINGTON

Model R (1918) And R-19 (1919)

Westinghouse Generating, Starting and Lighting System
Connecticut Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts separate .023 inch. They are made of tungsten. When the condition of the points affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Timing.—Contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .023 inch.

Starter.—Frame No. 710. Starter is connected to engine through a Bendix drive. Torque is 2.5 pound-feet at 1200 R. P. M. Lock torque is 14 pound-feet, current 450 amperes.

Oiling.—Refill starter oil wells with light engine oil every month.

Generator.—Frame No. 760. Generator current regulation is by third brush system. Current output is varied by adjustment of third brush setting. Normally set the third brush so that at 1100-1500 R. P. M., the maximum current output is 15 to 17 amperes, at 7½ volts. The cold test readings are obtained with the normal setting of third brush, and a generator temperature under 35° C., or 95° F. The hot test readings are obtained after the generator has been operated one hour at 1800 R. P. M., charging a half-charged battery or its equivalent.

GENERATOR DATA

Cold Test

R. P. M.	Generator Output—Amperes	Generator Voltage
500	0	6.5
750	8	6.5
1250	15-17	7.5
2500	7-11	6.5-7.5

Hot Test

R. P. M.	Generator Output—Amperes	Generator Voltage
1250	12-14	7.5
2500	7-11	6.5-7.5

Field current is 2.8 to 3.25 amperes, 6 volts. Field resistance is 1.9 to 2.25 ohms at 25° C., or 77° F.

Field Test, Generator Operating—Cold Test

R. P. M.	Generator Output Amperes	Generator Voltage	Field Current
1250	15-17	7.5	1.5-2.4

Hot Test

R. P. M.	Generator Output Amperes	Generator Voltage	Field Current
1250	12-14	7.5	1.5-2.2

Operating freely as a motor, current flow is 3.5 to 5 amperes, 6 to 6.6 volts.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—Relay closes at 8-10 miles per hour or 500-550 R. P. M., of armature, and opens at 6-8 miles per hour, or 450-500 R. P. M., of armature. Charging current is 1 to 2 amperes at closing, and the discharge current 0 to 2 amperes at opening of relay. Air gap between relay armature (moving member) and coil core is .031 inch, contacts separated. Contacts separate .013 to .018 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service.

Lamps:—Head lamps are 6-8 volt, 21 cp.. Dimmer lamps are 6-8 volt, 7 cp. Dash and tail lamps are 6-8 volt, 2 cp. On the 1918 cars, head lamps are 6-8 volt, 32 cp.

LEXINGTON

SERIES S AND T (1919-20-21-22)

GRAY & DAVIS GENERATING, STARTING AND LIGHTING SYSTEM

CONNECTICUT IGNITION

BATTERY.—Willard, Type SJRN-4, 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model MA. Distributor Model No. 17C. Breaker contacts separate .017 to .024 inch. They are made of tungsten. When the condition of the contacts affects the ignition, renew the inner breaker mechanism. For temporary service resurface contacts with fine emery cloth.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, thus must be done every 1000 miles. Do not put grease or oil in the cup.

Timing.—Breaker contacts begin to seperate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .025 inch.

STARTER:—Type 510, 522, 531, 533, 534. The direction of rotation is counter-clockwise, looking at the commutator end. Starter is connected to the engine through a Bendix drive. Starter normally cranks the engine at 100-125 R.P.M., taking 100 to 160 amperes.

Starter Data.—Type 531.

Torque	R.P.M.	Amperes
2 lb. ft.	1600	130
6 lb. ft.	600	280
10 lb. ft.	250	410
12 lb. ft.	125	465
15 lb. ft.	Lock	540

The brush tension is 2 pounds.

Oiling.—Oilless bearings are used. No oil is required.

GENERATOR:—Type 605, 631, 634, 635, 647, 650. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system.

Generator Data.—Type 647.

Hot Test		Cold Test	
Amperes	R.P.M.	Amperes	R.P.M.
0	550	0	500
4	780	4	650
8	1200	12	1150
10	1800	15	1800
8	2300	12	2500

The fields draw 2.6 amperes at 6 volts.

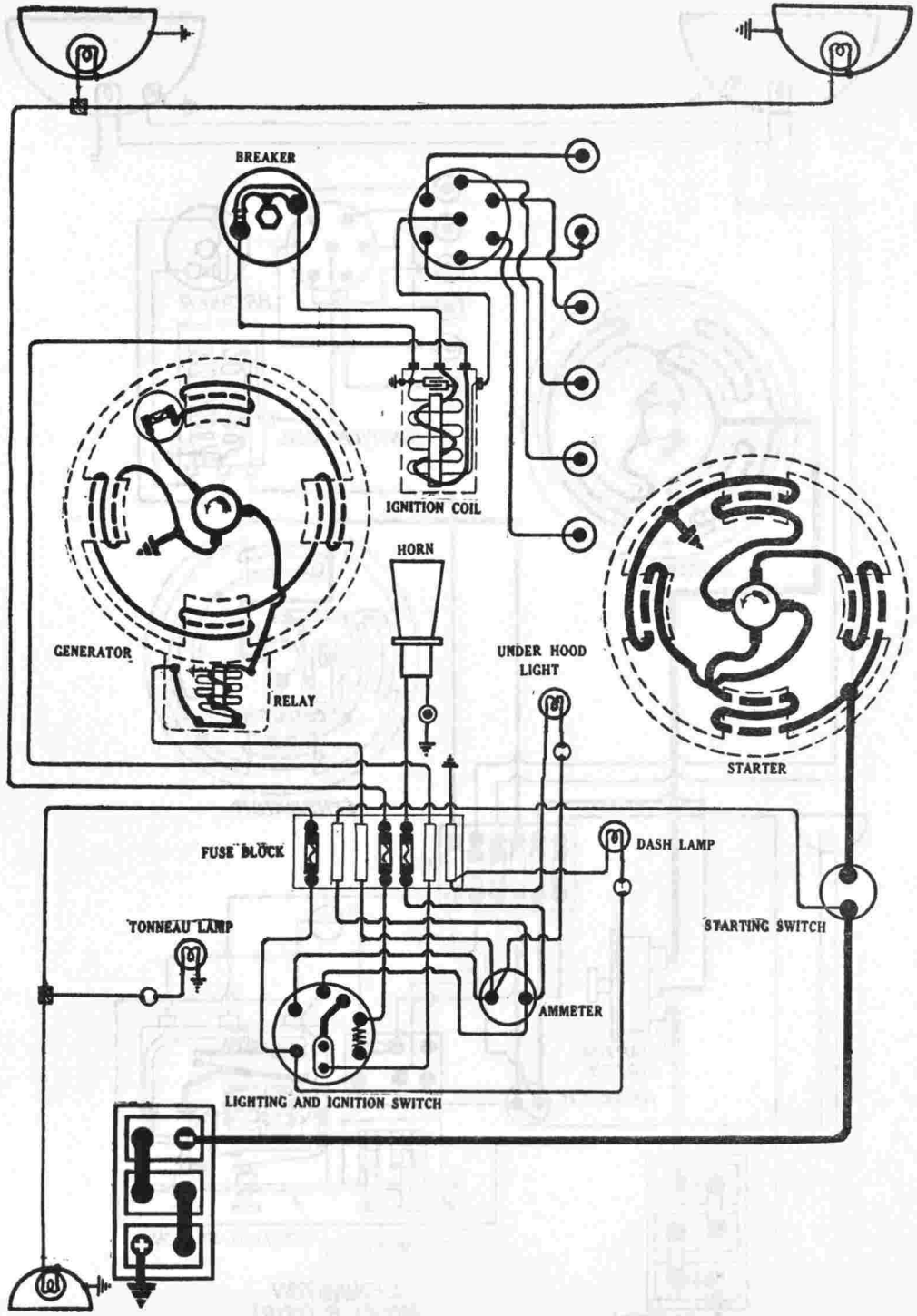
The charging rate is varied by adjustment of the third brush setting. The third brush adjusting screw extends through the commutator end plate toward the bottom of the generator. Turn the screw in a clockwise direction to increase the charging rate or in the opposite direction to decrease the charging rate. Reseat the brush after the adjustment.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes when the voltage of the generator reaches 6.5 to 7.5 volts, and opens when there is a discharge current of 0 to 2 amperes. Relay contacts separate .015 to .018 inch. The air gap between the relay armature and the coil core is .010 to .012 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dash, tail, tonneau, and under-hood lamps are 6-8 volts, 2 cp.

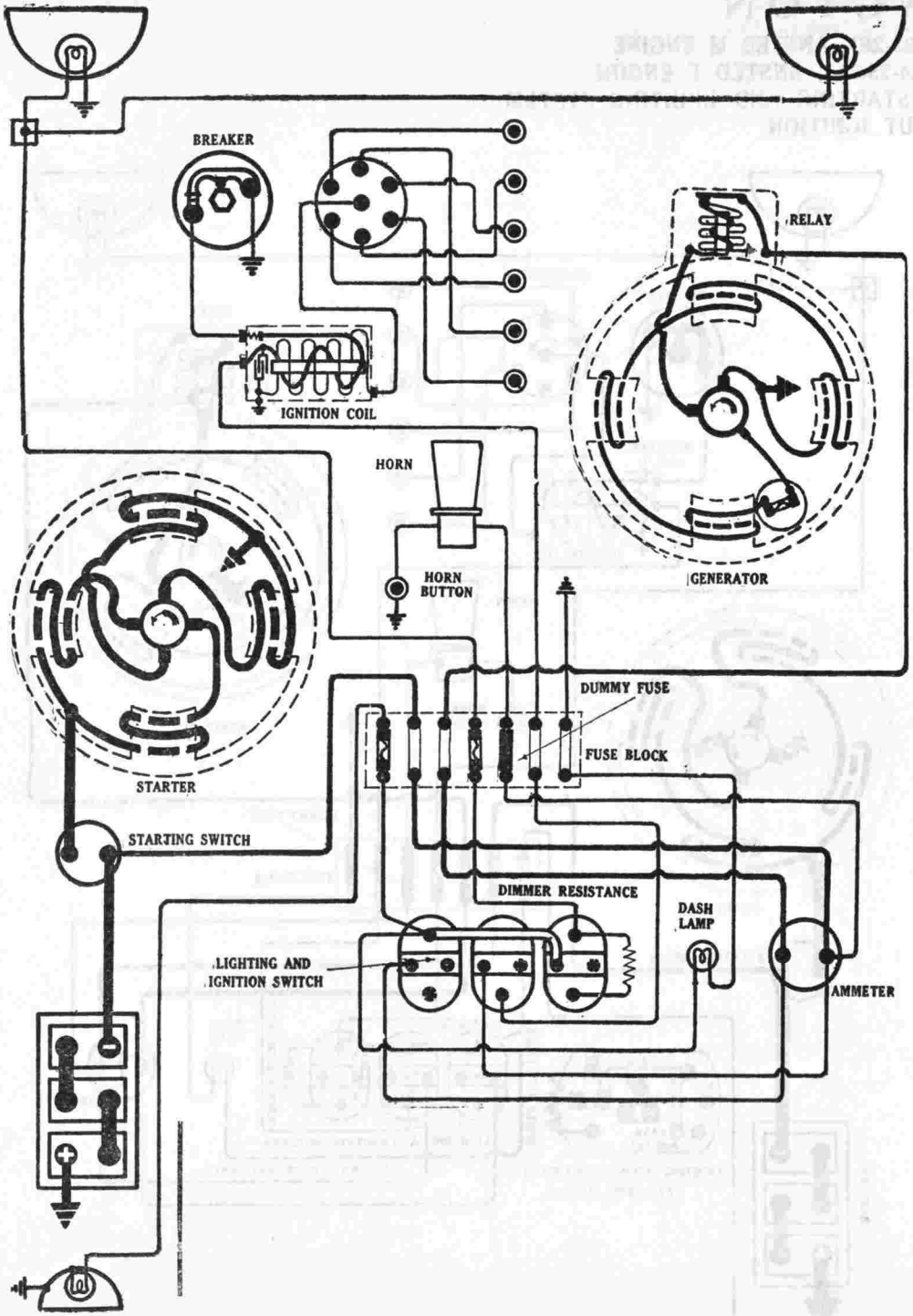
FUSES.—Head light and horn fuses are 15 ampere. Tail light and generator field fuses are 5 ampere.



LEXINGTON

SERIES 22 (1922), 23 (1923)

GRAY & DAVIS GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION



BATTERY.—Willard, Type SJRN-4, 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model 225Y. Breaker contacts separate .012 to .015 inch. They are made of tungsten. When the condition of the contacts affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Timing.—Breaker contacts begin to separae when the piston entering power stroke is on top dead center. Spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plug Gaps.—The spark plug gaps are .020 inch.

STARTER.—Type 532-534. The direction of rotation is counter-clockwise, looking at commutator end. Starter is connected to engine through a Bendix drive. Starter cranks the engine at 140 R.P.M., taking 138 amperes.

Starter Data.

Torque	R.P.M.	Amperes
2 lb. ft.	1600	130
6 lb. ft.	600	**280**
10 lb. ft.	240	410
12 lb. ft.	125	465
15 lb. ft.	Lock	540

The brush tension is 2 pounds.

Oiling.—Oilless bearings are used. No oil is required.

GENERATOR.—Type 647-650. The direction of rotation is counter-clockwise, looking at commutator end. Generator current regulation is by the third brush system.

Generator Data.

Hot Test.		Cold Test.	
Amperes	R.P.M.	Amperes	R.P.M.
0	550	0	500
4	780	4	650
8	1200	12	1150
10	1800	15	1800
8	2300	12	2500

The brush tension of all of the brushes is 1¾ pounds. The fields draw 2.6 amperes at 6 volts. The charging rate is varied by adjustment of the third brush setting. The third brush adusting screw extends through the commutator end plate toward the bottom of the generator. Turn the screw in a clockwise direction to increase the charging rate or in the opposite direction to decrease the charging rate. Reseat the brush after the adjustment. The maximum charging rate is 14 amperes, reached at 25-30 M.P.H.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes when the voltage of the generator reaches 6.5 to 7.5 volts, and opens when there is a discharge current of 0 to 2 amperes. Relay contacts separate .015 to .018 inch. The air gap between the relay armature and coil core is .010 to .012 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volts, 21 cp., S.C. Dimmer, resistance and dash lamps are lamps are 6-8 volts, 4 cp., D.C. Tail lamp is 6-8 volts, 2 cp., D.C.

FUSES.—Lighting circuit fuses are 15 ampere. Generator fuse is 5 ampere.

COMBINATION SWITCH.—Connecticut No. 186-2-Y.

LEXINGTON

CONCORD MODEL (1924-25-26), ANSTED M ENGINE
MINUTE MAN MODEL (1924-25-26), ANSTED F ENGINE
AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY:—(Concord) Willard, Type XW-15. ..(Minute Man) Willard, Type SJR-4. 6 volt, 105 ampere hour. The positive (+) terminal is grounded.

IGNITION:—Coil Model 225-Y. Breaker contacts separate .012-.015 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone or with a fine flat jeweler's file. Distributor is full manual advance. Maximum manual advance is 52 degrees. Ignition current with engine running is 1.5 amperes at 6 volts. With engine stopped, ignition current is 4.5 amperes at 6 volts.

Mounting:—Coil is mounted at front of engine on the left side. Distributor is mounted at left of engine near front. To remove distributor, disconnect breaker lead and manual control rod. Remove distributor head or disconnect spark plug cables. Then remove wing nut on clamping stud and lift breaker assembly from place.

Oiling:—Refill the cup under the distributor head with vaseline and turn down every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position at which the top dead center mark on the flywheel is two teeth after top dead center on the Concord model and when the exhaust closing mark on the flywheel is opposite the indicator on the Minute Man model The spark control lever and breaker assembly should be in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .020 inch.

VALVE TIMING:—Concord Model. INLET VALVES:—Head diameter is 1¾ inches; stem diameter is .310 inch; stem length is 5¾ inches. Spring pressure is 50 pounds. Inlet valves open at 10 degrees after top dead center and close at 56 degrees after lower dead center.
EXHAUST VALVES:—Head diameter is 1¾ inches; stem diameter is .310 inch; stem length is 5¾ inches. Spring pressure is 50 pounds. Exhaust valves open 50 degrees before lower dead center and close at 10 degrees after top dead center.

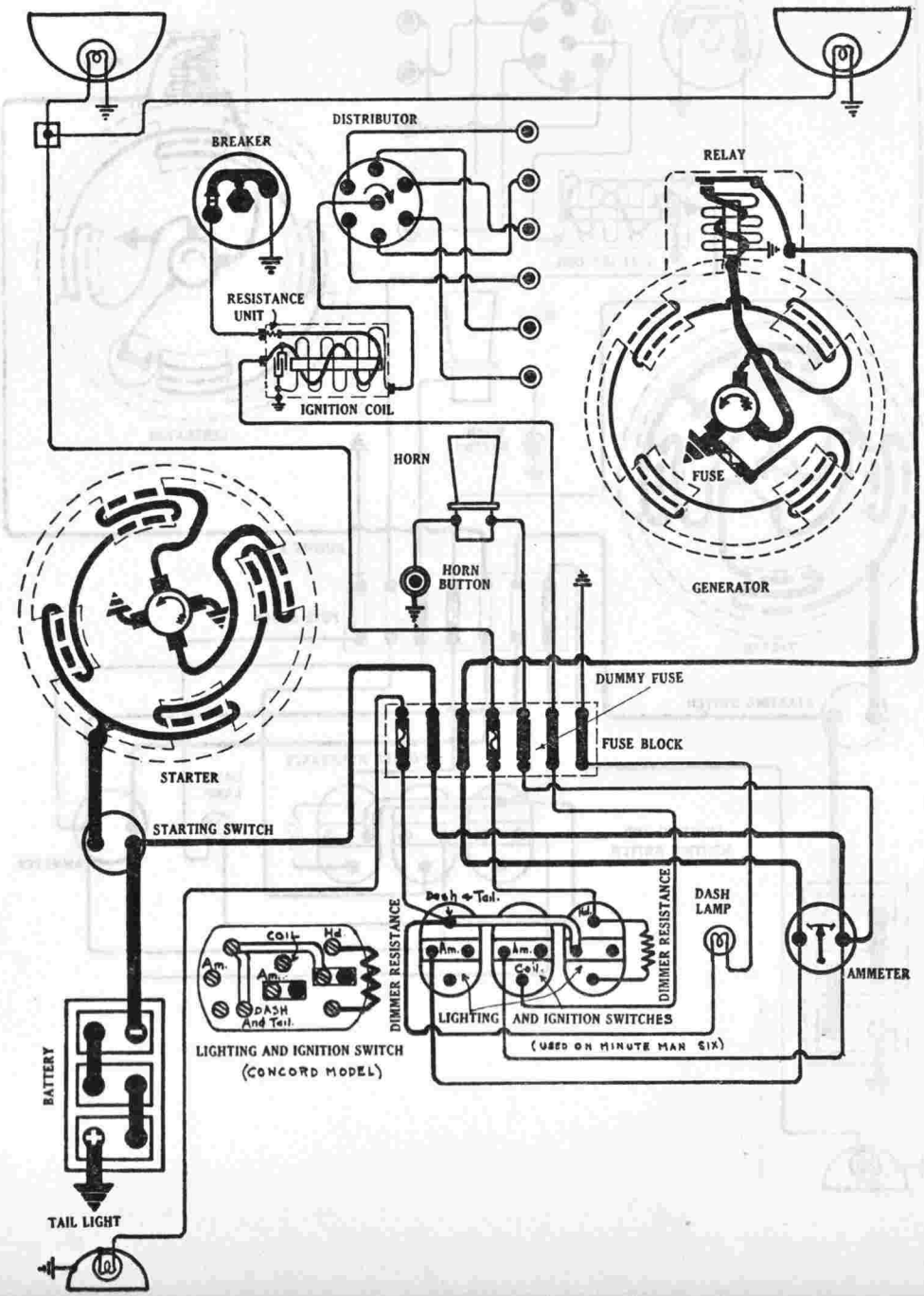
Minute Man Model. INLET VALVES:—Head diameter is 1¾ inches; stem diameter is .310 inch; stem length is 6¼ inches. Spring pressure is 50 pounds. Inlet valves open at 10 degrees after top dead center and close 56 degrees after lower dead center.
EXHAUST VALVES:—Head diameter is 1¾ inches; stem diameter is .310 inch; stem length is 6¼ inches. Spring pressure is 50 pounds. Exhaust valves open at 50 degrees before lower dead center and close at 10 degrees after top dead center.

STARTER:—Model 942. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 1¾-2 pounds each.

Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	6	50
9 "	350	4	—

Mounting:—Starter is mounted at right of engine by flange mounting to the flywheel case. To remove starter, disconnect starter cable and remove three flange mounting screws. Then slide starter from place.



LEXINGTON

CONCORD MODEL (1924-25-26), ANSTED M ENGINE
MINUTE MAN MODEL (1924-25-26), ANSTED F ENGINE
AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

Oiling:—Starter bearings are of the oilless type. They require no attention.

GENERATOR:—Model 1051. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the charging rate turn the small screw located on the commutator end plate. Turning the screw in a clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. The maximum charging rate is 13-14 amperes reached at 1500-1600 R.P.M. of the generator armature.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	425	0	6.4	500
9	6.8	800	4	6.5	800
12	7.5	1200	8.4	7	1200
13.5	7.7	1600	9.8	7.2	1700
11.5	7.5	2400	8.6	7	2400

The brush spring tension should be 1¾-2¾ pounds each. Motoring freely, generator draws 6 amperes at 6 volts. Shunt field current is 2.3 amperes at 6 volts.



Mounting:—Generator is mounted at left side of engine at the rear of the chain case. To remove generator, remove the flange mounting screws and slide generator from place.

Oiling:—Put 3 or 4 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Relay contacts close when the voltage of the genetrator reaches 6.5-7.5 volts and open with a discharge current of 0-2 amperes. Contacts separate .015 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING:—Connecticut Switch. (Concord) Model 198-1-Y. (Minute Man) Model 186-2-Y. Head lamps are 6-8 volt, 21 cp.S.C. Side lamps are 6-8 volt, 3 cp.S.C. Dome lamps are 6-8 volt, 4 cp.S.C. Dash lamps are 6-8 volt, 2 cp.D.C. Tail lamps are 6-8 volt, 3 cp.S.C. on the Concord model and 4 cp.S.C. on the Minute Man models.

FUSES:—Generator field fuse is 5 amperes. Lighting fuses are 15 ampere.

LEXINGTON

"CONCORD" MODEL W (1927)

Serial Nos. 50,000 Up

AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM

CONNECTICUT IGNITION

BATTERY:—Willard, CWR-15, 6 volt. Starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The positive (+) terminal is grounded. Battery is mounted under the front floor boards on the left hand side.

IGNITION:—Coil Model 225-Y. Breaker contacts separate .012-.015 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone or with a fine, flat jeweler's file.

Mounting:—Coil is mounted at front of engine on the left side. Distributor is mounted at left of engine near front. To remove distributor, disconnect breaker lead and manual control rod. Remove distributor head or disconnect spark plug cables. Then remove wing nut on clamping stud and lift breaker assembly from place.

Oiling:—Refill the cup under the distributor head with vaseline and turn down every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing:—Breaker contacts begin to separate with piston No. 1 entering power stroke when the flywheel marking is two teeth past the top dead center mark on the flywheel case. The spark control lever and breaker assembly must be in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .020 inch.

STARTER:—Model 942. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end Starter brush tension should be 1¾-2 pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000		60
12 "	Lock	4	450

Armature air gap is .014-.024 inch. Armature resistance at 70°F is .0031 ohms. Field resistance at 70°F is .0035 ohms.

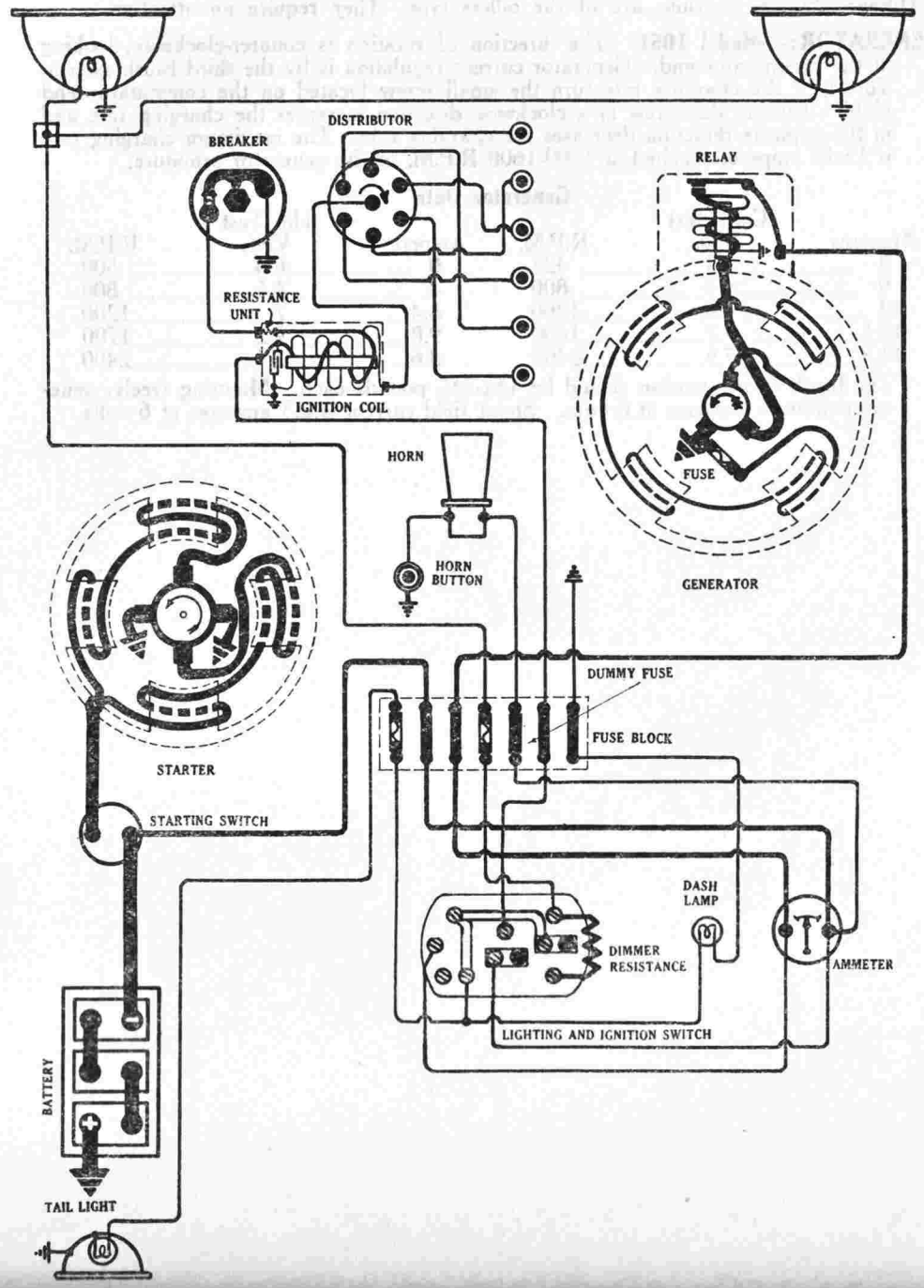
Mounting:—Starter is mounted at right of engine by flange mounting to the flywheel case. To remove starter, disconnect starter cable and remove three flange mounting screws. Then slide starter from place.

Oiling:—Starter bearings are of the oilless type. They require no attention.

GENERATOR:—Model 1051. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the charging rate, insert a special Bosch key in the hole on the generator end plate and shift the third brush by turning the key. The third brush mounting bracket may be shifted by hand after the commutator cover band has been removed. Shifting the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. The maximum charging rate of 13-14 amperes is reached at 1500-1600 R.P.M. of the generator armature.

Generator Data.

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	425	0	6.4	500
7	6.8	800	4	6.5	800
12	7.5	1200	8.4	7.	1200
13.5	7.7	1600	9.8	7.2	1700
11.5	7.5	2400	8.6	7.	2400



LEXINGTON

"CONCORD" MODEL W (1927)

Serial Nos. 50,000 Up.

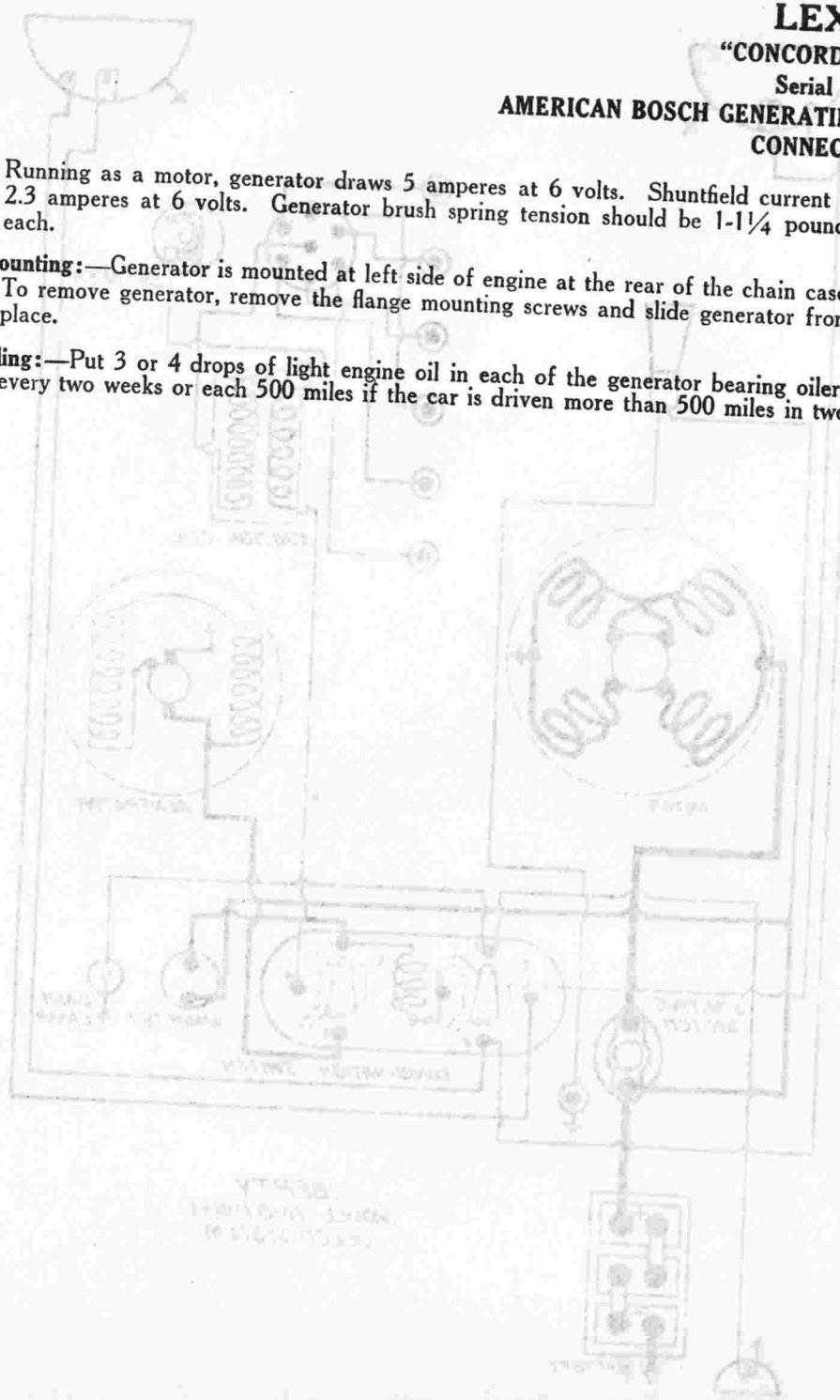
AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM

CONNECTICUT IGNITION

Running as a motor, generator draws 5 amperes at 6 volts. Shuntfield current is 2.3 amperes at 6 volts. Generator brush spring tension should be 1-1¼ pounds each.

Mounting:—Generator is mounted at left side of engine at the rear of the chain case. To remove generator, remove the flange mounting screws and slide generator from place.

Oiling:—Put 3 or 4 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.



RELAY:—Relay contacts close when the voltage of the generator reaches 6.5-7.5 volts and open with a discharge current of 0-2 amperes. Contacts separate .015 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING:—Connecticut Switch Model 198-1-Y. Head lamps are 6-8 volt, 21 cp. S.C. Side and tail lamps are each 6-8 volt, 3 cp. S.C. Dash lamp is 6-8 volt, 2 cp. D.C. Dome lamp is 6-8 volt, 4 cp. S.C.

FUSES:—Generator field fuse is 5 ampere. Lighting fuses are 15 ampere.

LIBERTY

MODELS 10, 10 A AND 10 B (1916-17-18-19)

Delco Generating, Starting and Lighting System
Delco Ignition

Battery.—Battery is 6 volt, 93.8 ampere-hour. The negative (—) terminal is grounded

Ignition.—Breaker contacts should separate .018 inch. They are made of tungsten. They will operate properly even though very irregular, due to the fact that the rough surfaces fit each other perfectly. Their natural color is dark gray, not silver. Should they become badly burned or pitted, affecting the ignition, remove and resurface them by drawing across a piece of fine emery cloth laid on a flat surface, as on the bed of a drill press, finishing on a very hard oil stone. Clean all oil from contacts before again putting into service.

Timing.—Breaker contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be .025 inch to .030 inch.

Oiling.—Put several drops of light engine oil in timer oiler every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Starter.—Starter is connected to engine through a Bendix drive. It cranks the engine at 100 R. P. M., taking 145 amperes. Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current. Starter lock torque is eleven pound-feet.

Oiling.—Put 2 or 3 drops of light engine oil in each of starter bearings every month.

Generator.—Generator current regulation is by third brush system.

GENERATOR DATA, MODEL 105

Amperes	R. P. M.	M. P. H.
0	375	5
6-8	750	10
12-14	1125	15
13-15	1200	18
15-16	1500	20
13-14	1875	25
10-12	2250	30
10-12	2625	35

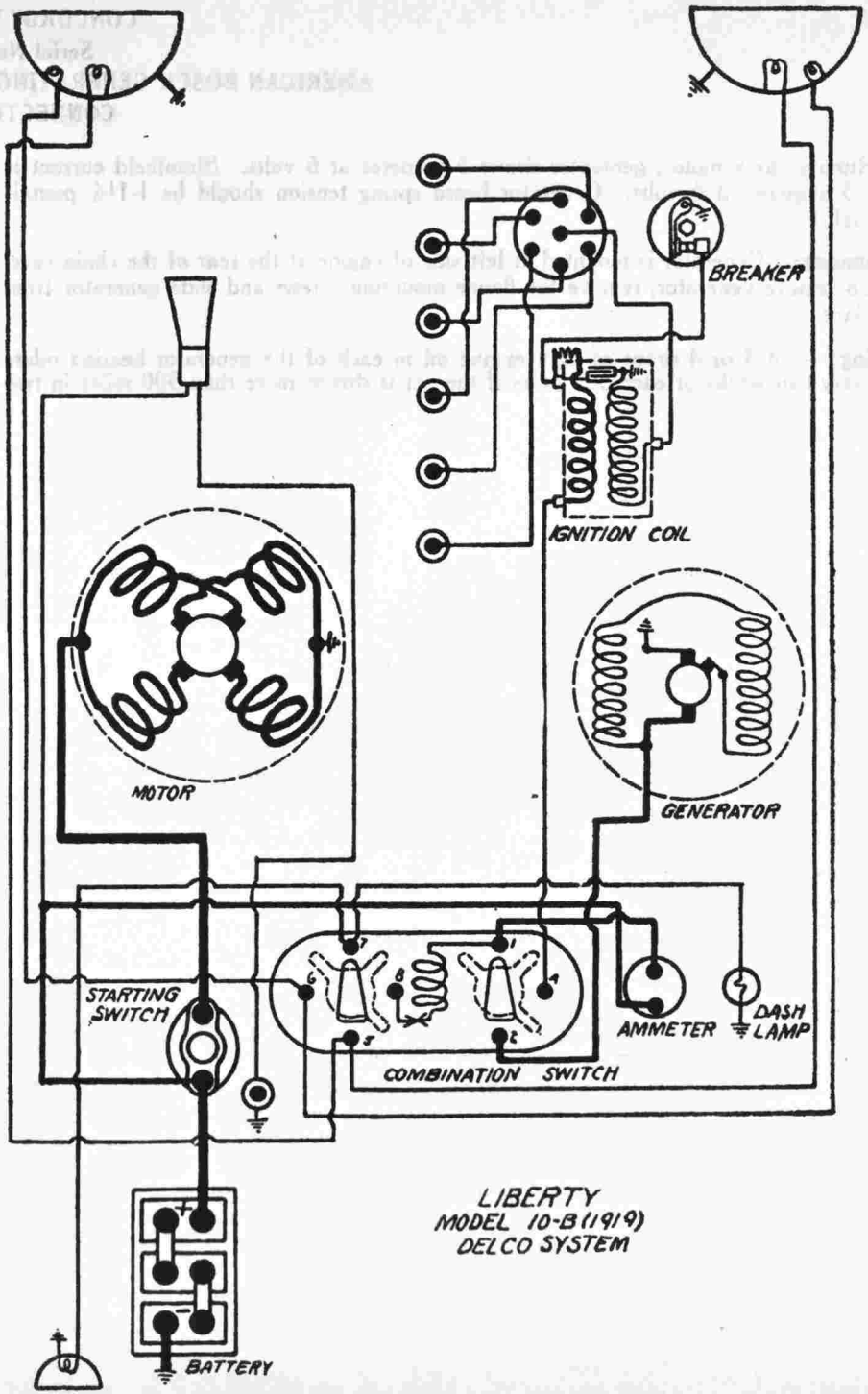
Charging rate may be varied by moving third brush. Moving brush in different direction of armature rotation will increase charging rate. Moving it in the opposite direction will decrease charging rate.

Oiling.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles

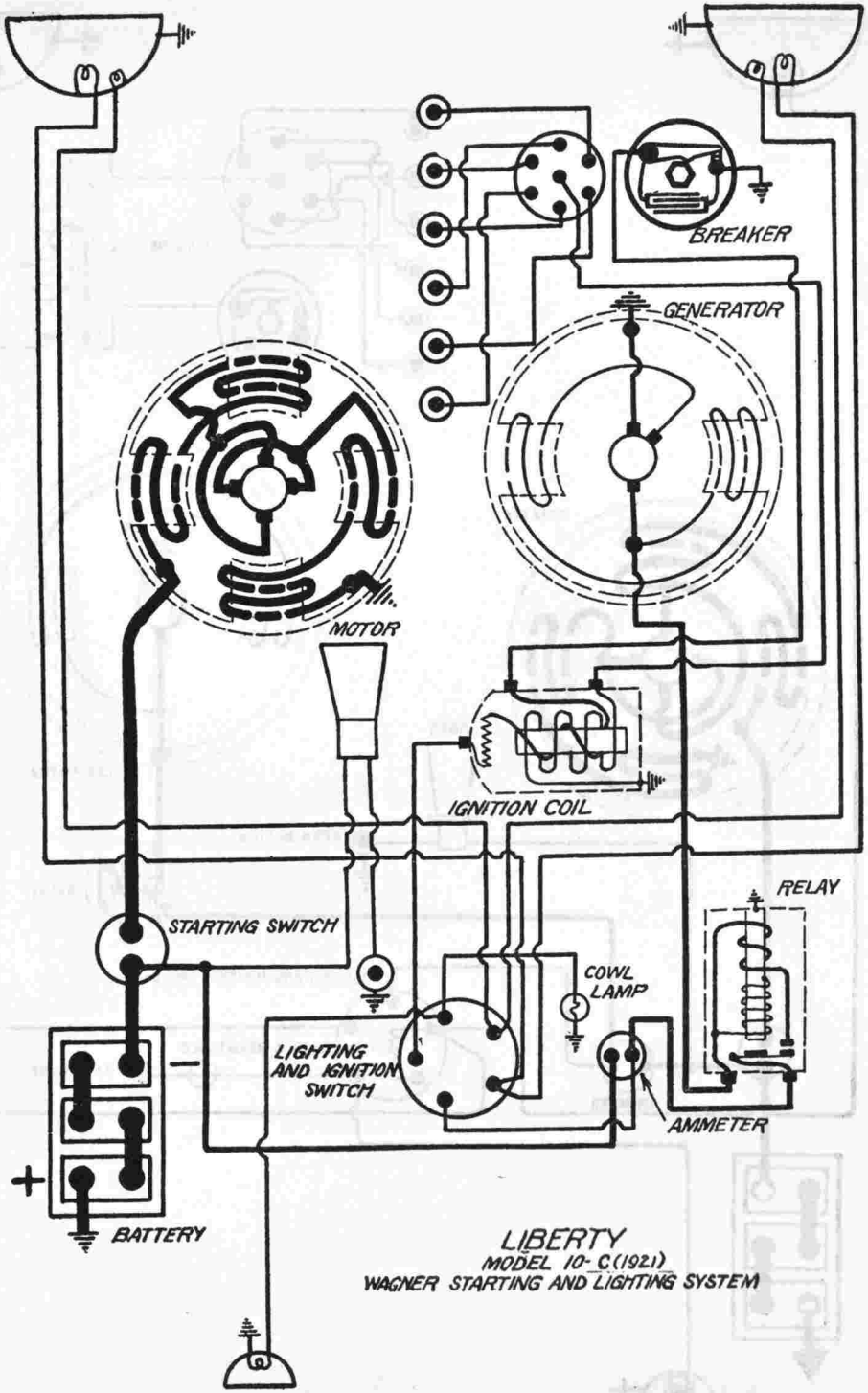
Relay.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch. There is an overrunning clutch at driving end to allow generator to operate as a motor when battery pressure is above that of generator, thereby reducing the discharge current from the battery and in a measure acting as a relay.

Lamps.—Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

Circuit Breaker.—There is a vibrating type circuit breaker to take the place of fuses in



LIBERTY
MODEL 10-B (1919)
DELCO SYSTEM



LIBERTY

MODEL 10-B (1919), 10-C (1920-21)
WAGNER GENERATING, STARTING AND LIGHTING SYSTEM
WAGNER IGNITION

BATTERY:—(1919-20-21) Willard, Type SJW-3, 6 volt, 90 ampere-hour **(1922) Prest-O-Lite, Type 613 SHC,** 6 volt, 115 ampere hour. The positive (+) terminal is grounded.

IGNITION:—Coil Model No. K-32. Distributor Model KC-335. Breaker contacts separate .024 to .029 inch. When the condition of the contacts affects the ignition, renew the lever arm and contact screw.

IGNITION:—Atwater Kent, Type C C used on 10-B cars. Breaker contacts separate .005 to .008 inch. Remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oilstone. Every two weeks remove distributor cap and put a few drops of oil in the oil hole exposed.

OILING.—Screw up the grease cup under the breaker head one-half turn every two weeks. If the car is driven more than 500 miles in two weeks, this must be done every 500 miles. Put 3 or 4 drops of light engine oil on the wick in the breaker lever spindle every 6 months.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER:—The firing order of the 10-B cars is 1, 5, 3, 6, 2, 4. That of the 10-C and 10-D cars is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model E.M.-266, Type 36-T. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 115 R.P.M., current being 160 amperes Lock torque is 11.5 pound-feet, current 475 amperes. Running freely, starter current is 60-90 amperes, armature revolving at 8000 R.P.M.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Model E.M.-277, Type 45-W. Generator current regulation is by third brush system. Maximum current output is 15-17 amperes, reached at 20-23 miles per hour or 1600 R.P.M. of armature. Charging rate reduces to 8 amperes at 40 miles per hour or 3200 R.P.M.

OILING.—Put 5 or 6 drops of light engine oil in each generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Model I-471. Relay closes at 8-10 miles per hour or 660-750 R.P.M. of the armature, and opens at 6-8 miles per hour or 450-660 R.P.M. of the armature. Charging current is 2 amperes at closing, and the discharge current is 0-4 amperes at opening of relay contacts. Contacts separate .035 to .065 inch. Air gap between relay armature (moving member) and coil core is .025 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and are each 6-8 volt, 2 cp.

LIBERTY

MODEL 10-D (1922-23-24)

WAGNER GENERATING, STARTING AND LIGHTING SYSTEM

WAGNER IGNITION

BATTERY.—Prest-O-Lite, Type SCH-613, 6 volt, 115 ampere-hour. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. K-32. Distributor Model KC-335. Breaker contacts separate .024 to .029 inch. When the condition of the contacts affects the ignition, renew the lever arm and contact screw.

Oiling:—Screw up the grease cup under the breaker head one-half turn every two weeks. If the car is driven more than 500 miles in two weeks, this must be done every 500 miles. Put 3 or 4 drops of light engine oil on the wick in the breaker lever spindle every 6 months.

Timing:—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plug Gaps:—Spark plug gaps are .025 inch.

STARTER:—Model E.M.-266, Type 36-T. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 115 R.P.M., current being 160 amperes. Lock torque is 11.5 pound-feet, current 475 amperes. Running freely, starter current is 60-90 amperes, armature revolving at 8000 R.P.M.

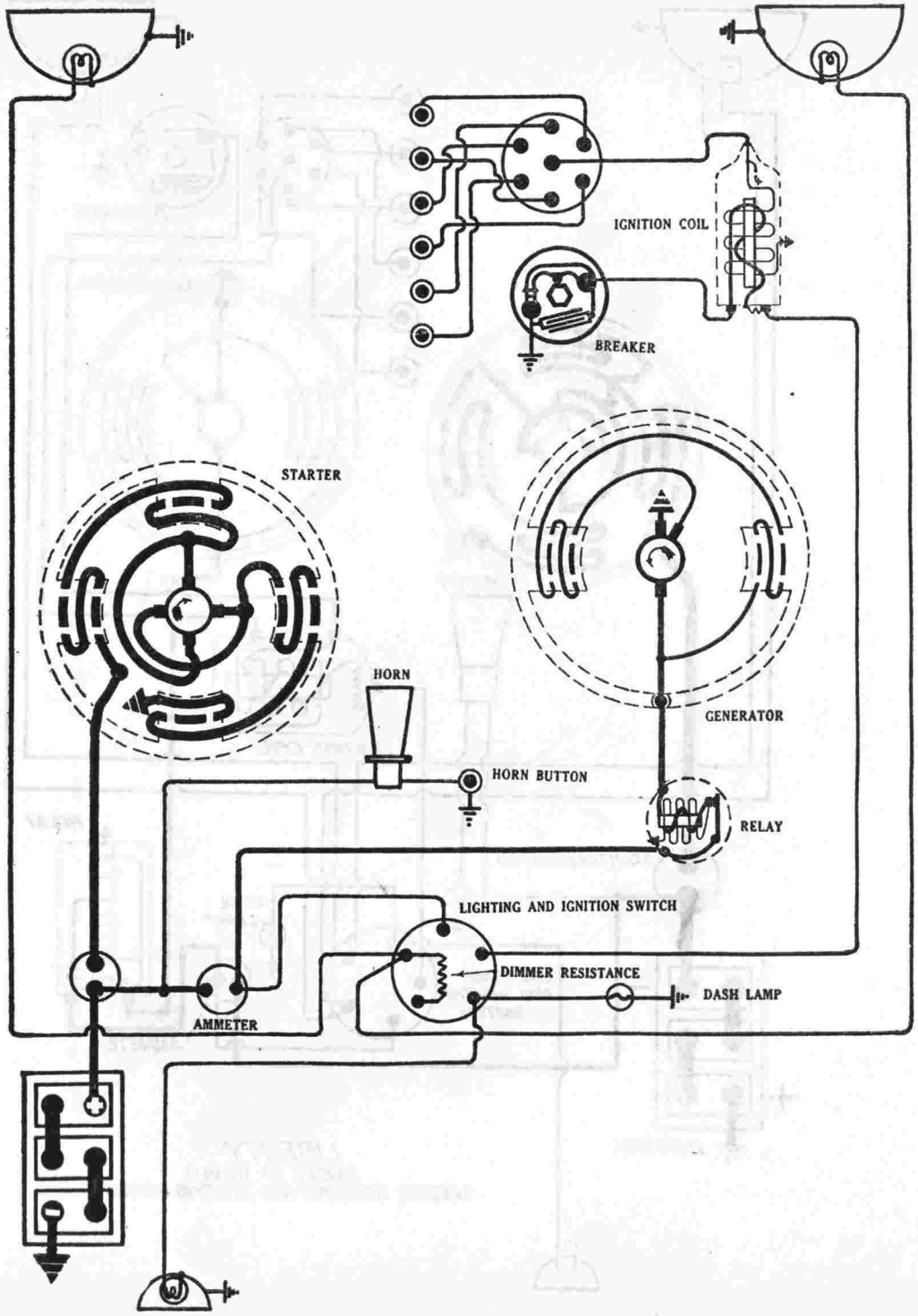
Oiling:—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR:—Model E.M.-277, Type 45-W. Generator current regulation is by third brush system. Maximum current output is 15-17 amperes, reached at 20-23 miles per hour or 1600 R.P.M. of armature. Charging rate reduces to 8 amperes at 40 miles per hour or 3200 R.P.M.

Oiling:—Put 5 or 6 drops of light engine oil in each generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY:—Model I-471. Relay closes at 8-10 miles per hour or 660-750 R.P.M. of the armature, and opens at 6-8 miles per hour or 450-660 R.P.M. of the armature. Charging current is 2 amperes at closing, and the discharge current is 0-4 amperes at opening of relay contacts. Contacts separate .035 to .065 inch. Air gap between relay armature (moving member) and coil core is .025 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

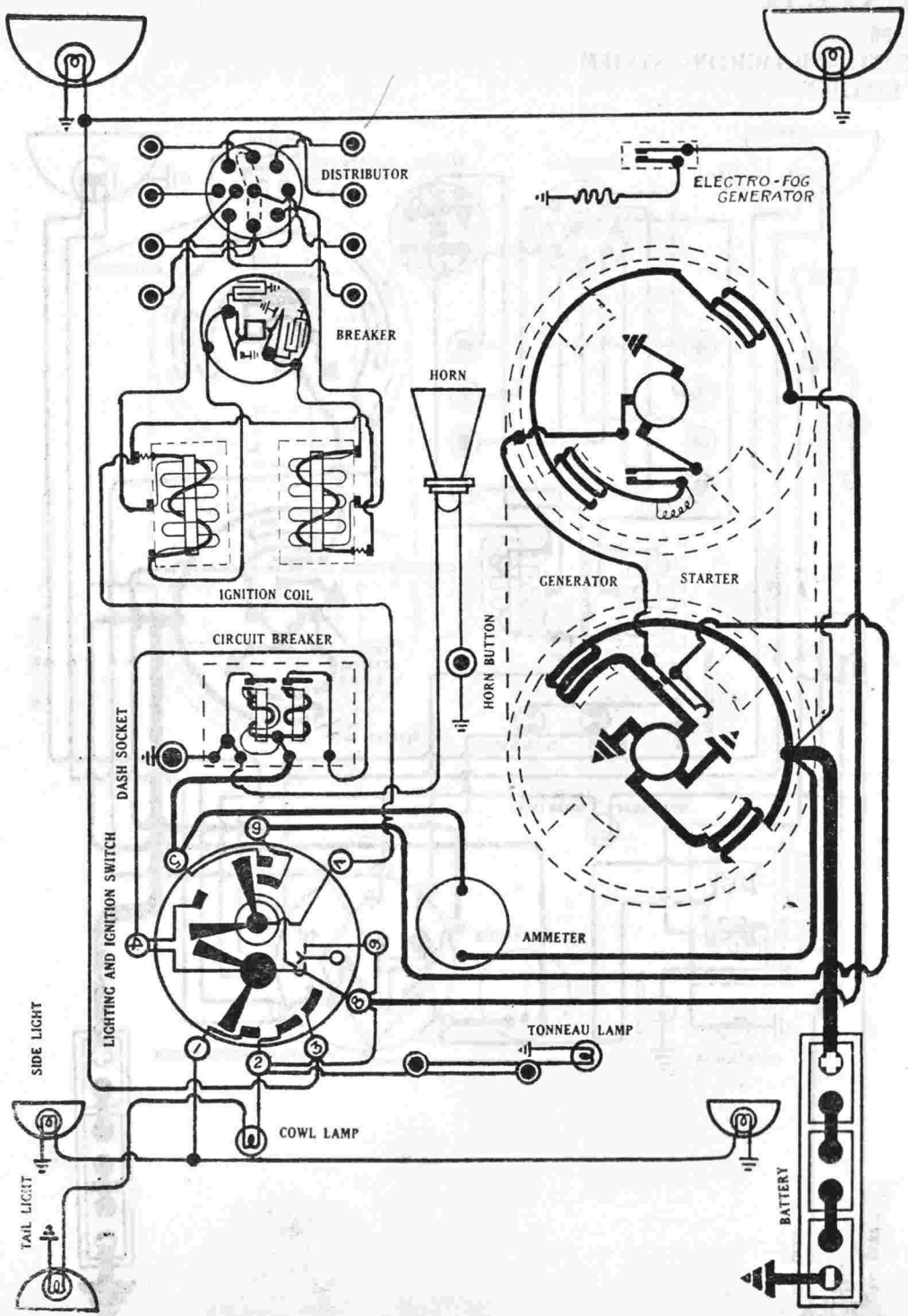
LAMPS:—Head lamps are 6-8 volt, 21 cp. Dash and tail lamps are 6-8 volt, 2 cp.



LINCOLN

1921-22-23-24-25

DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION



BATTERY.—Exide, Type 3, LRVX-15-2, 6 volt, 135 ampere-hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2159. Distributor Model No. 5226. Breaker contacts separate to .020 inch. If burned or pitted, affecting the ignition, resurface on a medium hard oilstone.

Oiling:—Put 3 or 4 drops of oil in the oiler every 250 miles. Also put light cup grease to a level just above the cover plate near the spark advance lever on the forward side of the housing every 5000 miles. A very small amount of grease or vaseline should be applied to the surface of the breaker cam every 2000 miles.

Timing.—The right breaker points should commence to open on the mark "RET" on the clutch-ring. Spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1R, 4L, 2R, 3L, 4R, 1L, 3R, 2L.

Spark Plug Gaps.—Spark plug gaps are .025-.030 inch.

STARTER-GENERATOR.—Model No. 193. The starter and generator are combined into one unit. Starter is connected to the engine through a set of reduction gears, meshed by the operator. Two overrunning clutches are provided in connection with the ignition switch. A circuit is closed, allowing current to flow through the generator windings, causing the armature to revolve slowly, aiding the meshing of the reduction gears. One clutch permits this rotation, and also permits a relatively high speed of the armature, necessary when operating as a starter. The second overrunning clutch prevents the engine driving the armature through the reduction gears. Depressing the starter pedal meshes the reduction gears, opens the generator circuit and allows the motor brushes to come in contact with the commutator, closing the starter circuit and cranking the engine. When the pedal is released, a spring reverses the operations. The direction of rotation is counter-clockwise, looking at the starter commutator end. The starter running freely, takes 60 amperes at 6 volts. Lock torque is 10 lb. ft. at 3 volts. The pressure of the starter brushes should be 2¼-2¾ pounds each.

GENERATOR.—Generator current regulation is by the third brush. It begins to supply current at a speed of 7 miles per hour. The maximum charging rate is 16 amperes, reached at 1400 R.P.M. of armature, or 20 miles per hour.

Generator Data.—Motor Generator No. 193

Amperes	R.P.M.
3	600
12	1000
14-16	1400
15	2000

To adjust the charging rate, loosen the commutator cover band and the locknut on the end of the generator. Then turn the adjusting screw in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate, Tighten the locknut after making the adjustment.

Oiling.—Put a few drops of good oil in front and rear oil cups of the starter-generator bearings every 250 miles.

RELAY.—There is no relay. It is controlled by the ignition switch.

LAMPS.—Head lamps, 6-8 volt, 21 cp. Side, tonneau extension, dash, dome, rear quarter and inspection lamps, each 6-8 volt, 4 cp.Cowl and rear lamps, 3-4 volt, 2 cp. Handy extension lamp, 6-8 volts, 4 cp. Signal lamp, 6-8 volts, 21 cp. All lamps are single contact.

CIRCUIT BREAKER.—A circuit breaker mounted on the back of the switch takes the place of fuses. The vibrating circuit breaker in the lighting circuit begins to operate when the current flow reaches 25-30 amperes. While vibrating the current is not over 15 amperes. The lockout circuit breaker protects the horn and handy lamp circuits. A current of 25-30 amperes causes this device to operate. While operating the current flow is less than 1 ampere.

LINCOLN

1926

DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Exide, Type 3-LXRV-15-2. 6 volt. 130 ampere hour. The starting capacity is 137 amperes for 20 minutes. Lighting capacity is 5 amperes for 26 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model 2159. Distributor Model 5226. Breaker contacts separate .015-.020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file or on a medium hard oilstone. A manual advance of 18-23° is provided. Automatic advance begins at 900 R.P.M. and reaches a maximum of 24-28° at 2000 R.P.M. The tension of the breaker arm spring should be 16-20 ounces.

Oiling:—Put 3 or 4 drops of light engine oil in the oiler on the side of the distributor housing every 250 miles. Remove the grease plug and pack the gear case with light cup grease to a level just below the cover plate (located on the front of the unit near the spark control lever) every 5000 miles. Place a small amount of vaseline or heavy grease on the face of the breaker cam and in the distributor head every 1000 miles. Remove all excess and polish the rotor track with a soft clean cloth.

Mounting:—Distributor is mounted at the forward end of the engine. To remove, remove four hold down screws and lift distributor upward and out from position.

Timing:—Right hand breaker contacts begin to separate when piston No. 1R on compression stroke reaches a position at which the vertical mark preceding the marking "RET" on the clutch ring is opposite the indicator with the spark control lever in the fully retarded position. This breaker controls the right hand coil and fires 4 cylinders. The left hand breaker controls the other coil and fires the remaining cylinders. The engine fires at intervals of 60° and 120° corresponding to 30° and 60° of distributor travel. These intervals must be accurately located. It may be done by connecting a test lamp in each circuit and noting the exact instant the contacts separate. Small marks may be scratched on the edge of the housing opposite the rotor when the contacts separate. These should measure 1 1/16 for the 30° and 2 1/32 for the 60° intervals.

Firing Order:—The firing order is 1R-4L-2R-3L-4R-1L-3R-2L.

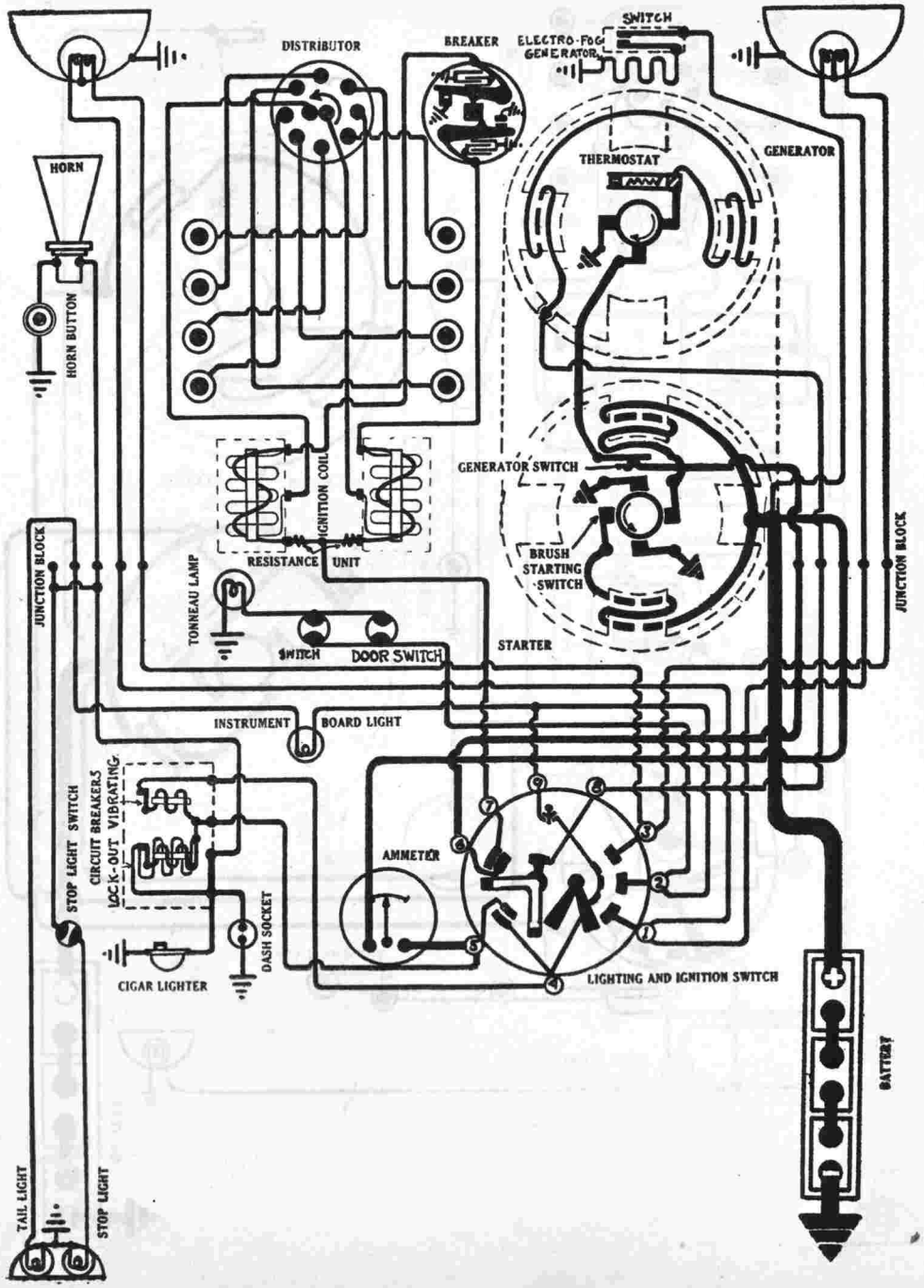
Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025-.030 inch.

STARTER-GENERATOR:—Model 193. Starter and generator are combined into one unit. Starter is connected to the engine through a set of reduction gears meshed by the operator. Depressing the starter pedal meshes the gears, opens the generator circuit and brings the starter brushes in contact with the commutator, allowing it to crank the engine. When the pedal is released, a spring reverses these operations. Two overrunning clutches permit the high speed necessary in cranking the engine and prevent the engine driving the starter. The direction of rotation is counter-clockwise, looking at the starter commutator end; starter brush tension should be 2¼-2¾ pounds.

Starter Data

Torque	R.P.M.	Volts	Amperes
0	4000	6	60
10	Lock	3	—

GENERATOR:—Generator current regulation is by the third brush system. To adjust charging rate, loosen cover band on the generator end (front) of unit, exposing the brush regulating lever. Raising the lever increases the charging rate.; lowering it decreases the charging rate. Replace the cover band after adjusting. A thermostat mounted with third brush opens at 195-200° F. cutting down the output 30%. The brush tension should be 1½-1¾ pounds each.



LINCOLN

1926

DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

Generator Data

Amperes	R.P.M.
3	600
16-18	1400

Mounting:—Starter-generator is mounted at right of engine. To remove, drain radiator disconnect pump shaft, and remove drip pan under starter-generator. Then remove all pump bolts and drop pump down past engine. Remove two cap screws extending through to back of crank case arm holding starter-generator to engine and remove unit by slipping it down past the engine.

Oiling:—Put 8 or 10 drops of light engine oil in each of the starter-generator oilers every 500 miles. Once each year, remove, disassemble and clean motor and generator clutches. Repack with vaseline.

RELAY:—No relay is used. Generator is connected to the battery through the ignition switch.

LIGHTING.—Switch Model 1236. Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 6 cp. Two element bulbs are used. Dash and tail lamps are 3-4 volt, 2 cp. Handy extension lamp is 6-8 volt, 4 cp. Signal lamp is 6-8 volt, 21 cp.

CIRCUIT BREAKER:—Model 5742. Two circuit breakers are mounted on the rear of the dash. A vibrating circuit breaker opens when the current flow reaches 25-30 amperes and continues with a flow of 10-15 amperes. A lock out circuit breaker operates when the current flow reaches 25-30 amperes and continues with less than 1 ampere.

LINCOLN

1927

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY.—Exide Type 3-LXRV-15-2. 6 volt, 130 ampere hour. The starting capacity is 137 amperes for 20 minutes. Lighting capacity is 5 amperes for 26 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model 2159. Distributor Model 5226. Breaker contacts separate .015-.020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file or on a medium hard oilstone. A manual advance of 18-23° is provided. Automatic advance begins at 900 R.P.M. and reaches a maximum of 24-28° at 3000 R.P.M. The tension of the breaker arm spring should be 16-20 ounces.

Oiling.—Put 3 or 4 drops of light engine oil in the oiler on the side of the distributor housing every 250 miles. Remove the grease plug and pack the gear case with light cup grease to a level just below the cover plate (located on the front of the unit near the spark control lever) every 5,000 miles. Place a small amount of vaseline or heavy grease on the face of the breaker cam and in the distributor head every 1,000 miles. Remove all excess and polish the rotor track with a soft clean cloth.

Mounting.—Distributor is mounted at the forward end of the engine. To remove, remove three hold down nuts and lift distributor upward and out from position.

Timing.—Right hand breaker contacts begin to separate when piston No. 1R on compression stroke reaches a position at which the vertical mark preceding the marking "RET" on the clutch ring is opposite the indicator with the spark control lever in the fully retarded position. This breaker controls the right hand coil and fires 4 cylinders. The left hand breaker controls the other coil and fires the remaining cylinders. The engine fires at intervals of 60° and 120° corresponding to 30° and 60° of distributor travel. These intervals must be accurately located. It may be done by connecting a test lamp in each circuit and noting the exact instant the contacts separate. Small marks may be scratched on the edge of the housing opposite the rotor when the contacts separate. These should measure 1 1/16" for the 30° and 2 1/32" for the 60° intervals.

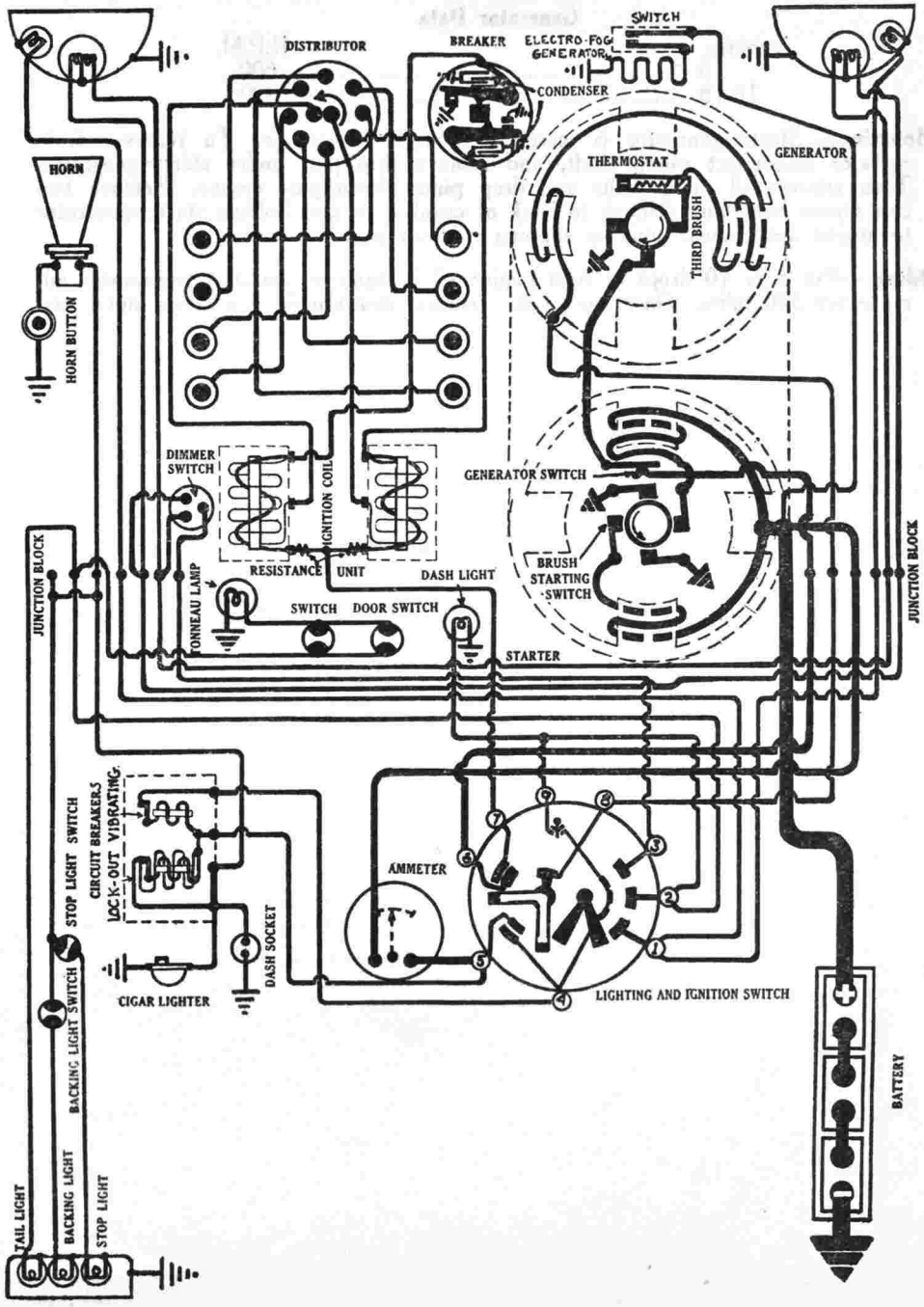
Valve Timing:—INLET VALVES:—Head diameter, 1¾ inches; stem diameter, ⅜ inch; stem length, 6¾ inches; tappet clearance, .004 inch cold; spring pressure, 85 pounds; valve lift, 5/16 inch; intake opens 2½° before top dead center and closes 46° after lower dead center.

EXHAUST VALVES:—Head diameter, 1¾ inches; stem diameter, ⅜ inch; stem length, 6¾ inches; tappet clearance, .004 inch cold; spring pressure, 85 pounds; valve lift, 5/16 inch; intake opens 48° before lower dead center, and closes at top dead center. The guide stems are removable. No oversize valves are made.

Firing Order.—The firing order is 1R-4L-2R-3L-4R-1L-3R-2L.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .020-.025 inch.

STARTER-GENERATOR.—Model 193. Starter and generator are combined into one unit. Starter is connected to the engine through a set of reduction gears meshed by the operator. Depressing the starter pedal meshes the gears, opens the generator circuit and brings the starter brushes in contact with the commutator, allowing it to crank the engine. When the pedal is released, a spring reverses these operations. Two overrunning clutches permit the high speed necessary in cranking the engine and prevent the engine driving the starter. The direction of rotation is counter-clockwise, looking at the starter commutator end; starter brush tension should be 2¼-2¾ pounds.



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LINCOLN

1927

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

Starter Data.

Torque	R.P.M.	Volts	Amperes
0	4000	6	60
10	Lock	3	....

GENERATOR.—Generator current regulation is by the third brush system. To adjust charging rate, loosen cover band on the generator end (front) of unit, exposing the brush regulating lever. Raising the lever increases the charging rate; lowering it decreases the charging rate. Replace the cover band after adjusting. A thermostat mounted with third brush opens at 195-200° F. cutting down the output 30%. The brush tension should be 1½-1¾ pounds each.

Generator Data.

Amperes	R.P.M.
3	600
16-18	1400

Mounting.—Starter-generator is mounted at right of engine. To remove, drain radiator, disconnect pump shaft, and remove drip pan under starter-generator. Then remove all pump bolts and drop pump down past engine. Remove two cap screws extending through to back of crank case arm holding starter-generator to engine and remove unit by slipping it down past the engine.

Oiling.—Put 8 or 10 drops of light engine oil in each of the starter-generator oilers every 500 miles. Once each year, remove, disassemble and clean motor and generator clutches. Repack with vaseline.

RELAY.—No relay is used. Generator is connected to the battery through the ignition switch.

LIGHTING:—Switch Model 1236. Head lamps are 6-8 volt, 21 cp. double filament. Dimmer lamps are 6-8 volt, 6 cp. S.C. Dash and tail lamps are 6-8 volt, 2 cp. S.C. Stop and backing lamps are 6-8 volt, 21 cp. S.C.

CIRCUIT BREAKER.—Model 5742. Two circuit breakers are mounted on the rear of the dash. A vibrating circuit breaker opens when the current flow reaches 25-30 amperes and continues with a flow of 10-15 amperes. A lock out circuit breaker operates when the current flow reaches 25-30 amperes and continues with less than 1 ampere.

LINCOLN

1928

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Exide, Type 3-LXRV-15-2, 6 volt, 135 ampere hour. The starting capacity (20 minute rate) is 137 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 26 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model 2192. Distributor Model 5226. Breaker contacts separate .015-.020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone. Two sets of contacts are used with a four sided cam. Contacts open alternately at intervals of 30 degrees and 60 degrees corresponding to 60 degrees and 120 degrees of crankshaft rotation. This is the correct firing interval for the Lincoln engine. Contacts must be synchronized (see Timing). Distributor is semi-automatic. Maximum manual advance is 18-23 degrees. Automatic advance begins at 900 R.P.M. and reaches a maximum of 24-28 degrees at 3000 R.P.M. Breaker arm spring tension is 16-20 ounces.

Oiling:—Put 3 or 4 drops of light engine oil in the oiler on the side of the distributor housing every 250 miles. Remove the grease plug and pack the gear case with light cup grease to a level just below the cover plate (located on the front of the unit near the spark control lever) every 5000 miles. Place a small amount of vaseline or heavy grease on the face of the breaker cam and in the distributor head every 1000 miles. Remove all excess and polish the rotor track with a soft clean cloth.

Mounting:—Distributor is mounted at the forward end of the engine. To remove, remove 4 hold-down screws and lift distributor upward and out from position.

Timing:—Synchronization of Contacts:—Use Delco-Remy Tool, Part No. 822570, and follow directions on Page S-30 to synchronize contacts. Connect a test lamp in each primary circuit to determine accurately when contacts open.

Timing Distributor:—Right hand breaker contacts begin to separate when piston No. 1R on compression stroke reaches a position at which the vertical mark preceding the marking '/R1' on the clutch ring is opposite the indicator with the spark control lever in the fully retarded position. This mark is 3/8 inch past the 'T.D.C.' mark on the flywheel. This breaker controls the right hand coil and fires the four cylinders of the right hand block. To set timing, loosen lock screws in center of cam and rotate cam until right hand contacts separate. Use a test lamp connected in series with each primary circuit to determine this point. Then tighten lock screw. Connect spark plugs in order around distributor head as shown on diagram.

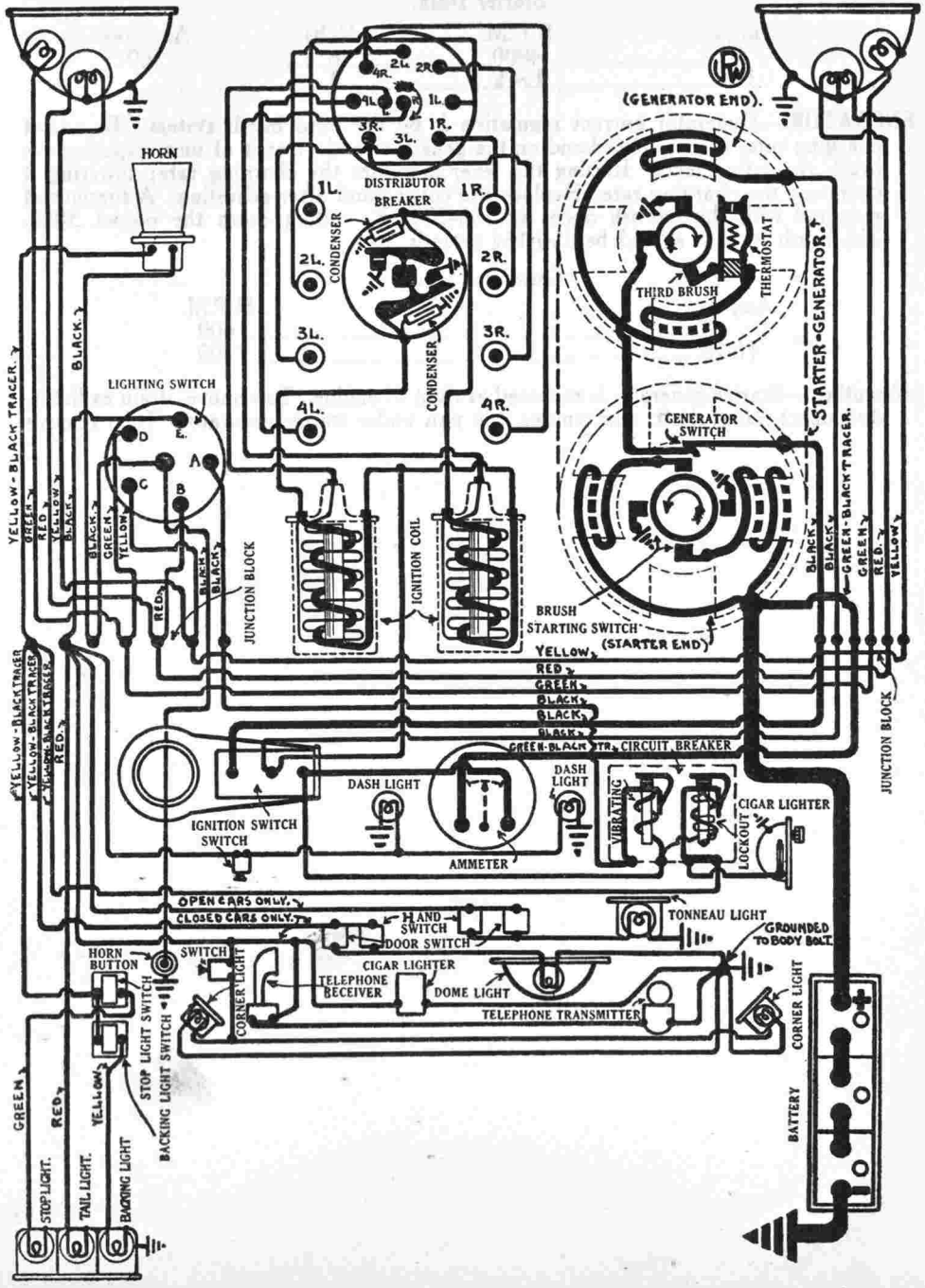
Firing Order:—The firing order is 1R-4L-2R-3L-4R-1L-3R-2L. Cylinder banks are right and left as viewed from driver's seat. No. 1 cylinder is nearest the radiator.

Spark Plugs:—Spark plugs are 7/8 inch. Gaps are .020-.025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1 7/8 inches; stem diameter, 3/8 inch; stem length, 6 3/4 inches. Tappet clearance, .003-.004 inch(cold) Spring pressure, 85 pounds. Valve lift, 5/16 inch. Intake opens 2 1/2 degrees before top dead center and closes 46 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 3/4 inches; stem diameter, 3/8 inch; stem length, 6 3/4 inches. Tappet clearance, .003-.004 inch (cold). Spring pressure, 85 pounds. Valve lift, 5/16 inch. Intake opens 48 degrees before lower dead center, and closes at top dead center. Valve stem guides are removable. Oversize valves are not made.

STARTER-GENERATOR:—Model 193. Starter and generator are combined into one unit. Starter is connected to the engine through a set of reduction gears meshed by the operator. Depressing the starter pedal meshes the gears, opens the generator circuit and brings the starter brushes in contact with the commutator, al-



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lowing it to crank the engine. When the pedal is released, a spring reverses these operations. Two over-running clutches permit the high speed necessary in cranking the engine and prevent the engine driving the starter. The direction of rotation is counter-clockwise, looking at the starter commutator end. Starter brush tension should be 2¼-2¾ pounds.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	6	60
10 "	Lock	3	....

GENERATOR:—Generator current regulation is by the third brush system. To adjust charging rate, loosen cover band on the generator end (front) of unit, exposing the brush regulating lever. Raising the lever increases the charging rate; lowering it decreases the charging rate. Replace the cover band after adjusting. A thermostat mounted with third brush opens at 195-200 degrees F. cutting down the output 30%. The brush tension should be 1½-1¾ pounds each.

Generator Data

Amperes	R.P.M.
3	600
16-18	1400

Mounting:—Starter-generator is mounted at right of engine. To remove, drain radiator, disconnect pump shaft, and remove drip pan under starter-generator. Then remove all pump bolts and drop pump down past engine. Remove two cap screws extending through to back of crank case arm holding stater,generator to engine and remove unit by slipping it down past the engine.

Oiling:—Put 8 or 10 drops of light engine oil in each of the starter-generator oilers every 500 miles. Once each year, remove, disassemble and clean motor and generator clutches. Repack with vaseline.

RELAY:—No relay is used. Generator is connected to the battery through the ignition switch.

LIGHTING:—Lincoln Make. Lighting switch is mounted on steering wheel. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using 21 cp. filament instead of dimming) Mazda No. 1110. Auxiliary head lights are 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash and tail lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop and backing lights are 6-8 volt, 21 cp. S.C. Mazda No. 1129.

CIRCUIT BREAKER:—Model 5770. Two circuit breakers are mounted on the rear of the dash. A vibrating circuit breaker opens when the current flow reaches 25-30 amperes and continues with a flow of 10-15 amperes. A lock-out circuit breaker operates when the current flow reaches 25-30 amperes and continues with less than 1 ampere.

SERIES 38 AND 48 (1914-15-16-17-18)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM.
BOSCH AND EISEMANN IGNITION.

BATTERY:—Battery is 6 volt, 120 ampere-hour. The positive (+) terminal is grounded

IGNITION:—Eisemann, Type E.M.-6 Dual. and Bosch, Type ZR-6, Dual Model 4. Breaker contacts separate .015 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING:—Put several drops of light engine oil in each of magneto oilers every month. If car is driven more than 1000 miles in a month, oiling must be done every 1000 miles

TIMING:—Breaker contacts begin to separate when piston on compression stroke is 5/16 inch from the top of the stroke on Model 38, and 7/16 inch from the top of the stroke on the Model 48, spark control lever and breaker assembly in the fully advanced position.

FIRING ORDER:—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS:—Spark plug gaps ore .028 inch.

STARTER:—Frame 775, Style 241,820. Starter is connected to the engine through a magnetic pinion shift.

Starter Data

Torque	R.P.M.	Amperes	Volts
4.0 lb. ft.	1000	160	5.6
12.0 lb. ft.	490	320	4.8
22.5 lb. ft.	Lock	500	4.5

Starter cranks the engine at 125 R. P. M. on the Model 38, and at R. P. M. on the Model 48.

OILING:—Put 4 or 5 drops of light engine oil in each of starter oilers every month.

GENERATOR:—Frame No. 521. Generator current regulation is by reverse series field.

Generator Data

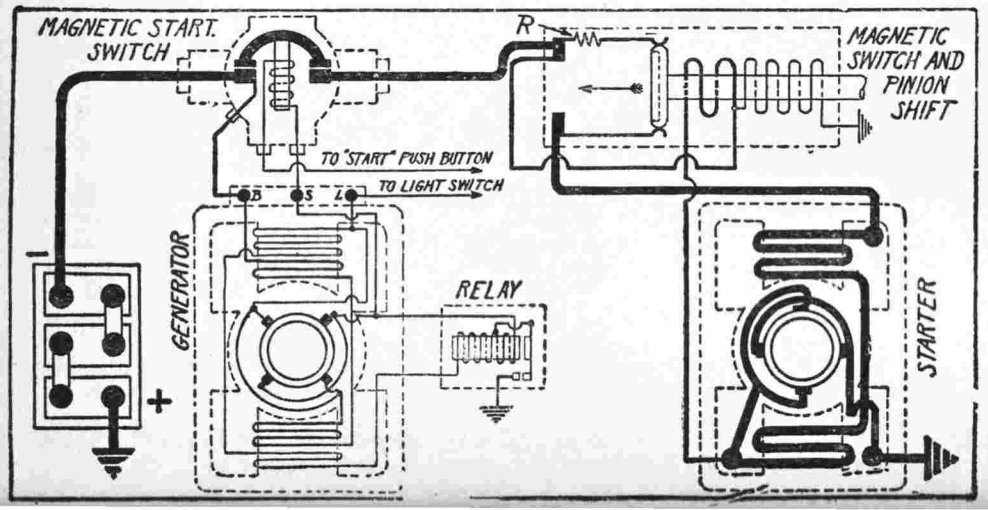
Charging Rate	Total Output—Amperes	R.P.M
4.4	7.6	500
8.0	12.0	800
10.0	13.6	1200
11.0	14.4	1600

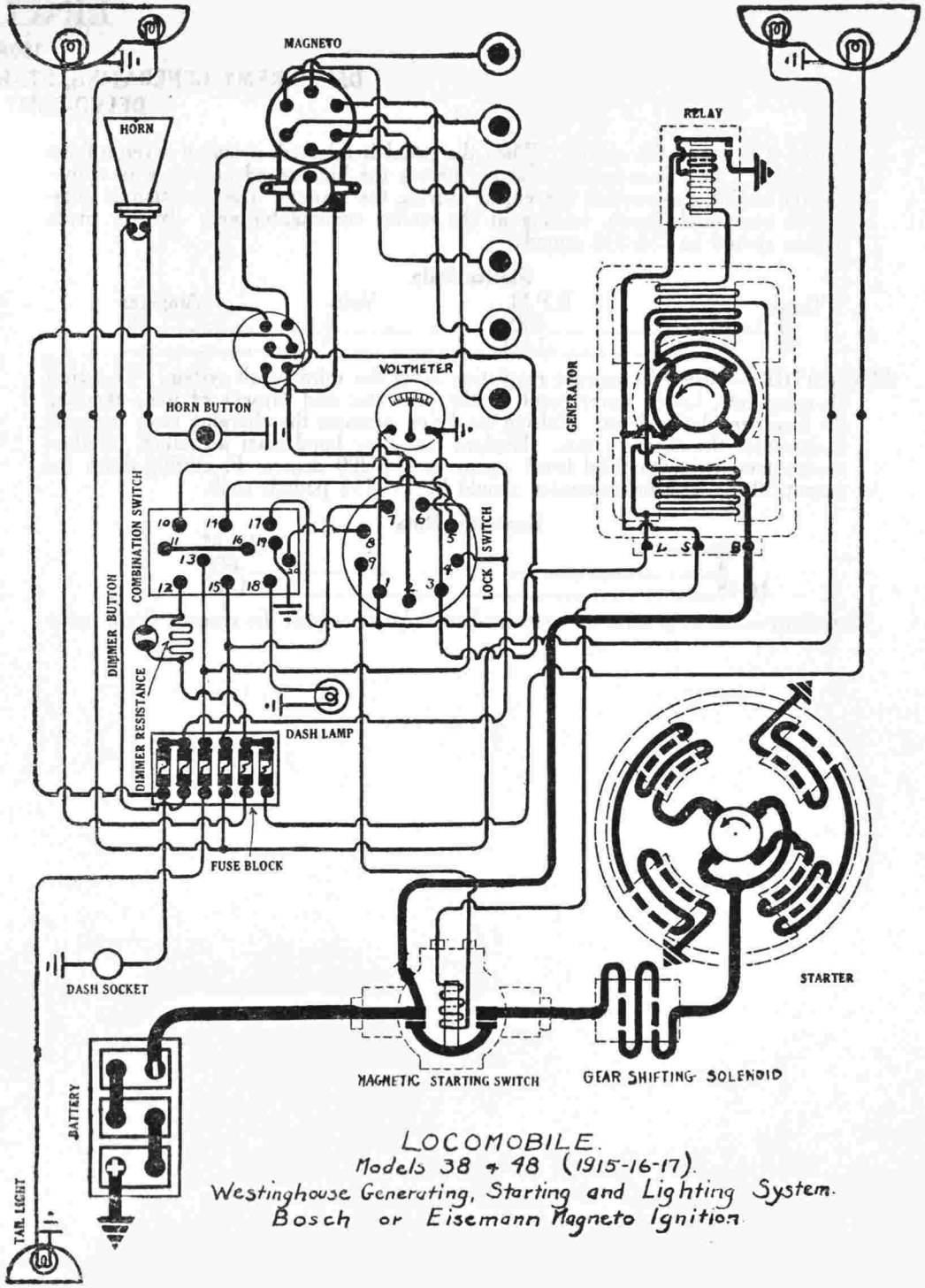
The current for the lights does not pass through the reverse series field. When the lamps are turned on, the current output automatically increases to supply the extra current used, keeping the charging rate practically constant. Maximum charging rate is reached at 20-25 miles per hour.

OILING:—Put 4 or 5 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY:—Relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS:—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 6 cp. Tail lamp is 6-8 volt, 4 cp. Cowl, tonneau and step lamps are each 6-8 volt, 2 cp. Trouble lamp is 6-8 volt, 6 cp.





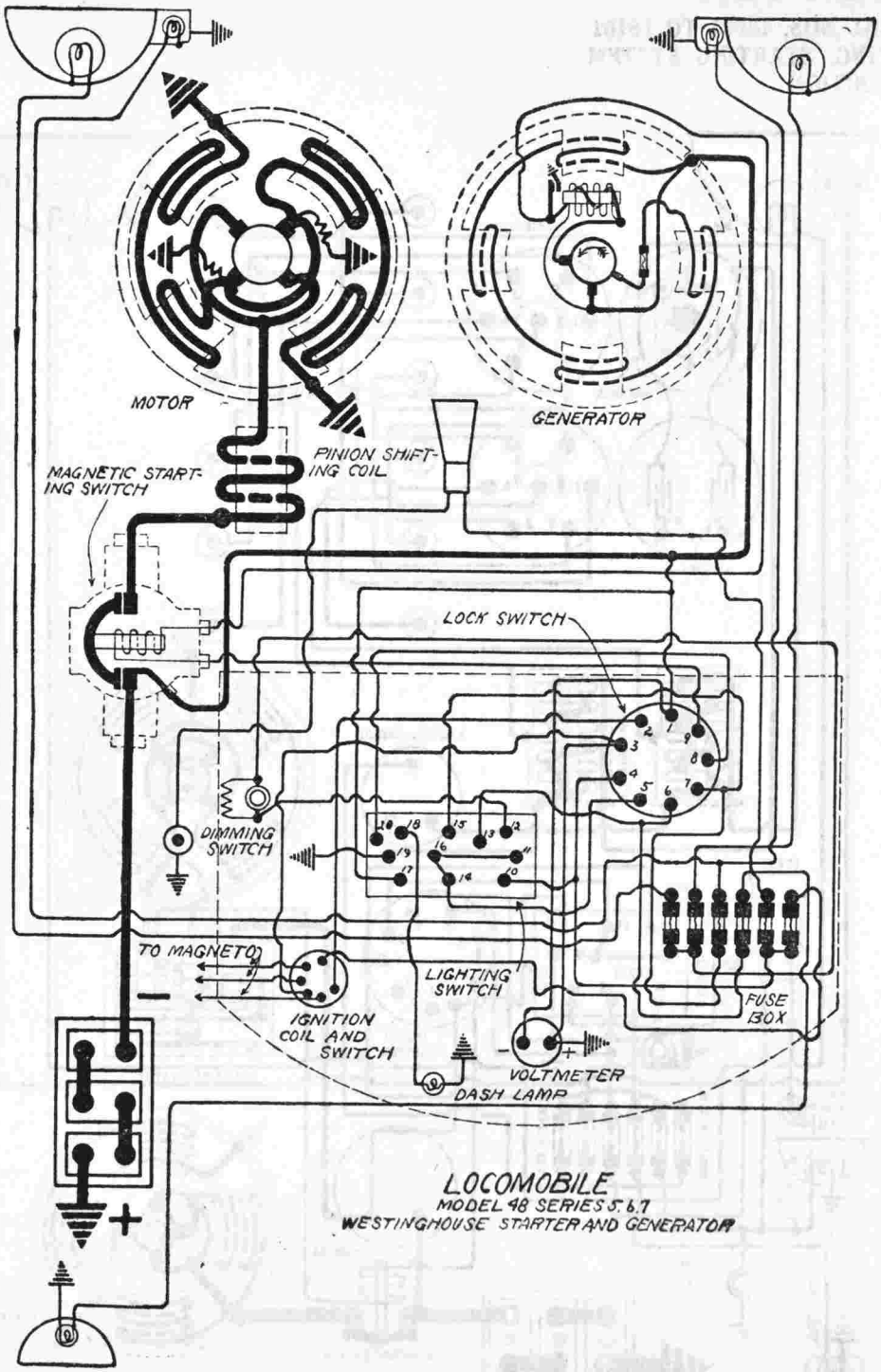
LOCOMOBILE.
Models 38 & 48 (1915-16-17).
Westinghouse Generating, Starting and Lighting System.
Bosch or Eisemann Magneto Ignition

LOCOMOBILE

MODEL IV, V, VI, VII, SERIES 48 (1919-20-21-22)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM

BERLING MAGNETO IGNITION



BATTERY.—Exide, 6 volt, 130 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Berling, Two-spark Dual. Breaker contacts separate .016 to .020 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 10 drops of light engine oil in the magneto oilers every month. Put a small amount of vaseline on the cam and rubbing surfaces of the fiber lever, applying with a toothpick. If the car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

TIMING.—Magneto breaker contacts begin to separate when the piston on the compression stroke is 3/16 inch from top dead center, spark control lever and breaker assembly in the fully retarded position. Battery breaker contacts begin to separate when the piston of the compression stroke is 7/16 inches from top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .024 to .025 inch on the inlet side and .023 inch on the exhaust side.

STARTER.—Frame 777. Starter is connected to the engine through a magnetic pinion shift. Lock torque is 27.5 pound-feet, current 750 amperes at 4 volts. Torque at 1250 R.P.M. is 3.5 pound-feet, current 230 amperes at 5.5 volts. Running freely, armature revolves at 5000 R.P.M., current 80 amperes at 5.5 volts. Brush pressure is 2½ to 3 pounds. Pinion must be pulled into mesh by a current of 125 amperes or less, and must not be held in by 80 amperes. With the plunger in the "In" position, the air gap between the plunger and the cover of the pull-in coil is 5/16 inch, including the micarta washer. With the plunger in the "In" position, the spring is compressed into an overall length of 1 11/32 inches, and exerts a pressure of 7 pounds. With the plunger in the "Out" position, the spring measures 2 13/16 inches and exerts a pressure of 2 pounds. Pressure of brushes on commutator is 2.5 to 3 pounds.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Frame No. 760. Generator current regulation is by the third brush system. Maximum current output is 15-17 amperes, reached at 1250 R.P.M. of the armature or 16-20 miles per hour.

Generator Data

Amperes	Cold Test	R.P.M.	Amperes	Hot Test	R.P.M.
0		450	0		500
8		675	6		725
12		840	9		850
15-17		1250	12-14		1250
10		2000	7- 8		2000

The cold test readings are obtained with a generator temperature under 95°F. The hot test readings are obtained after the generator has been operated one hour at 1800 R.P.M., charging a half-charged battery. Shunt field current is 2.8 to 3.25 amperes at 6 volts. When the generator is operating freely as a motor, current is 3.5 to 5 amperes at 6 to 6.6 volts.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in the generator frame. Relay closes at 500-550 R.P.M. of the armature or 7-9 miles per hour and opens at 450-500 R.P.M. of the armature or 5-7 miles per hour. Adjust the spring tension on the relay armature so that the contacts open with a discharge current of 0-3 amperes. Adjust the air gap between the relay armature and coil core so that the contacts close when the voltage of the generator reaches 6.2 to 6.5 volts. Air gap between relay armature and coil core is .005 inch, contacts closed. Contacts separate .030 to .035 inch. Resistance of the shunt coil is 68 ohms. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 6 cp. Tail, tonneau and step lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 3 cp.

FUSES.—Fuses are 10 ampere.

LOCOMOBILE

SERIES M-48 (1923), SERIAL NOS. 18001 TO 18101
WESTINGHOUSE GENERATING, STARTING SYSTEM
DELCO IGNITION

BATTERY:—Exide, Type 3-XC-21-1. 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 163 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 30 hours.

IGNITION:—Coil Model 2171. Distributor Model 5216. There are two coils used with a double distributor. Breaker contacts separate .020-.025 inch with breaker arm on lobe of cam. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Manual advance is 24-29 degrees. Automatic advance begins at 600 R.P.M. Maximum automatic advance is 15-18 degrees reached at 2000 R.P.M. Breaker contacts are made of tungsten. When the condition of the contacts affects the ignition resurface with a fine flat contact file or on a medium hard oilstone.

Mounting:—Distributor is mounted on a special mounting bracket at the left of the engine. To remove, disconnect primary leads and manual advance rod. Remove heads with high tension cables intact. Loosen the drive coupling. Remove mounting screws in base and lift distributor from engine.

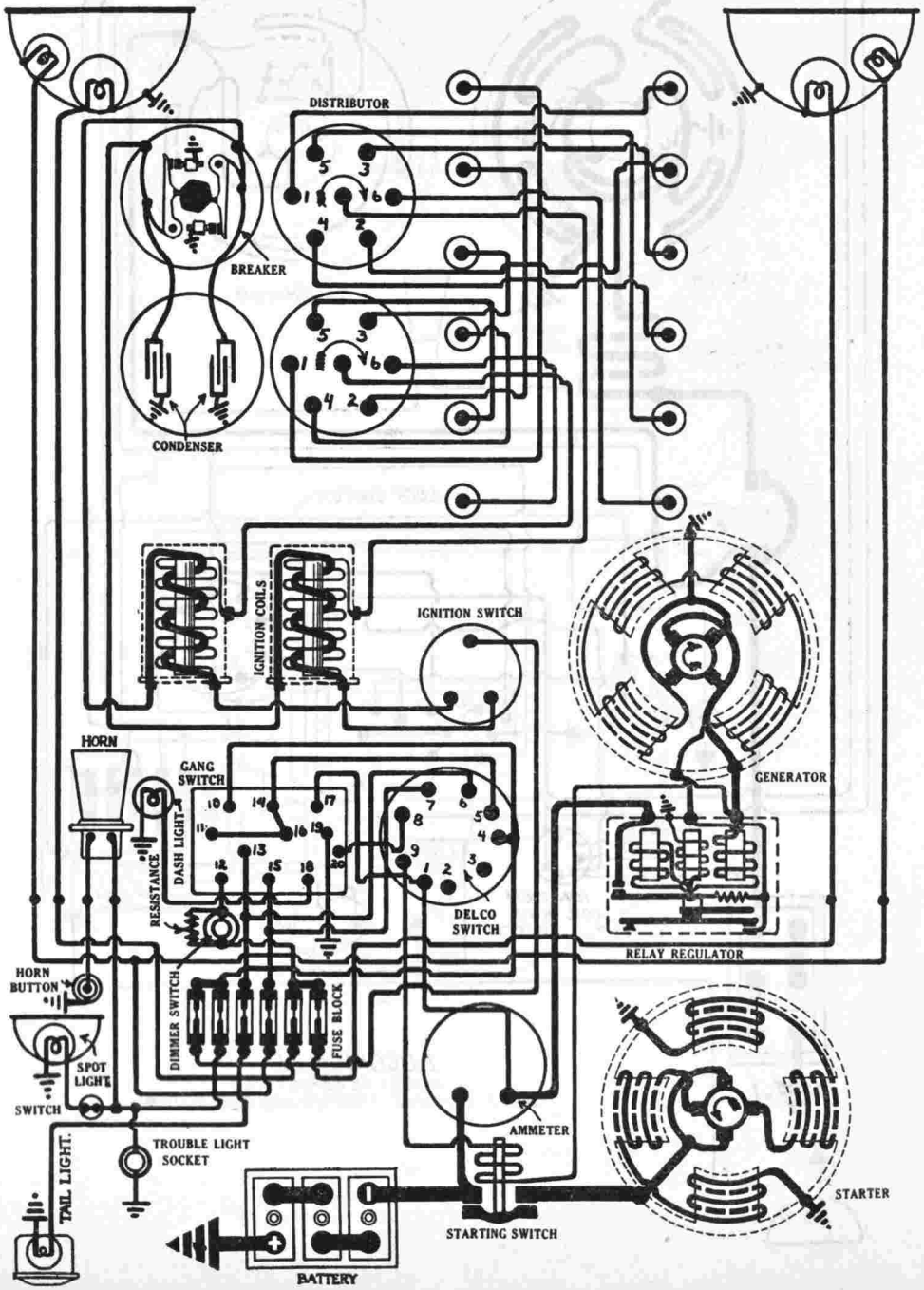
Oiling:—Put 8 or 10 drops of light engine oil in each of the distributor oilers every two weeks or each 500 miles. Remove plug in distributor housing and fill with light gear grease up to the level of the under side of the horizontal shaft. This attention should be given once or twice a year. Apply a small bit of medium grease to the breaker cam and to the track in the distributor head every 1000 miles. Polish distributor head track and remove all excess grease with a clean cloth.

Timing:—Breaker contacts in the ignition circuit firing the plugs over the intake valves (rear distributor) begin to separate when the piston reaches a position 1/16 inch past top dead center centering power stroke with the spark control lever and breaker assembly in the fully retarded position. This position is approximately 1½ inches past top dead center measured on the flywheel. Breaker contacts firing plugs over the exhaust valves open approximately 3-7 degrees earlier than this. To check timing, crank engine over until piston No. 1 is coming up on the compression stroke. This is the upstroke with both valves closed. Fully retard the spark. Continue to crank engine until piston No. 1 reaches a position 1½ inches past top dead center (measured on the flywheel). Breaker contacts firing plugs over the intake valves should separate at this point. If they do not, loosen the timing adjustment screw in the center of the cam in the forward distributor and rotate cam until contacts separate. Tighten the screw and make cerain that the rotor in each distributor is opposite the segment connected to the spark plug in cylinder No. 1 and connect the remaining plugs in order around each distributor head. With the proper adjustment of the contacts firing the plugs over the intake valves the second set of contacts will fire the plugs over the exhaust valves 3-7 degrees earlier.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .027 inch.

STARTER:—Frame 777. Starter is connected to the engine through a magnetic pinion shift. Pinion should be pulled into mesh by a current of 125 amperes or less but should not be held in mesh by less than 80 amperes. With the plunger in the "IN" position, the air gap between the plunger and the cover of the pull-in coil is 5/16 inch, including the micarta washer. When the plunger is in this position the spring is compressed into an overall length of 1 11/32 inches and exerts a pressure of 7 pounds. With the plunger in the "OUT" position the spring measures 2 13/16 inches and



exerts a pressure of 2 pounds. The pressure of the starter brushes on the commutator is 2½-3 pounds.

Starter Data

Torque	R.P.M.	Volts	Amperes
Free	5000	5.5	80
3.5 lb. ft.	1250	5.5	230
27.5 "	Lock	4.0	750

Mounting:—Starter is mounted at the right of the engine. To remove, remove bracket and clamping bolts and slip starter out of bracket.

Oiling:—Put 5 or 6 drops of light engine oil in each of the starter oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR:—Frame 788-R. The direction of rotation is clockwise, looking at the commutator end. Generator regulation is by a vibrating relay regulator. The voltage remains constant and the charging rate depends upon the condition of the battery. Maximum charging rate is 20 amperes reached at 1200 R.P.M. of the armature. To increase the charging rate, increase the regulator contact spring tension by turning the thumb screw and decrease the spring tension to decrease the charging rate.

Generator Data

Amperes	Volts	R.P.M.
0	6.5	425
20	6.5	1200

Operating freely as a motor, generator draws 5 amperes at 6-6.3 volts. Shunt field current is 1.25-1.75 amperes at 6-6.3 volts. Brush spring tension should be 1¼-1½ pounds each.

Mounting:—Generator is cradle mounted at the right of the engine. To remove generator, loosen mounting strap and slide generator from position.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY-REGULATOR:—Relay closes at 425-450 R.P.M. of the armature or 6-7 miles per hour and opens at 400-425 R.P.M. of the armature or 5-6 miles per hour. Adjust relay spring tension so that the contacts open with a discharge current of 1-2 amperes. Adjust air gap between relay armature and coil core so that the contacts close when the voltage of the generator reaches 6.5-7 volts. Relay contact gap is .055-.060 inch. Regulator contacts separate .045-.055 inch. Adjust regulator to limit the voltage to 6.5 volts with a 20 ampere resistance load, generator being driven at 1200 R.P.M. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LIGHTING:—Delco Combination Switch Model 1237. Bryant Electric Co. four button Gang Switch Model B2462-L. Head lights are 6-8 volt, 21 cp. S.C. Stop lights are 6-8 volt, 21 cp. S.C. Dash, dome, tonneau and side lights are 6-8 volt, 2 cp. S.C. With dimmer resistance, head lights are 2 cp. Car can be locked by the Delco switch but the circuits are also controlled by the Bryant switch.

FUSES:—Fuses are 10 ampere capacity.

LOCOMOBILE

MODEL M48 (1923-24-25-26-27-28), SERIAL NOS. 18210 UP
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY.—Prest-O-Lite, Type 12-11-SHC. 12 volt, 92.5 ampere hour. The positive (+) terminal is grounded.

IGNITION:—Coil Model No. 2135. Distributor Model No. 5258. Breaker contacts separate .020 to .025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or on a medium hard oilstone. Manual advance is 24-29°. Automatic advance starts at 600 R.P.M. and reaches a maximum of 15-18° at 2000 R.P.M. The tension of the contact arm spring should be 16-20 ounces.

Mounting:—Distributor is mounted on left side of motor. To remove, first remove bracket bolts then take distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the oilers on the side of the distributor housing every 1000 miles. Remove the plug and fill gear compartment with very light gear grease to the level of the lower side of the horizontal shaft each six months. Put a small bit of vaseline on the breaker cam and wipe out the distributor head with a small bit of vaseline, removing all excess, every 1000 miles.

Timing:—Breaker contacts in the ignition circuit firing the plugs over the intake valves (rear distributor) begin to separate when the piston reaches a position 1/16 inch past top dead center entering power stroke with the spark control lever and breaker assembly in the fully retarded position. This position is approximately 1½ inches past top dead center measured on the flywheel. Breaker contacts firing plugs over the exhaust valves open approximately 3-7° earlier than this.

Valve Timing:—INLET VALVES:—Head diameter, 2 5/16 inches; stem diameter, .4345 inch; stem length, 8½ inches; tappet clearance, .002 inch; spring pressure, 120 pounds; valve lift, .4078 inch; intake opens 20° before top dead center and closes 70° after lower dead center.

EXHAUST VALVES:—Head diameter, 2 5/16 inches; stem diameter, .4345 inch; stem length, 8½ inches; tappet clearance, .002 inch; spring pressure, 120 pounds; valve lift, .4078 inch; exhaust opens 57° before lower dead center, and closes 21° after top dead center. The guide stems are removable. Oversize guide valve stems are made.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .027 inch.

STARTER:—Frame No. 779. Starter is connected to the engine through a magnetically operated pinion shift. The direction of rotation is counter-clockwise looking at the commutator end. Pinion should be pulled into mesh in 10% of one revolution with a current of 125 amperes and must not be held in by a current of 65 amperes.

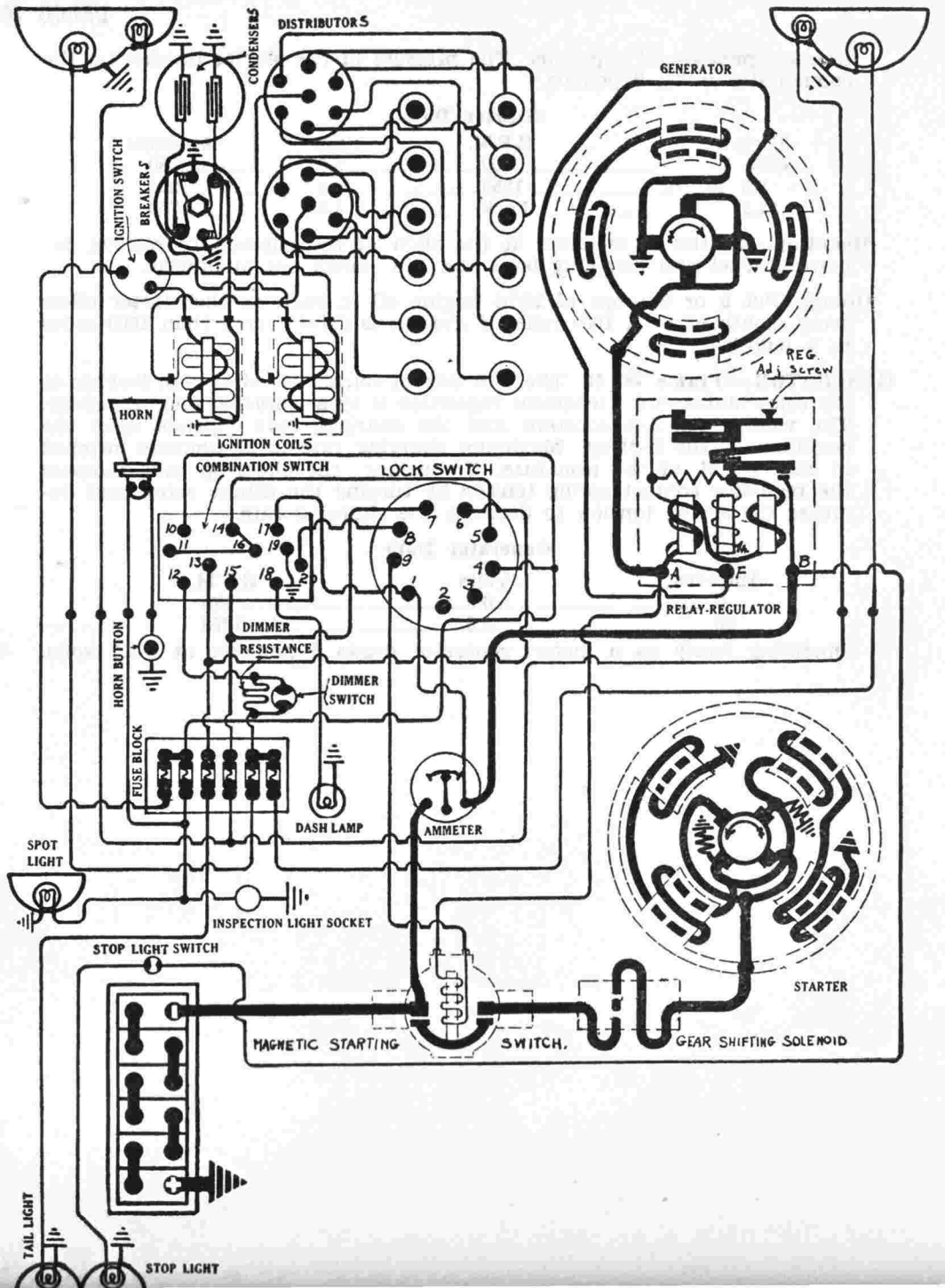
Starter Data.

Torque	R.P.M.	Volts.	Amperes.
0 lb. ft.	Free.	5.5	65
3.5 "	2400	10.5	210
28.5 "	Lock.	6.0	750

The starter brush pressure should be 2.5 to 3 pounds each.

Mounting:—Starter is mounted on left side of motor. To remove, remove bracket and clamping bolts and slip starter out of bracket.

Oiling:—Put 4 or 5 drops of light engine oil in each of the oilers every 500 miles.



LOCOMOBILE

MODEL M48 (1923-24-25-26-27-28), SERIAL NOS. 18210 UP
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

GENERATOR:—Frame No. 787-R. The direction of rotation is clockwise looking at the commutator end. Generator regulation is by an automatic voltage regulator. To increase generator output increase regulator voltage by turning the regulator adjusting screw in a clockwise direction. The maximum generator output is 13 amperes reached at 1250 R.P.M. of the generator armature.

Generator Data.

Amperes.	Volts.	R.P.M.	Field Amperes
0	13	450	1.8
4	13	500	1.6
10	13	800	1.4
10	13	1250	1.35

Motoring freely the generator draws 5 amperes at 12 volts. The field draws 1.5 amperes at 12 volts.

Mounting:—Generator is mounted on right side of motor. To remove, loosen strap.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every 500 miles.

RELAY-REGULATOR:—Westinghouse Type 322873-3. Relay contacts close at 450 R.P.M. of the generator when the voltage reaches 12.4 volts, and open with a discharge current of 0 to 3 amperes. Set regulator contacts at 1250 R.P.M. of the generator with an output of 10 amperes at 13 volts. Relay air gap is .055-.060 inch. Regulator air gap is .055 inch. Center gap is .015 inch.

LIGHTING:—Bryant Electric Co. four-button gang switch Model B2462 L. Mounted on the dash. Head and stop lamps are 12-16 volt, 21 cp. S.C. Dash, tonneau, side, step and tail lamps are each 12-16 volt, 2 cp. S.C. Dome lamp is 12-16 volt, 4 cp. Dimmer switch is model 2440. With dimmer resistance head lamps are 2 cp.

FUSES:—Ignition fuse is 20 amperes. All other fuses are 10 ampere.

LOCOMOBILE

MODEL 90 (1925-26-27-28), SERIAL NOS. 33-101 UP
DEJON GENERATING, STARTING AND LIGHTING SYSTEM
DEJON IGNITION

BATTERY.—U. S. L. Type 3-HVX-8Z. 6 volt. Starting capacity is 170 amperes for 20 minutes. Lighting capacity is 5 amperes for 33 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model CA-4002. Distributor Model IA-4007. Breaker contacts separate .018-.020 inch. Resurface contacts in a medium hard oilstone or with a fine, flat tungsten contact file. Ignition current is 6.3-6.5 amperes at 6 volts reducing to 3.5-3.6 amperes when the ballast coil becomes heated. Distributor is of the semi-automatic type. Manual advance is 6°. Automatic advance begins at 200 R.P.M. (distributor) and reaches a maximum of 12.5° (distributor) at 1200 R.P.M. or 2400 R.P.M. of the crankshaft. Condenser is mounted in distributor housing and has a capacity of .20-.25 microfarads. When tested without ballast resistor, coil draws 11 amperes (cold) and 6.75 amperes (hot) at 6 volts. On bench test maximum spark gap between needle points at atmospheric pressure is .394 inch with distributor R.P.M. of 1000.

Mounting:—Distributor is mounted on right hand side of engine on top of cylinder head.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every week or each 500 miles if the car is driven more than 500 miles in a week.

Timing.—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control lever in the fully retarded position. To set timing, crank engine until piston on compression stroke (piston coming up—both valves closed) reaches top dead center. Then loosen tapered screw in center of cam and turn cam on shaft until breaker contacts begin to separate. Tighten the screw. Make certain that cam is replaced with arrow pointing in direction of rotation (clockwise.)

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .018 inch.

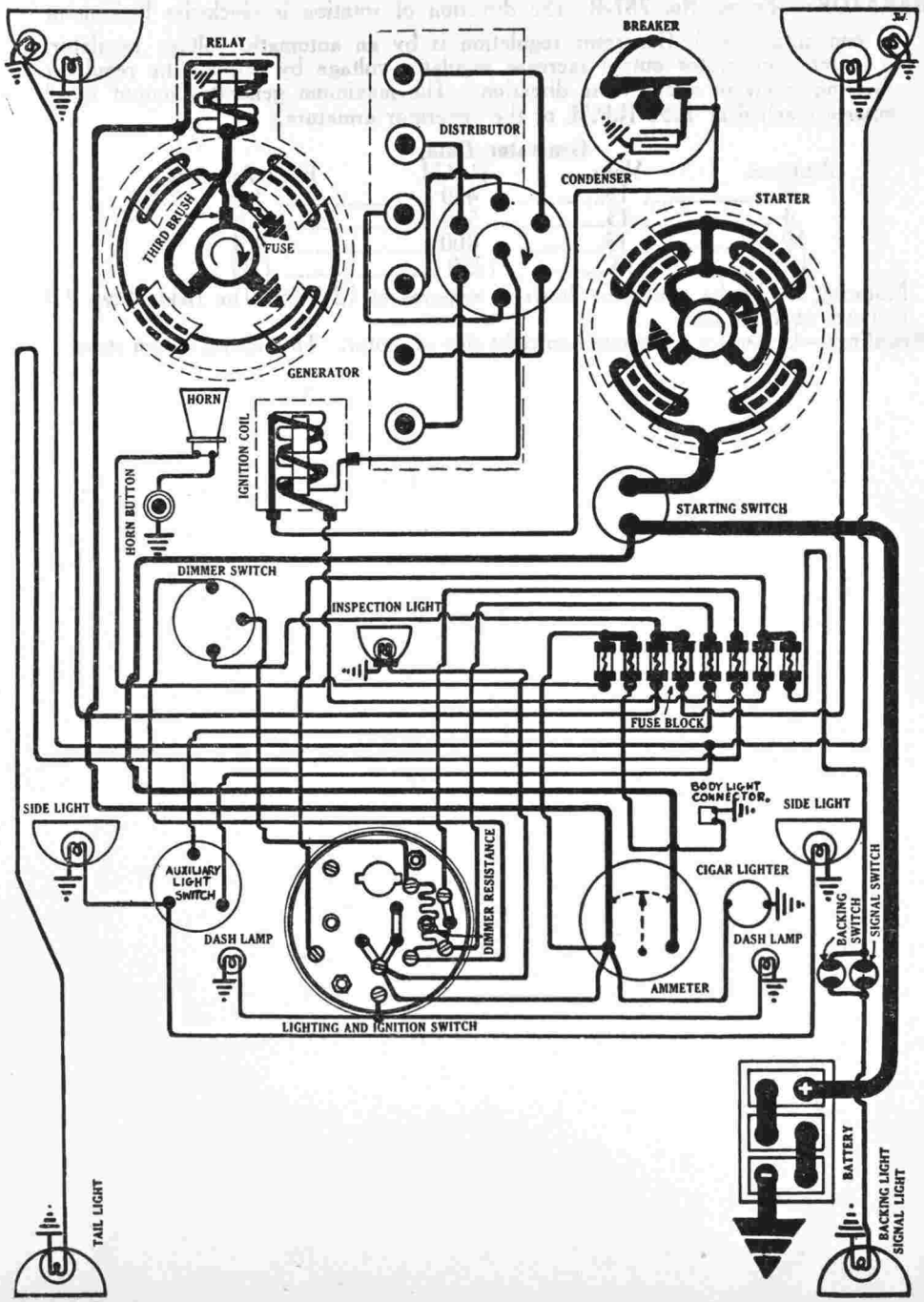
Valve Timing:—INLET VALVES:—Head diameter, 1 15/16 inches; stem diameter, .3725 inch; stem length, 7 1/8 inches; tappet clearance, .003 inch; spring pressure, 95 pounds; valve lift, .3812 inch; intake opens at top dead center and closes 50° after lower dead center.

EXHAUST VALVES:—Head diameter, 1 15/16 inches; stem diameter, .3725 inch; stem length, 7 1/8 inches; tappet clearance, .003 inch; spring pressure, 95 pounds; exhaust opens 40° before lower dead center and closes 20° after top dead center. The guide stems are removable. No oversize valve stems are made.

STARTER.—Model SB-4001. Starter is connected to the engine through an Eclipse manual shift Type E. S. 1. The direction of rotation is clockwise, looking at the commutator end.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	5	40
1.2 "	2200	5.5	100
4.1 "	1150	5	200
7.3 "	760	4.5	300
10.5 "	500	4	400
28.4 "	Lock	4	930



LOCOMOBILE

MODEL 90 (1925-26-27-28), SERIAL NOS. 33-101 UP
DEJON GENERATING, STARTING AND LIGHTING SYSTEM
DEJON IGNITION

Mounting:—Starter is mounted on right hand side of engine. To remove starter, remove the bolts at the end of starter.

Oiling.—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR.—Model DD-4001. The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, shift the third brush by turning the slotted third brush shifting shaft on the generator end plate above the bearing retainer. Insert a screw driver in the slot and turn the shaft to the left (counter-clockwise) to increase the charging rate and to the right or clockwise to decrease the charging rate. Maximum charging rate is 15.5 amperes (hot) reached at 1200 R.P.M. of the generator.

Generator Data

Cold Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
2	500	0	500
7	600	3	600
13	800	9.5	800
16.5	1000	13.5	1000
17.5	1200	15.5	1200
16.8	1600	15.2	1600
13.2	2400	12.2	2400
11	3200	10	3200

Shunt field current is 2.6 amperes at 6 volts.

Mounting:—Generator is mounted on left side of engine. To remove generator, remove bolts at end of generator.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY.—Model RA-4001-A. Relay is mounted on top of the generator. Relay closes at 450-500 R.P.M. when the voltage of the generator reaches 7-8 volts and opens with a current discharge of .5-2.5 amperes. Maximum charging current at closing of contacts is 5 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .015 inch, contacts closed.

LIGHTING.—Head lamps and stop lamp are each 6-8 volt, 21 cp. S. C. Dimmer lamps are 6-8 volt, 3 cp. S. C. Dash, dome, side and tail lamps are each 6-8 volt, 3 cp. S. C.

Switch.—Lighting switch is Clum 10471. Dimmer switch is Gnome.

FUSES.—Generator field fuse is 5 amperes. Lighting fuses are 10 amperes.

LOCOMOBILE

JUNIOR EIGHT (1925-26-27)
DEJON GENERATING, STARTING AND LIGHTING SYSTEM
DEJON IGNITION

BATTERY.—U. S. L. Type 3-HVF-6X. 6 volt, 117 ampere hour. The starting capacity is 127 amperes for 20 minutes. Lighting capacity is 5 amperes for 23 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model CA-4008. Distributor Model IA-4008. Breaker contacts separate .018-.020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file. Distributor has a manual advance of 10° and automatic advance of 15°. Automatic begins at 200 R.P.M. of the distributor and reaches a maximum of 15° at 1400 R.P.M. Condenser is mounted in the distributor housing and has a capacity of .20-.25 microfarads. The ignition coil draws 6.5 amperes cold at 6 volts reducing to 4.-4.25 amperes within 30 seconds as the ballast resistor becomes heated. Tested without the ballast resistor, coil draws 12.5 amperes cold and 7.5 amperes hot. The maximum spark gap (between needle points and at atmospheric pressure) is .400 inch with a primary coil voltage of 6 volts and a distributor speed of 600-1600 R.P.M.

Mounting:—Coil is mounted on generator. Distributor is mounted on generator shaft. housing every week or each 500 miles if the car is driven more than 500 miles

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every week or each 250 miles if the car is driven more than 250 miles in a week.

Timing.—Breaker contacts begin to separate when piston entering power stroke reaches top dead center with the manual spark control lever in the fully retarded position. To set timing, loosen tapered screw in center of breaker cam and turn cam in a counter-clockwise direction until the contacts begin to separate. Then tighten the screw. The cam is of the reversible type and must be placed with the arrow pointing in the direction of rotation (clockwise). The breaker arm is fitted with a flexible pigtail which must be intact.

Valve Timing:—INLET VALVES:—Head diameter, 1 13/32 inches; stem diameter, .330 inch; stem length, 4 63/64 inches; tappet clearance, .003 inch; spring pressure, 75 pounds; valve lift, .2735 inch; intake opens at top dead center and closes 36° after lower dead center.

EXHAUST VALVES:—Head diameter, 1 13/32 inches; stem diameter, .330 inch; stem length, 4 63/64 inches; tappet clearance, .003 inch; spring pressure, 75 pounds; valve lift, .2735 inch; exhaust opens 36° before lower dead center, and closes at top dead center. The guide stems are removable. No oversize valve stems are made.

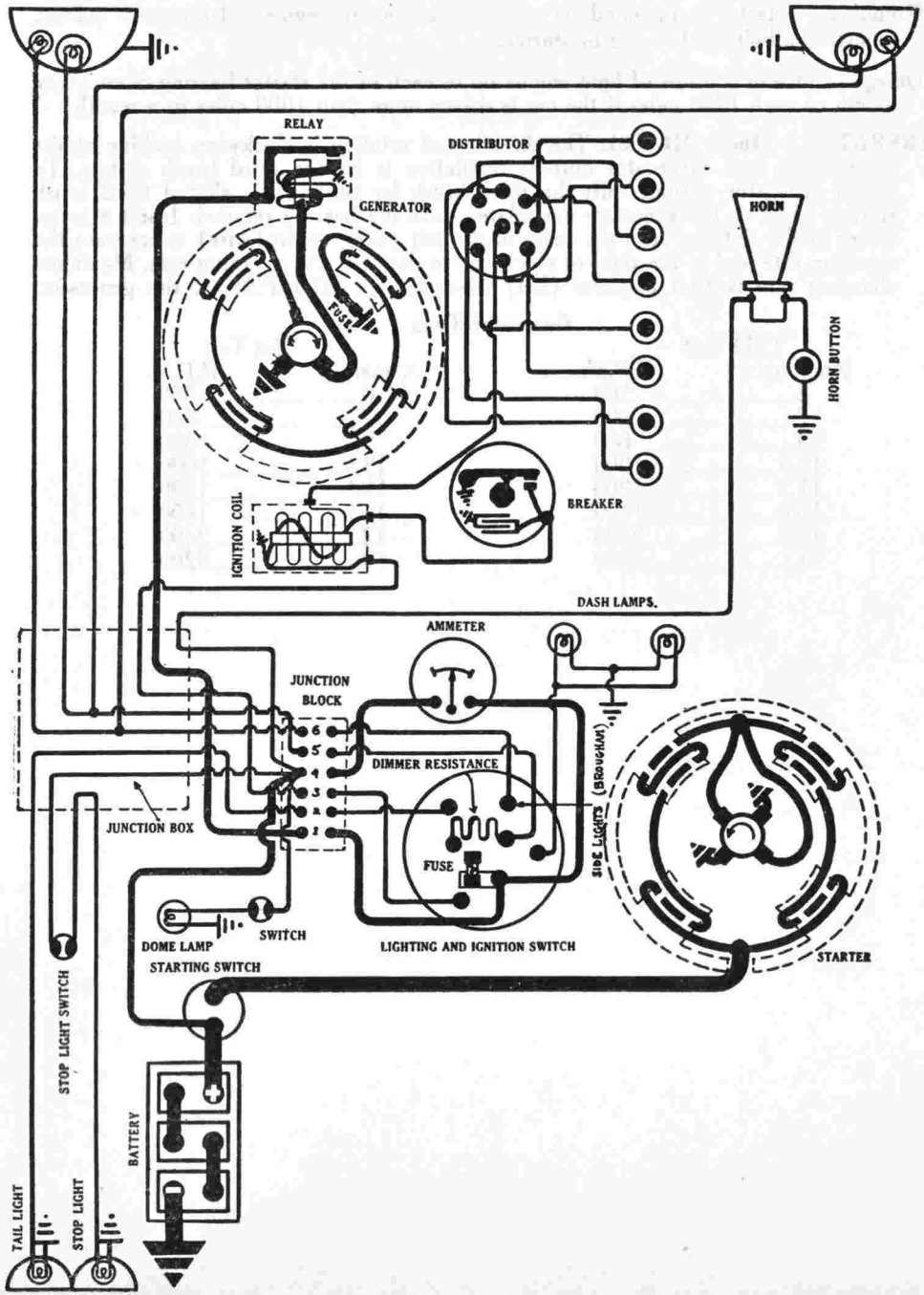
Firing Order.—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .018 inch.

STARTER.—Model SA-4003. Starter is connected to the engine through an inboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starting switch is Model SW-4001.

Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	5.	40
.5 lb. ft.	2800	5.5	100
2.5 lb. ft.	1600	5.	200
4.7 lb. ft.	1000	4.5	300
7.3 lb. ft.	600	4.	400
20. lb. ft.	Lock	4.	800



LOCOMOBILE

JUNIOR EIGHT (1925-26-27)
DEJON GENERATING, STARTING AND LIGHTING SYSTEM
DEJON IGNITION

Mounting:—Starter is mounted on left hand side of engine. To remove, first remove bolt from clamping strap, then pull starter from place.

Oiling.—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

GENERATOR.—Model DA-4006. Generator is mounted at left of engine and is fitted with a distributor drive. The direction of rotation is clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the charging rate, insert a screw driver in the slotted adjustment screw on the generator end plate and turn in a counter-clockwise direction to increase the charging rate and in a clockwise direction to decrease the charging rate. This screw turns the third brush mounting plate. With a maximum setting generator output is 16 amperes at 6 volts.

Generator Data.

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0		480	0		500
1.		500	2.		600
5.5		600	7.		800
11.		800	10.		1000
15.		1200	11.		1200
12.		2400	9.		2400
10.		3200	7.		3200

Shunt field current is 2.5 amperes at 6 volts. A five ampere fuse mounted on the generator end plate protects the field circuit.

Mounting:—Generator is mounted on left hand side of engine. To remove, first remove bolts at front end.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Model RA-4001-H. Relay is mounted on the generator. Relay contacts close at 480-500 R.P.M. of the generator with a voltage of 7-7.5 volts and open with a discharge current of 0-2 amperes. Contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING.—Clum Switch. Head lamps and stop lamp are each 6-8 volt, 21 cp. S. C. Dimmer lamps are 6-8 volt, 3 cp. S. C. Dash, dome, side and tail lamps are each 6-8 volt, 3cp. S. C.

FUSES.—Generator field fuse is 5 amperes. Lighting fuse is 20 amperes.

LOCOMOBILE

MODEL 8-70 (1927-28)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—U.S.L. Type 3-HVX-7X, 6 volt. Starting capacity is 148 amperes for 20 minutes. Lighting capacity is 5 amperes for 28 hours. The negative (—) terminal is grounded. Battery is mounted on the left side of the car at the rear.

IGNITION:—Coil Model 525-C. Distributor Model 658-F. Breaker contacts separate .018-.024 inch. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Maximum manual advance is 15° (engine). Maximum automatic advance is 18°. Breaker arm spring tension is 17-20 ounces. Breaker has two sets of contacts on a four sided cam opening alternately at intervals of 45° corresponding to 90° of crankshaft rotation. This is the correct firing interval for the Locomobile engine and must be accurately set (see Timing). Ignition current is 1-3 amperes with engine running and 3.4-5 amperes with engine stopped.

Mounting:—Distributor is mounted on the rear of the generator. To remove distributor, disconnect manual advance rod and breaker lead and remove head with cables attached. Then remove distributor clamp screw and lift distributor from place.

Oiling:—Refill the grease cup under the distributor head with medium cup grease and turn down two turns every month or each 1000 miles. Every 5000 miles remove the rotor and saturate the wick oiler in the center of the shaft with light engine oil. Put a small bit of heavy grease on the face of the breaker cam under the fiber bumper of the contact arm.

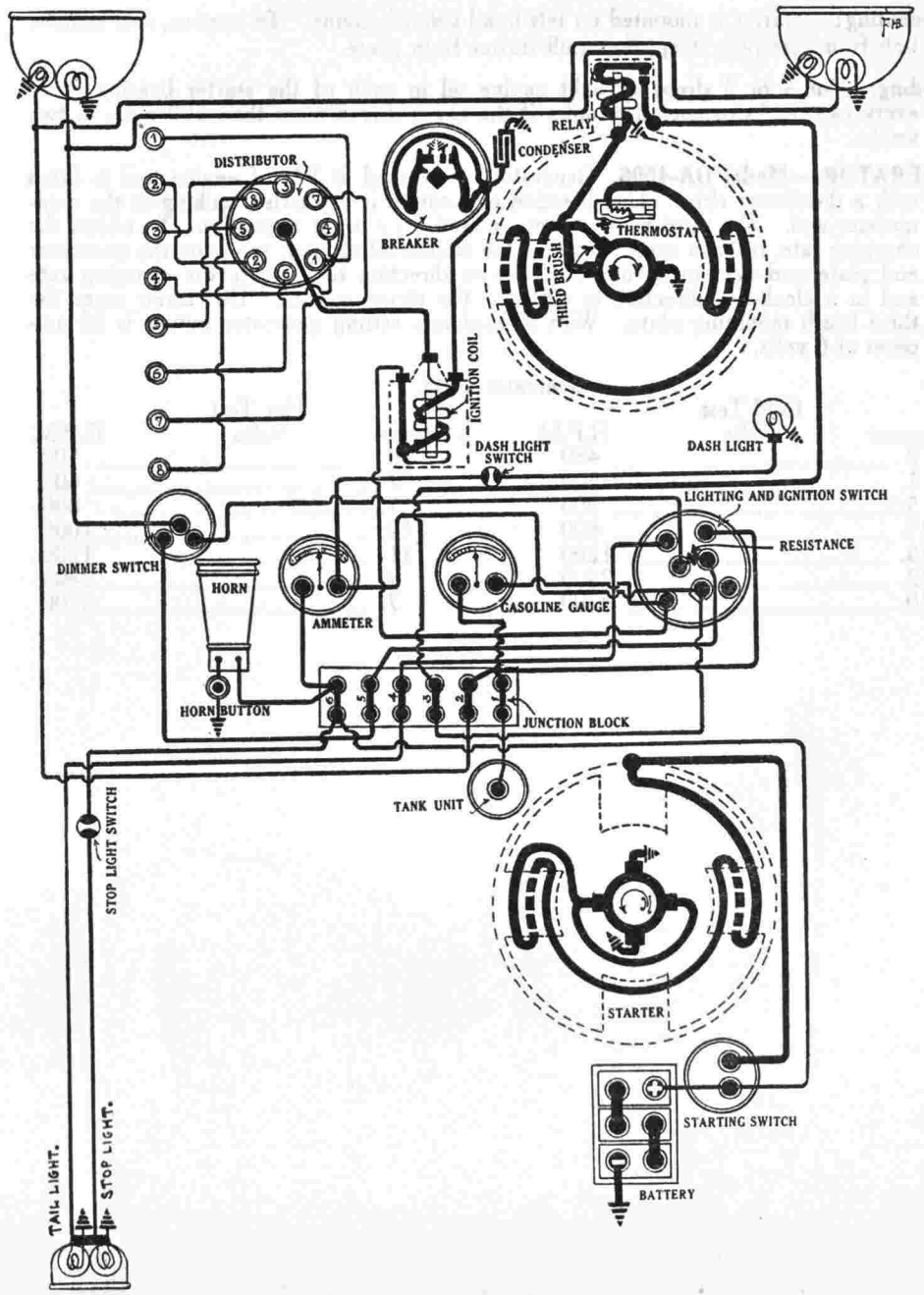
Timing:—Breaker contacts separate when the piston entering power stroke reaches top dead center with the manual spark control lever in the fully retarded position. To set timing, crank engine until piston No. 1 reaches top dead center on compression stroke (the upstroke with both valves closed). Make certain that the spark lever is in the fully retarded position. Loosen the advance arm clamp screw and rotate the distributor housing until the contacts mounted on stationary plate begin to separate. Tighten the clamp screw. The other set of breaker contacts separate 45° after this point. To check firing interval, use Delco-Remy Part No. 820738. Place synchronizing tool on shaft after rotor has been removed. Clamp in place with slide pushed in so that visible arrow points in direction of rotation. Note scale reading on leading scale when first set of contacts separate. Then turn distributor shaft until same figure on second scale is opposite the same point on the distributor housing. If the second set of breaker contacts are not separating, loosen the lockscrews on mounting plate and turn eccentric adjusting screw until contacts open. Check contact opening with contact arm on lobe of cam. If it is not within limits of .018-.024 inch, the contact gap must be reset and the synchronizing operation repeated.

Valve Timing:—INLET VALVES:—Head diameter, 1½ inches; stem diameter, .309 inch; stem length, 6 1/32 inches; valve lift, 5/16 inch; spring pressure, 87 pounds; tappet clearance, .004 inch. Inlet valves open 8° past top dead center and close 40° past lower dead center.

EXHAUST VALVES:—Head diameter, 1⅜ inches; stem diameter, .309 inch; stem length, 6 1/32 inches; valve lift, 5/16 inch; spring pressure, 87 pounds; tappet clearance, .006 inch. Exhaust valves open 40° before lower dead center and close 8° past top dead center. Valve stem guides are removable. Oversize valve stems are not made.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Gaps are .026 inch.



LOCOMOBILE

MODEL 8-70 (1927-28)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

STARTER:—Mode 716-B. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter switch is Model 406-A. Brush spring tension is 24-28 ounces each. Starter cranks the engine at 192 R.P.M. taking 128 amperes at 5 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	5	70
15 "	Lock	3.7	450

Mounting:—Starter is mounted on left of engine. To remove starter, disconnect cable and remove three mounting bolts. Then lift starter from place.

Oiling:—Put 4 or 5 drops of light engine oil in the starter oiler every month or each 1000 miles.

GENERATOR:—Model 944-E. The direction of rotation is counter-clockwise, looking at commutator end. Generator current regulation is by third brush system combined with a thermostat. Thermostat contacts open at 165°F. cutting a resistance in the shunt field circuit and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator endplate and remove the commutator cover band. Then move the third brush by hand in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Maximum charging rate is 19 amperes (cold) reached at 1300 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19	8.5	1300	9-12	7.35-7.65	1300

Shunt field current is 5 amperes with 6 volts directly across field terminals. Motoring freely generator draws 5 amperes at 6 volts. Brush spring tension is 14-18 ounces each.

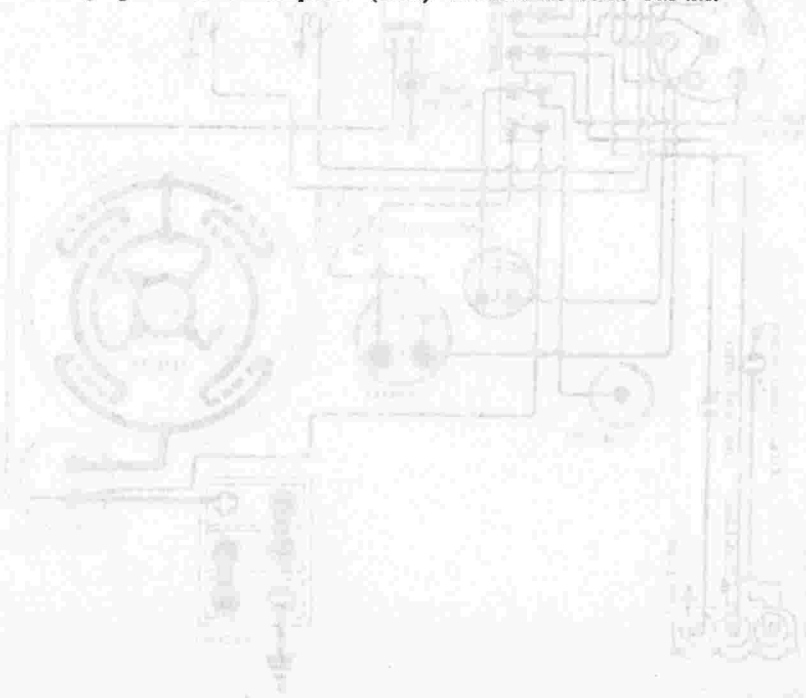
Mounting:—Generator is mounted at right of engine. To remove generator, disconnect generator lead and remove three flange mounting bolts. Then lift generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Contacts separate .015-.025 inch. Air gap is .014-.018 inch, contacts closed.

LIGHTING:—Clum Lighting Switch. Head lamps are 6-8 volt, 21 cp. S.C. Stop lamp is 6-8 volt, 21 cp. S.C. Auxiliary head lamps are 6-8 volt, 2 cp. S.C. Dash, tail and dome lamps are each 6-8 volt, 2 cp. S.C.

FUSES:—Lighting fuses are 20 amperes.



LOCOMOBILE

MODEL 8-80 (1927-28), SERIAL NOS. 101 UP
DEJON GENERATING, STARTING AND LIGHTING SYSTEM
DEJON IGNITION

BATTERY:—U.S.L. Type 3-HVX-7X, 6 volt. Starting capacity is 148 amperes for 20 minutes. Lighting capacity is 5 amperes for 28 hours. The negative (—) terminal is grounded. Battery is mounted on the right side of the car amidships.

IGNITION:—Coil Model CA-4021. Distributor Model IAA-4001. Breaker contacts gap should be set at .018-.020 inch. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 20° (engine). Automatic advance begins at 600 R.P.M. (engine). Maximum automatic advance is 16° at 2300 R.P.M. Breaker arm spring tension is 20 ounces. Ignition current is 6.3-6.5 amperes at 6 volts when ignition is turned on, reducing to 3.5-3.6 amperes with ballast resistance heated. Condenser capacity is .20-.25 microfarads. On bench test maximum spark between needle points at atmospheric pressure is .394 inch with breaker R.P.M. of 1000.

Mounting:—Distributor is mounted on top of the cylinder block. To remove, disconnect manual advance rod and primary lead and remove head with cables attached. Then remove set screw on side of shaft housing and lift distributor from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every week or each 250 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control lever in a fully retarded position. To set timing, crank engine until piston No. 1 reaches top dead center on compression stroke (the upstroke with both valves closed). Make certain that the spark lever is in the fully retarded position. Then loosen taper screw in center of the breaker cam and rotate cam until contacts begin to separate. Tighten the screw. Make certain that the arrow on the cam points in the direction of rotation.

Valve Timing:—INLET VALVES:—Head diameter, 1 25/32 inches; stem diameter, .3425 inch; stem length, 5½ inches; valve lift, .356 inch; spring pressure, 91-95 pounds; tappet clearance, .010 inch. Inlet valves open at top dead center and close 45° past lower dead center.
EXHAUST VALVES:—Head diameter, 1 25/32 inches; stem diameter, .3425 inch; stem length, 5½ inches; valve lift, .356 inch; spring pressure, 91-95 pounds; tappet clearance, .010 inch. Exhaust valves open 50° before lower dead center and close 10° after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

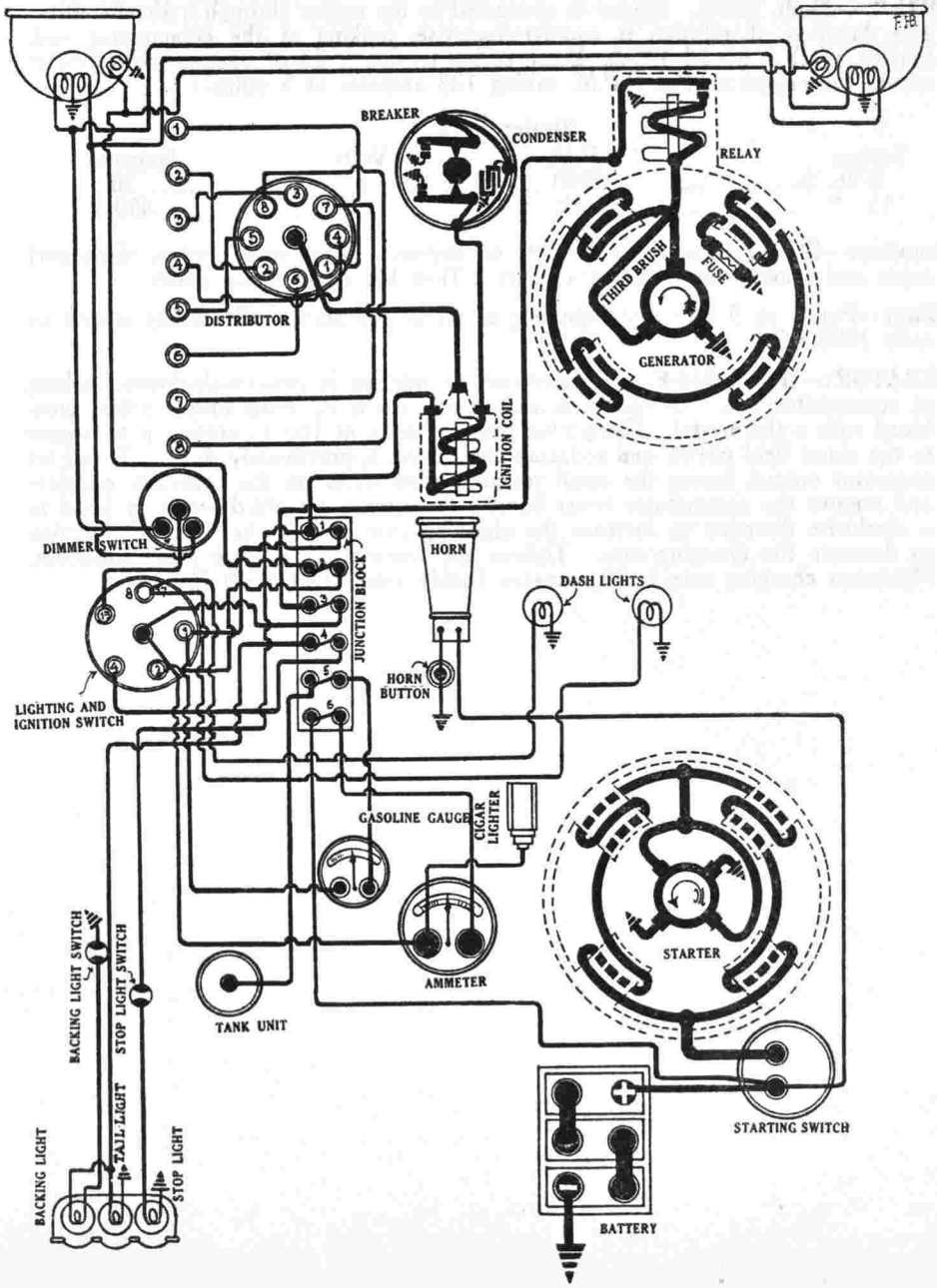
Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are .015-.018 inch.

STARTER:—Model SA-4013. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter switch is Model SW-4001. Brush spring tension is 2-3 pounds each. Starter cranks the engine at 138 R.P.M. taking 175 amperes at 5.05 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	5	40
.5 "	2800	5.5	100
2.5 "	1600	5.0	200
4.7 "	1000	4.5	300
7.3 "	600	4.0	400
20 "	Lock	4.0	800



LOCOMOBILE

MODEL 8-80 (1927-28), SERIAL NOS. 101 UP
DEJON GENERATING, STARTING AND LIGHTING SYSTEM
DEJON IGNITION

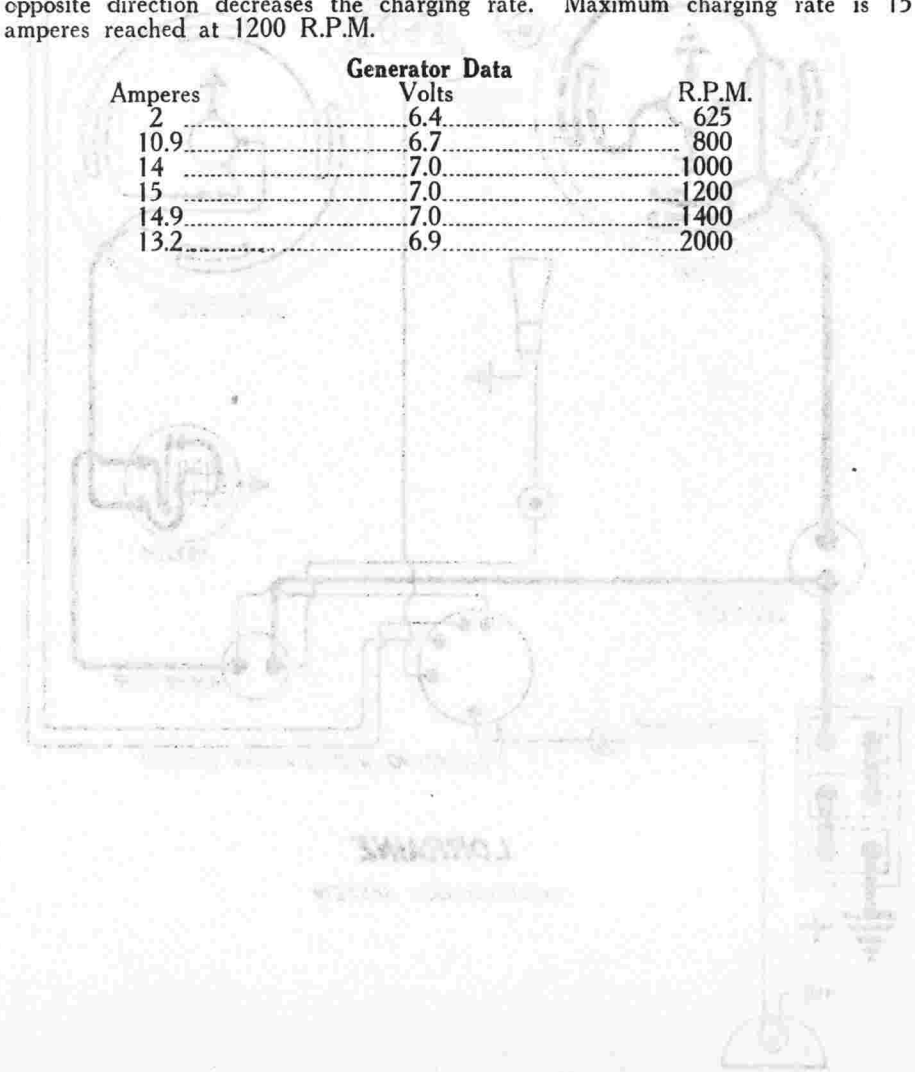
Mounting:—Starter is mounted on right side of engine. To remove, disconnect cable and remove four mounting bolts. Then lift starter from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every two weeks or each 500 miles.

GENERATOR:—Model DAA-4002. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust the generator output, turn the slotted head of the third brush shifting shaft which extends through the commutator endplate. Turning the shaft in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. Maximum charging rate is 15 amperes reached at 1200 R.P.M.

Generator Data

Amperes	Volts	R.P.M.
2	6.4	625
10.9	6.7	800
14	7.0	1000
15	7.0	1200
14.9	7.0	1400
13.2	6.9	2000



Running freely as a motor generator draws 4 amperes at 6 volts. Shunt field current is 2.5 amperes at 6 volts. Brush spring tension is 1½-2 pounds each.

Mounting:—Generator is mounted on right of engine. To remove generator, disconnect lead and remove four mounting bolts. Then lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Model RA-4001-A. Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 7-7.5- volts at approximately 600 R.P.M. and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is 2 amperes. Contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Switch Model 10653. Head lamps are 6-8 volt, 21 cp. S.C. Auxiliary head lamps are 6-8 volt, 3 cp. S.C. Stop and backing lamps are 6-8 volt, 21 cp. S.C. Side, dash, tail and dome lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuses are 20 amperes.

LORRAINE

MODEL 1920 AND 1921
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WESTINGHOUSE IGNITION

BATTERY.—U. S. L., Type HDC-311-C, 6 volt, 94 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type SC. Breaker contacts separate .012 to .016 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone. The bumper on the contact arm spring is 1/8 inch off center from the line through the centers of the shaft and terminal screw, the offset being opposite to the direction of rotation of the cam. The above adjustment is made by bending the solid arm at the terminal block. A pull of 20-25 ounces, applied to the movable contact, is required to separate the contacts .020 inch. The spring pressure is adjusted by bending the solid arm at the point of contact with the contact spring. Resistance of the primary winding of the induction coil is 1 ohm. Resistance of the ballast resistor is .4 ohm. The resistance of the secondary winding is 3700-4700 ohms.

OILING.—Put 4 or 5 drops of light engine oil in the oiler at the side of the breaker box every two weeks. If the car is driven more than 500 miles in two weeks, the oiling

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Frame No. 100. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 150 R.P.M., taking 200 amperes. Lock torque is 12 pound-feet, current being 450 amperes at 4 volts. Running freely, starter takes 50 amperes, armature revolving at 4000 R.P.M.

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR.—Frame No. 765. Generator current regulation is by the third brush system. Maximum current output is 15-17 amperes, reached at 1400 R.P.M. of the armature or 25 miles per hour.

Generator Data

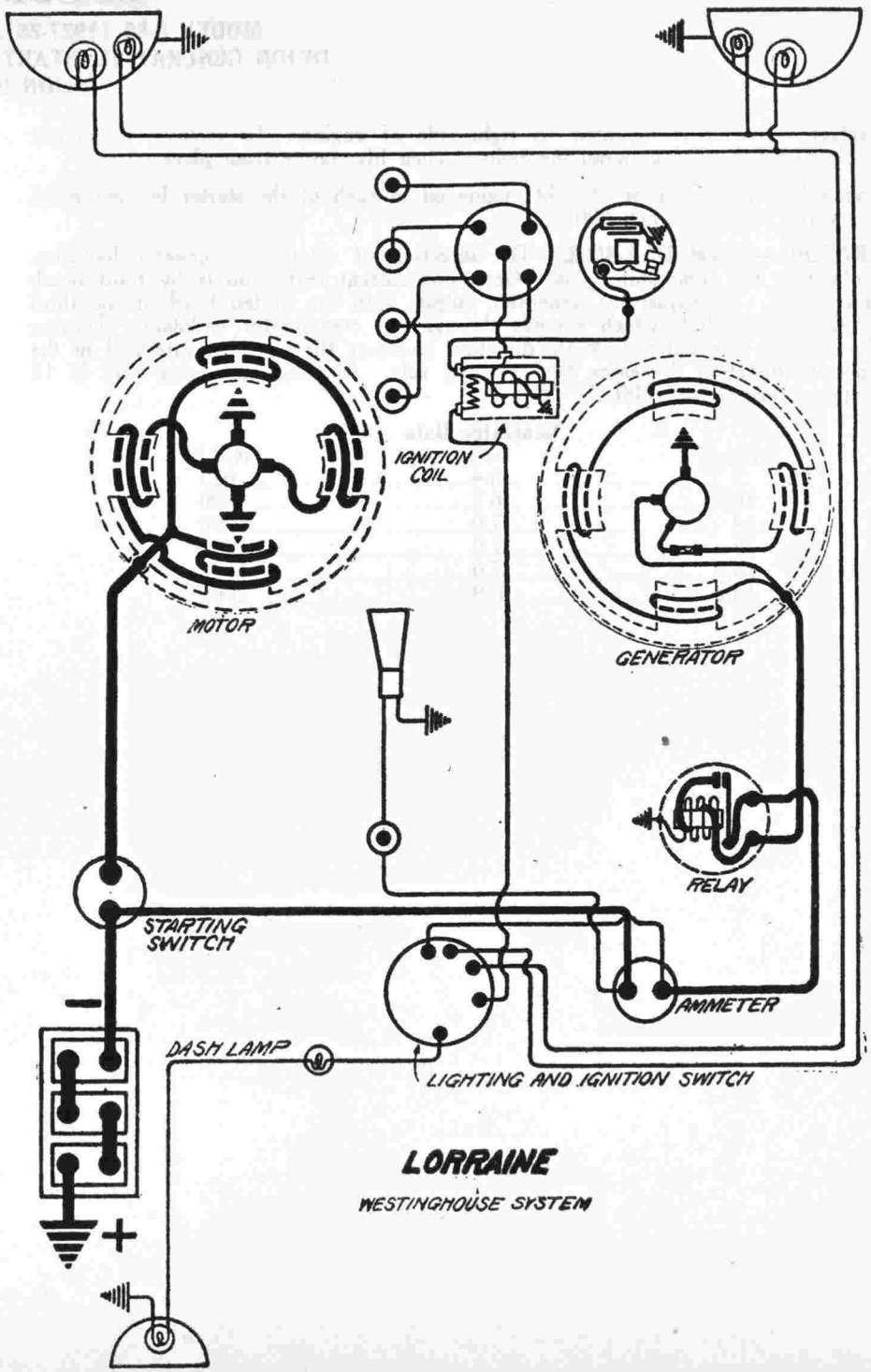
Amperes	R.P.M.	Volts
0	375	6.5
7-11	2500	7.5
15-17	900-1400	7.5

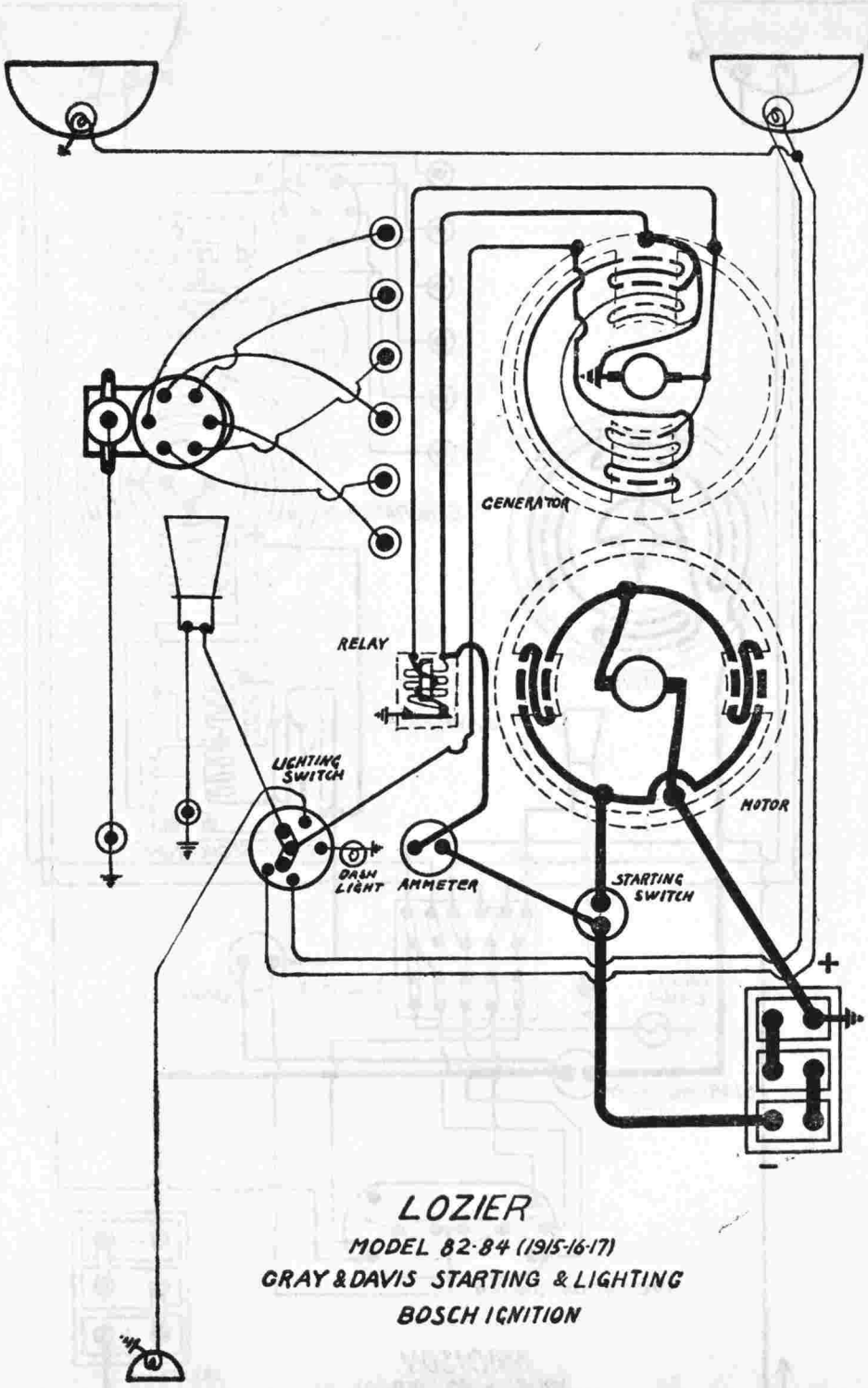
Shunt field winding takes 3.25 to 3.75 amperes at 6 to 6.3 volts. Running freely as a motor, generator takes 6 amperes at 6 to 6.3 volts. Move the third brush in the direction of armature rotation to increase the charging rate and in the opposite direction to decrease the charging rate. Reseat brush after adjusting position.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every two weeks.

RELAY.—Relay closes at 375-425 R.P.M. of the armature or 7-9 miles per hour and opens at 325-375 RP.M. of the armature or 5-7 miles per hour. Adjust the spring tension on the relay armature so that the contacts open with a discharge current of 0-3 amperes. Adjust the air gap between relay armature and coil core so that the contacts close when the voltage of the generator reaches 6.2 to 6.5 volts. Air gap between .035 inch. Resistance of the shunt coil is 68 ohms. Clean relay contacts by drawing relay armature and coil core is .005 inch, contacts closed. Contacts separate .030 to unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 2 cp. Dash and tail lamps are 6-8 volt, 2 cp.





LOZIER
MODEL 82-84 (1915-16-17)
GRAY & DAVIS STARTING & LIGHTING
BOSCH IGNITION

Lozier

Models 82 and 84 (1915-16-17)
Gray & Davis Starting and Lighting System
Bosch Dual Ignition

Battery.—Battery is 6 volt, 85 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate .014 inch to .016 inch. Should they become badly burned or pitted, affecting the ignition, resurface them with a fine, flat jeweler's file or a strip of worn No. 00 sand paper.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—Firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—Spark plug gaps should be .018 inch to .022 inch.

Oiling.—Put 3 or 4 drops of light engine oil in each of the magneto oilers every two weeks. At the same time put a very small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Starter.—Starter is connected to the engine by a pinion shifted by the operator. The H-1 motor should run at 1500 R. P. M., taking 150 amperes at 6 volts. The H-2 motor should run at 2600 R. P. M., taking 150 amperes at 6 volts. Starter should crank the Model 82 engine at about 140 R. P. M., and the Model 84 engine at about 125 R. P. M., taking 200-300 amperes. The clutch must be in on Model 84 cars during the cranking operation, as starter drives through the transmission. Cold engine, heavy oil, tight bearings, or other obstructions, or damp, grounded or short circuited motor windings or commutator bars will cause low speed and excessive current during the cranking operation.

Oiling.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

Generator.—Generator voltage regulation is by speed control. Generator should deliver 9 amperes at 6½ volts, reached at 1000 R. P. M. Same directions as given on Page 270 apply to this generator.

Oiling.—Put 5 or 6 drops of light engine oil in each of the three generator bearings every two weeks. At the same time oil the governor joints maked A (See Plate 210), with light engine oil. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 20 cp. Side lamps are 6-8 volts, 5 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 4 cp. Trouble lamp is 6-8 volts, 4-6 cp.

Fuses.—Fuses are 10 ampere.

MADISON

Models 6-40 And 8-18 (1916-17-18-19)

Remy Starting and Lighting System

Remy Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should open .020 inch to .023 inch.

Care.—Resurface them with a fine, flat jeweler's file or a strip of worn No. 00 sand paper.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order of the "Six" is 1, 5, 3, 6, 2, 4. That of the "Eight" is 1R, 1L, 3R, 3L, 4R, 4L, 2R, 2L.

Spark Plug Gaps.—The spark plug gap should be .028 inch to .031 inch.

Oiling.—Every month put a very small amount of vaseline on the fiber bumper of the contact arm. If there is a grease cup provided, keep it filled with soft cup grease and tighten two turns every month.

Starter.—Starter is connected to the engine through a Bendix drive. The following data applies to the Model 180-C starter, used on the eight cylinder cars:

Torque (with 6 pulley)	R. P. M.	Amperes	Volts
0 lbs.	3600-4000	55- 65	6.0
16 lbs.	1200-1450	200-220	4.6
24 lbs.	900-1100	290-310	4.5
40 lbs.	300- 450	460-600	3.6
14 ft. lbs.	Lock torque	550-600	3.2

The following data applies to the Model 186-A starter, used on the six cylinder cars:

Torque with 6" pulley	R.P.M.	Amperes	Volts
0 lbs.	3600-4200	56- 64	6.0
16 lbs.	1200-1450	200-230	4.7-4.8
24 lbs.	900-1100	290-310	4.5-4.6
40 lbs.	300- 450	450-500	3.5-3.6
14 lbs.	Lock torque	570-600	3.0

Oiling.—Put several drops of light engine oil in each of the motor oilers every month.

Generator.—Generator current regulation is by vibrating regulator. Relay closes at about 8 miles per hour, and opens at about 6 miles per hour. The relay and regulator contacts should separate .012 inch to .015 inch.

Care.—Clean by drawing a piece of soft paper between them. If necessary, resurface them with a piece of well worn No. 00 sand paper. The air gap between the relay armature and the magnet core should be .012 inch to .015 inch when relay contacts are closed.

The following data applies to the Model 16-C generator, used on the eight cylinder cars:

Amperes	R. P. M.	Volts
0	370	6.0
7	490	6.5
14.2	2200	6.9

5.9 volts will force 3 to 3.5 amperes through field windings. 5.8 volts will force 5 5 amperes through generator rotating it, running free at 430 R. P. M.

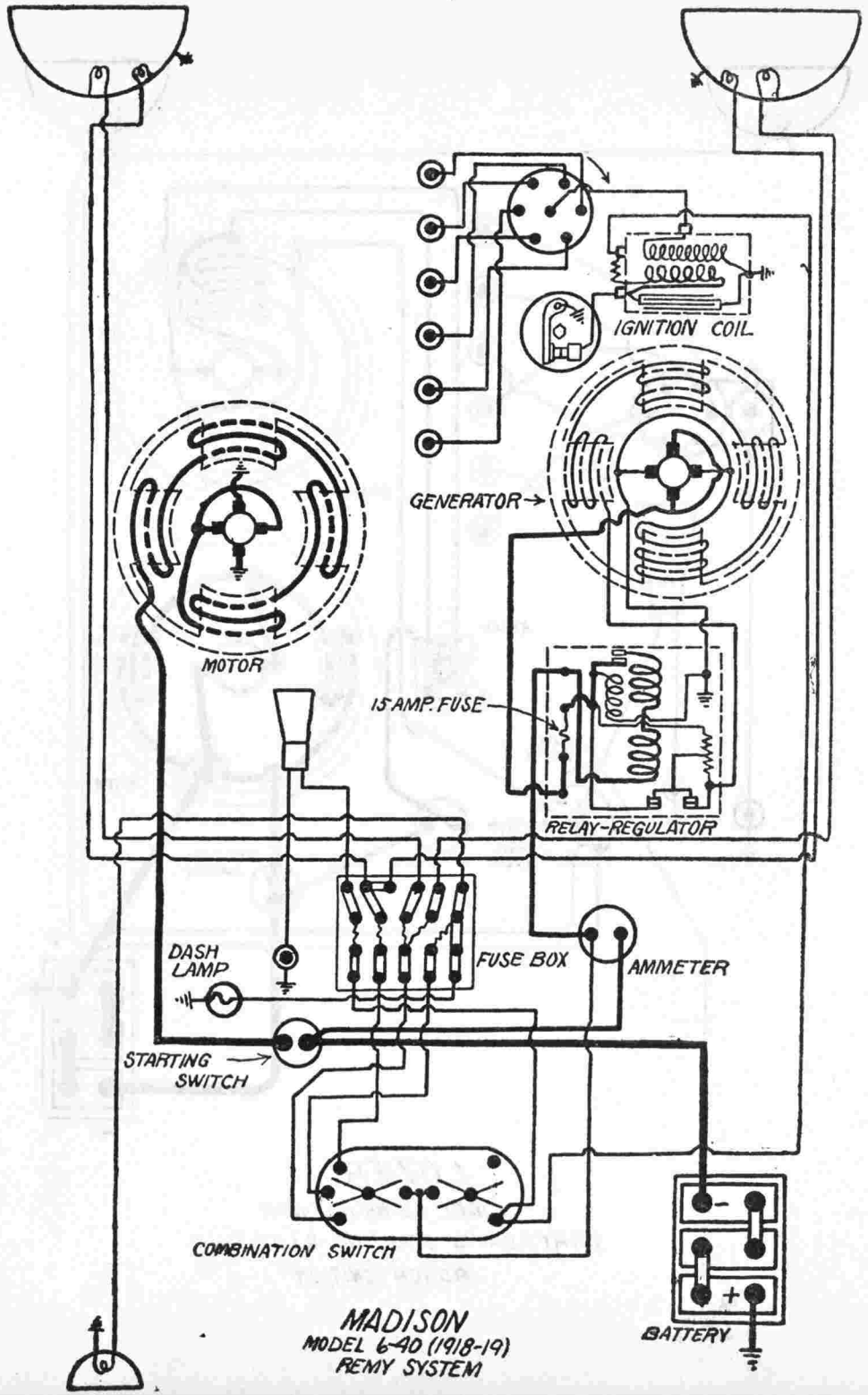
The following data applies to Model 168-A generator, used on the six cylinder cars, all tests to be made without ignition:

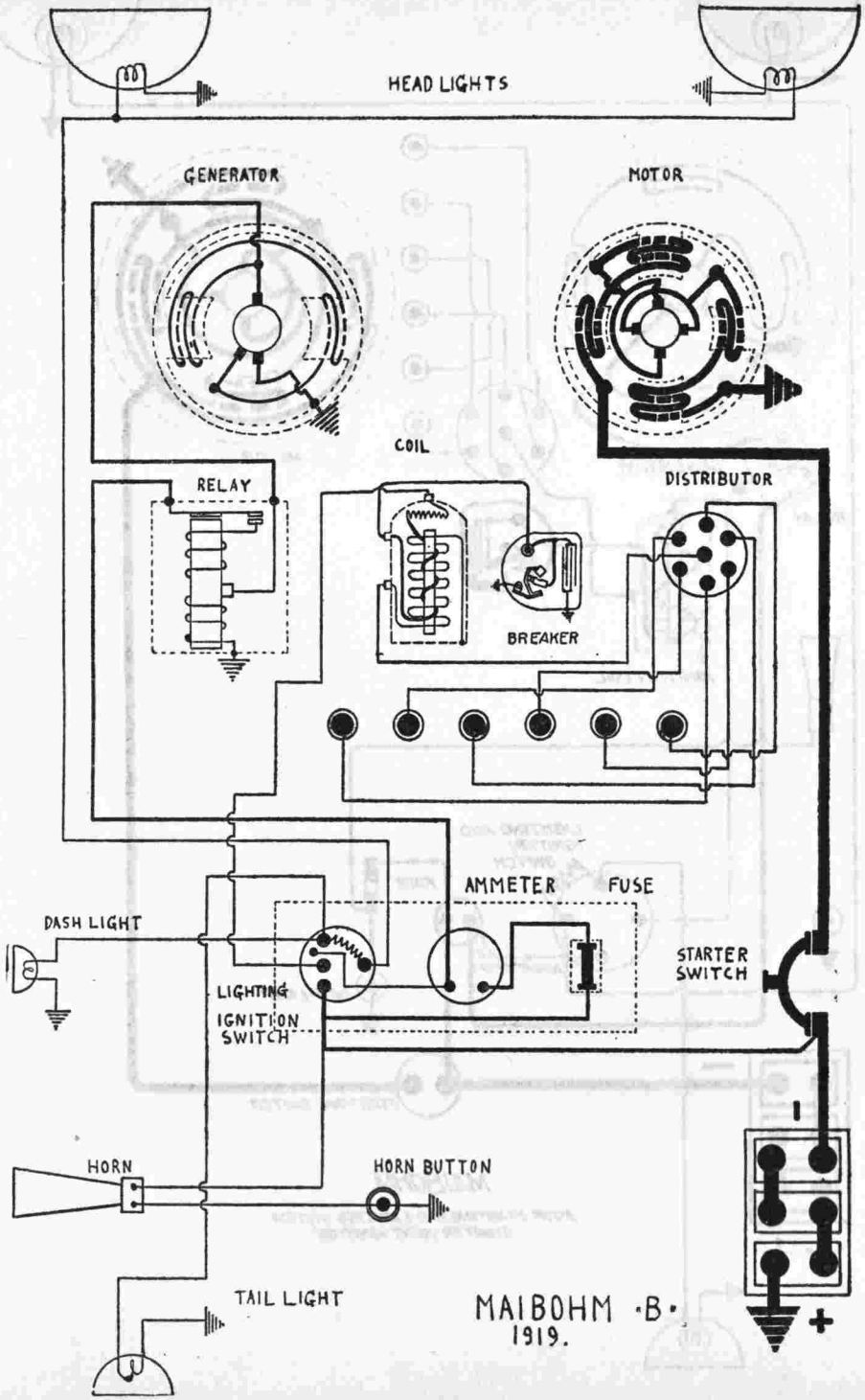
Amperes	R. P. M.	Volts
0	600- 650	6.0
7	780- 850	6.4
14.5	2500-3000	7.2

5.7 volts will force 5.5 amperes through generator rotating it running free at 420 R. P. M. Shunt field is protected by 15 ampere fuse. 5.9 volts will force 4 amperes through field windings.

Oiling.—Every two weeks put 5 or 6 drops of light engine oil in each of the generator oilers. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 17 cp. Dimmer lamps are 6-8 volts, 5-7 cp. Dash lamp is 6-8 volts, 2-4 cp. Tail lamp is 6-8 volts, 2 cp. Trouble lamp is 6-8 volts, 2 cp.





MAIBOHM

MODEL B (1918-19)

WAGNER GENERATING, STARTING AND LIGHTING SYSTEM

ATWATER-KENT IGNITION

BATTERY.—Willard, Type S-J-W-3. 6 volt, 90 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .005 to .008 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Every two weeks remove the distributor cap and put several drops of light engine oil in the oil hole exposed.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control ½ inch from the fully retarded position.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model E.M.-218, Type 35-T. Starter is connected to the engine through a Bendix drive.

OILING.—Put 5 or 6 drops of light engine oil in each of starter bearing oilers every month.

GENERATOR.—Model E.M.-165, Type 41-Y. Generator current regulation is by third brush system. Rotation is counter-clockwise, viewed from commutator end. Maximum current output of 15 amperes is reached at 1650 R.P.M. of armature, or 20 miles per hour.

Generator Data

Amperes	R.P.M.
4.0	800
9.0	1000
12.0	1200
14.5	1500
15.0	1650
14.0	2000
11.0	2500
8.5	3000

OILING.—Put 5 or 6 drops of light engine oil in each of generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour and opens at 6-8 miles per hour. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are connected in series and are each 3-4 volt, 2 cp.

FUSES.—Fuses are 30 ampere.

MAIBOHM

MODEL B (1920-21-22)

BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY.—Willard, SJWN-3, 6 volt, 90 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type CC. Breaker contacts separate .006 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Remove the distributor cap every two weeks, and put 4 or 5 drops of light engine oil in the oil hole exposed. Put a small amount of vaseline on the cam, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever ½ inch from the fully retarded position. See that the breaker assembly is fully retarded when the spark control lever is in the fully retarded position.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Type FD-140, M-1308. Starter is connected to the engine through a Bijur automatic pinion shift. Starter cranks the engine at 140 R.P.M., taking 125 amperes. The lock torque is 11.6 pound-feet, current being 505 amperes at 4 volts. Running freely, starter armature revolves at 5600 R.P.M., with a current of 27 amperes. Pressure of brushes on commutator is 30 ounces.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

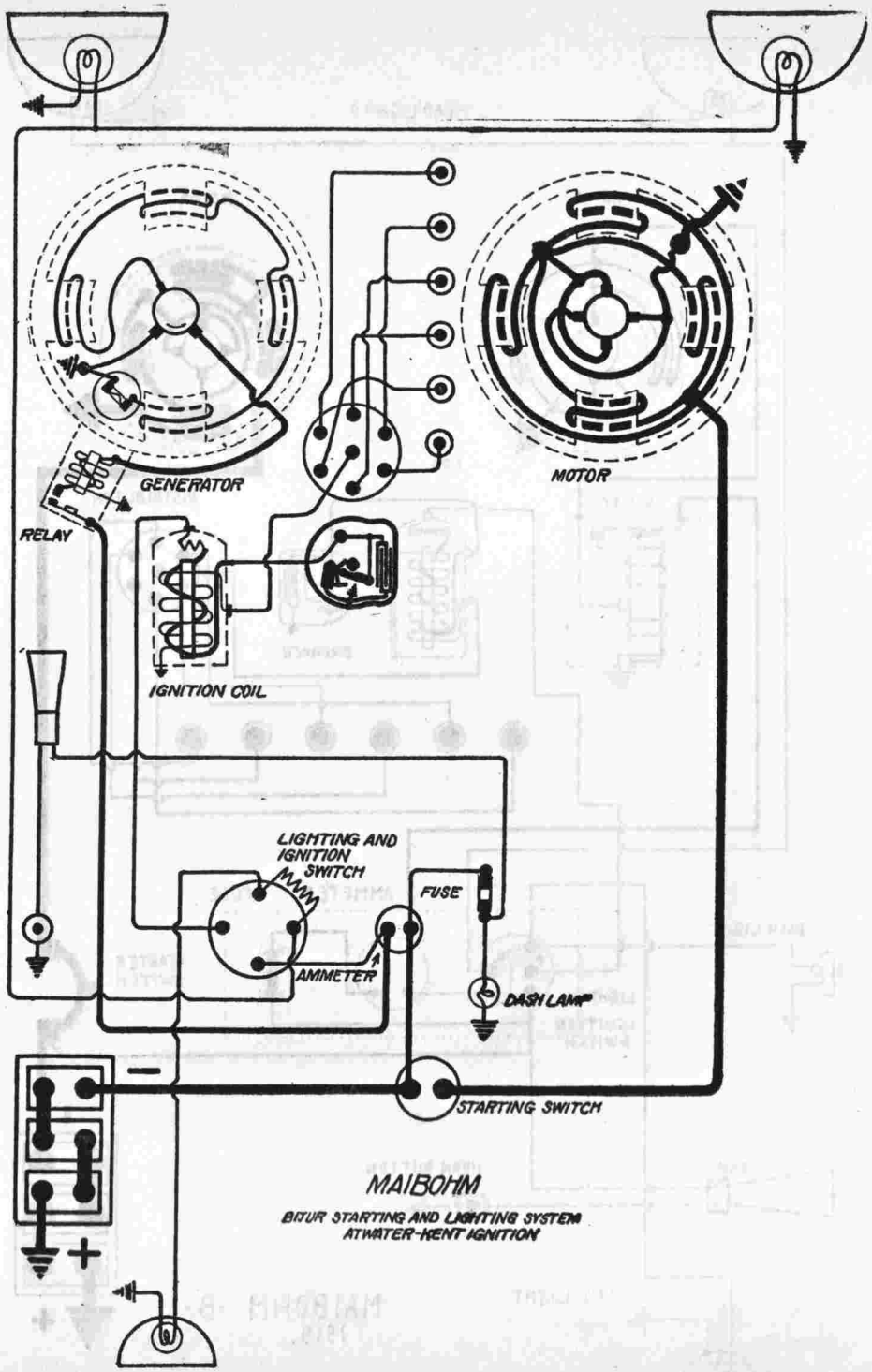
GENERATOR.—Type P-230, M-1371 or **M-1442.** Generator current regulation is by third brush system. Maximum current output is 12-14 amperes, reached at 1700 R.P.M. of the armature or 24 miles per hour. Charging rate is varied by adjusting third brush setting. Charging rate is varied by inserting a special toothed wrench in the adjusting hole in the commutator end plate, and moving the third brush through a ratchet engagement. Turn the wrench to the right to increase the charging rate and to the left to decrease the charging rate. Pressure of brushes on commutator is 32-36 ounces.

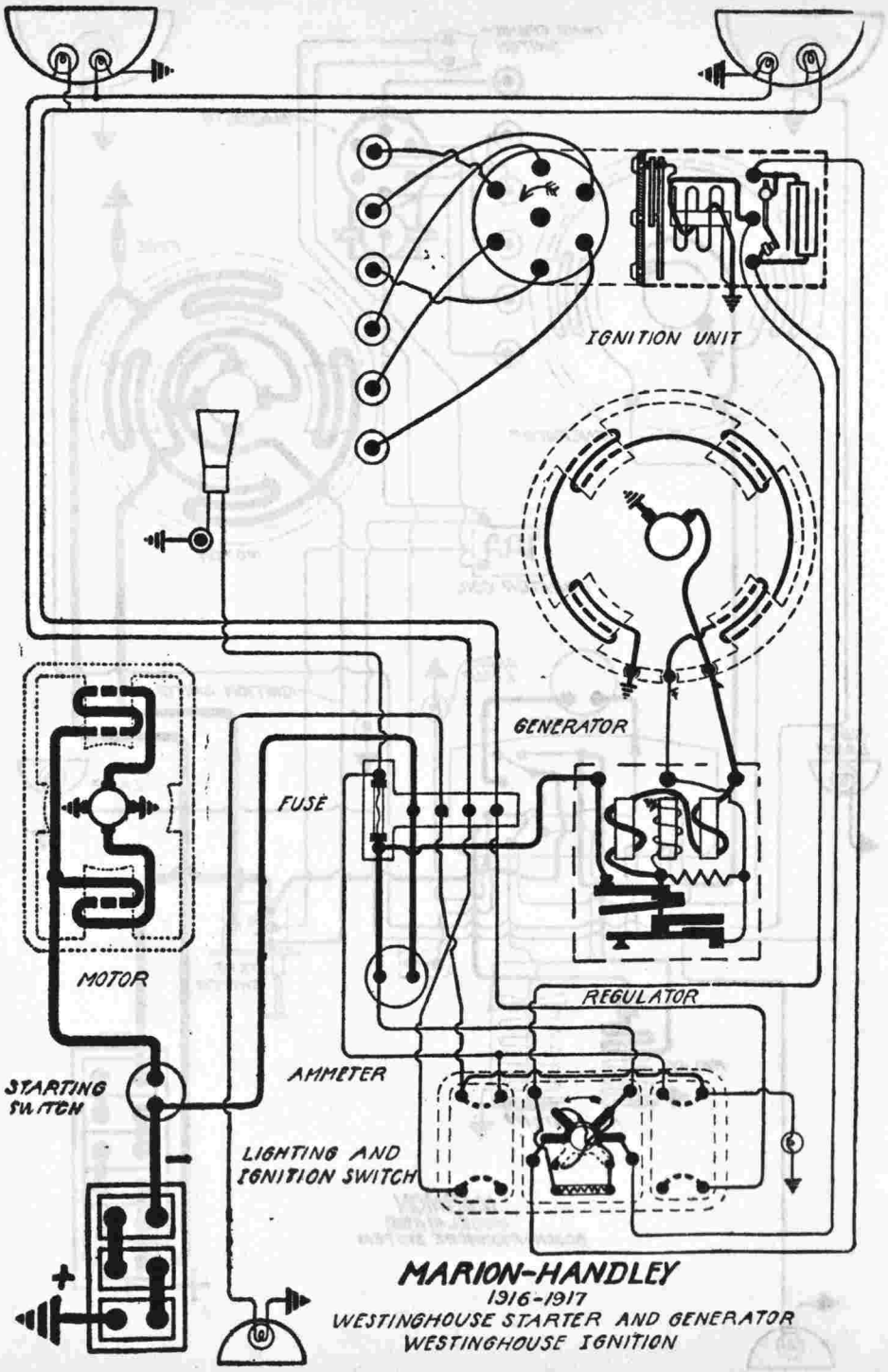
OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on generator frame. Relay closes at 8-10 miles per hour or 600-650 R.P.M. of the armature, and opens at 6-8 miles per hour or 550-600 R.P.M. of the armature. Relay contacts separate .015 inch. Air gap between relay armature and coil core is .030 inch, contacts closed. Relay must be adjusted so that the contacts will close when the voltage of the generator reaches 6.5 volts, as indicated by a voltmeter connected across the main brushes. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 20 cp. Dash and tail lamps are each 6-8 volt, 2 cp.

FUSES.—Fuses are 20 ampere.





Marion-Handley

Models K (1916) A-B (1917)

Westinghouse Starting and Lighting System

Westinghouse Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate .006 inch to .008 inch. Should they be burned or pitted, resurface them with a fine, flat jeweler's file or a strip of worn No. 00 sand paper. The springs should exert just enough pressure on the distributor brushes to force them ¼ inch past the top of the holder when the distributor cap is removed, but should retain them firmly so that they do not tend to fall out. Brushes must move freely in their holders. Be sure that both brushes are in place when replacing the rotor. (There is a brush on both the top and bottom side of the rotor).

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position. Contacts are beginning to separate when the distributor rotor is directly opposite the V notch on the rim of the case.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be about .025 inch.

Ballast Resistor.—There is a ballast resistor in the ignition switch. A fuse must not be permanently substituted for this resistor. In case it is necessary to operate the car with the ballast defective, a 5 ampere fuse may be used temporarily, but the ballast must be replaced as soon as possible, as continued operation without it will result in serious burning of the timer contacts.

Oiling.—Put 2 or 3 drops of light machine oil in the oil cup at the side of the unit every month. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

Starter.—Starter is connected to the engine through a Bendix drive. The Frame No. 318 starter, used on the 1916 cars should run at 1500 R. P. M., when delivering 2 pound-feet torque. It should develope 11.5 pound-feet lock torque, taking about 400 amperes. The Frame No. 700 starter, used on the 1917 cars, should deliver 2.5 pound-feet torque when running at 1200 R. P. M. It should develop 12.5 pound-feet lock torque, taking about 400 amperes.

Oiling.—Put 4 or 5 drops of light engine oil in each of the starter oilers every month. If starter is equipped with oil wells, keep cup filled.

Generator.—Generator voltage regulation is by a vibrating regulator. Relay is combined with the regulator. Relay should close at about 5 and open at about 3 miles per hour. The maximum generator output should be about 14 amperes, reached at about 20 miles per hour. The charging rate will vary with the state of charge of the battery, being 12-16 amperes when battery is discharged and gradually decreasing to 4 or 5 amperes as battery becomes charged. The generator voltage, hence output, is increased by increasing tension of regulator armature (moving member) spring and decreased by decreasing the tension of this spring. Before adjusting contacts and whenever necessary at other times, clean by drawing a piece of unglazed paper between them. If contacts are badly burned or pitted, it may become necessary to resurface them with a piece of well worn No. 00 sand paper. Draw a piece of unglazed paper between them to remove all grit before again putting into service.

Oiling.—Put several drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles. Fill the oil wells in the bottom of bearings with light machine or engine oil every three months.

Lamps.—Head lamps are 6-8 volts, 15 cp. Dimmer lamps are 6-8 volts, 2 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.

Fuses.—Fuses are 15 ampere.

MARMON

MODEL 41 (1915)

BOSCH-RUSHMORE STARTING AND LIGHTING SYSTEM

BOSCH MAGNETO IGNITION

BATTERY.—Battery is 12 volt, 60 ampere-hour. The positive (+) terminal is grounded through a fuse leading from the starting cable.

IGNITION.—Magneto breaker contacts should separate .014 inch to .016 inch. Should they become badly burned or pitted, affecting the ignition, resurface them with a very fine, flat jeweler's file or a strip of worn No. 00 sandpaper.

TIMING.—Contacts should begin to separate when the top dead center mark on the flywheel is at the indicator, spark control lever and breaker assembly in the fully retarded postition.

FIRING ORDER.—The firing order is 1,5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps should be about .018 inch.

OILING.—Put 2 or 3 drops of light machine oil in each of the magneto oilers every two weeks. At the same time put a very small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

STARTER.—The starter pinion is meshed with the flywheel gear by movement of the armature. The armature is constructed so that it has considerable end play. A spring at the commutator end normally holds the armature in such a position that the gears are demeshed. When the starting switch is moved so as to connect the first and second contacts, a large current is allowed to flow through the motor field and a small current through the armature. This causes a strong attraction between the armature and field, with the result that the armature is drawn further into the frame, meshing the gears. The current through the armature causes it to turn slowly, facilitating meshing of the gears. When the engine starts the current taken by the starter decreases sufficiently to allow the spring to force the armature out, demeshing the gears.

OILING.—Put 3 or 4 drops of light engine oil in each of the starter oilers every two weeks.

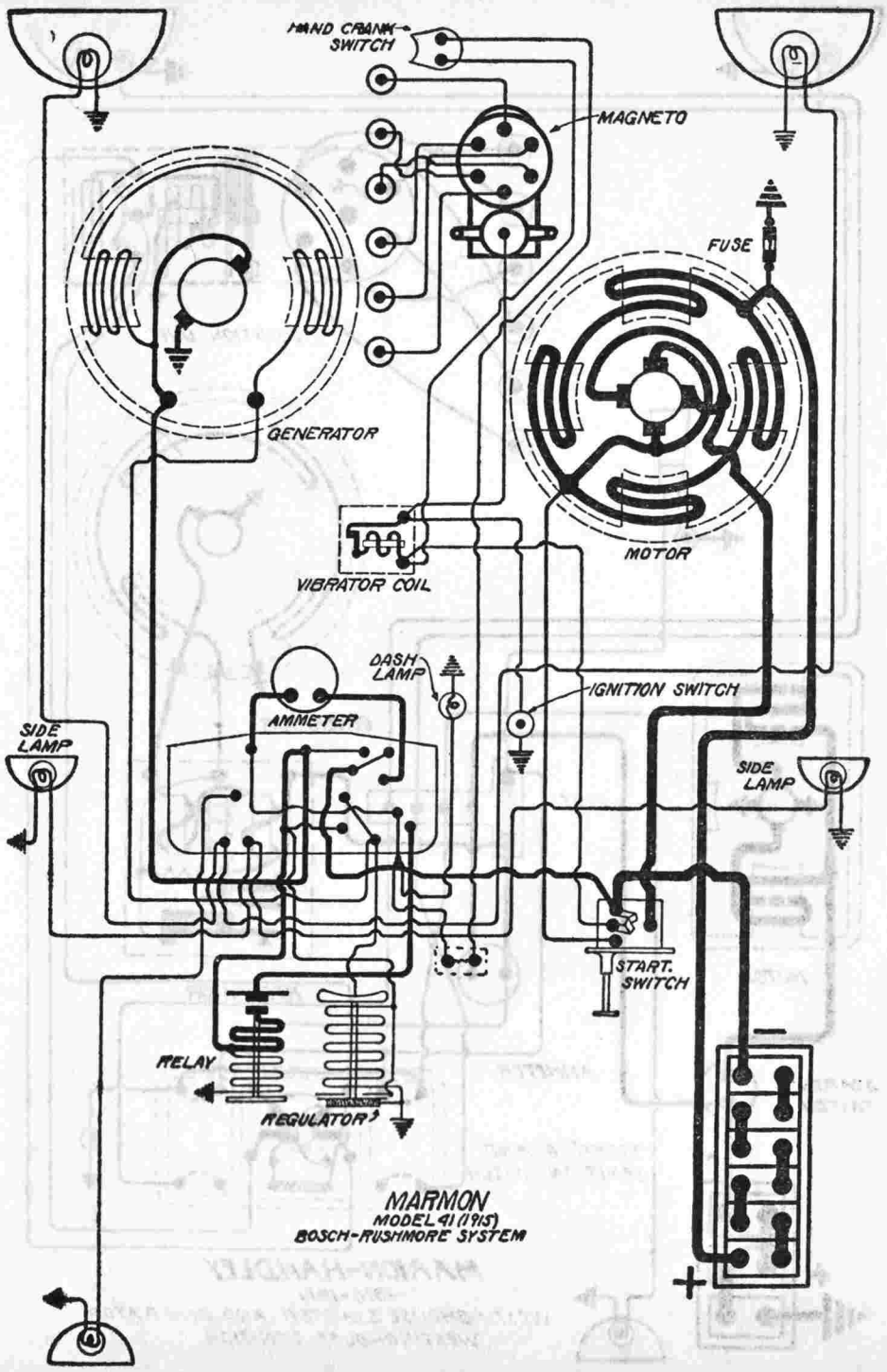
GENERATOR—Type DS-X. Generator voltage regulation is by a carbon-resistance regutor. Maximum charging rate is 8-10 amperes, reached at 20 miles per hour.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY-REGULATOR.—Relay and regulator are mounted in the dash unit. Relay closes at 8-10 and opens at 6-8 miles per hour. To adjust regulator, turn the tapered plug. Screwing the plug in increases the generator voltage, and screwing it out decreases the voltage. Relay is adjusted by means of a hexagon-headed nut in the center of spring at the bottom of the relay. Tighten this nut to raise the cut-in voltage, and loosen it to lower the cut-in voltage. When the contacts are closed the air gap between the moving member and the stationary part is 1/64 inch. To make this adjustment, loosen the hexagon nut and screw the contact screw in or out, after which the jam nut must be tightened again.

LAMPS.—Head lamps are 12-16 volt, 24 cp. Side lamps are 12-16 volt, 4 cp. Dash lamp is 12-16 volt, 4 cp. Tail lamp is 12-16 volt, 4 cp.

FUSE.—Fuse is 20 ampere.



Marmon

MODEL 34 (1916-17)

BOSCH-RUSHMORE GENERATING, STARTING AND LIGHTING SYSTEM

BOSCH IGNITION

BATTERY.—Battery is 12 volt, 50 ampere-hour. The positive (+) terminal is grounded at the starting motor.

IGNITION.—Breaker contacts separate .014 to .016 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 2 or 3 drops of light machine oil in each of magneto oilers every month. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

TIMING.—Breaker contacts separate when the top dead center mark on flywheel is one inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .028 to .032 inch.

STARTER.—Starter is connected to the engine through a pinion and ring gear on the fly-

OILING.—Put 4 or 5 drops of light engine oil in each of the starter oilers every month.

wheel, meshed by the magnetic attraction of the field poles for the armature.

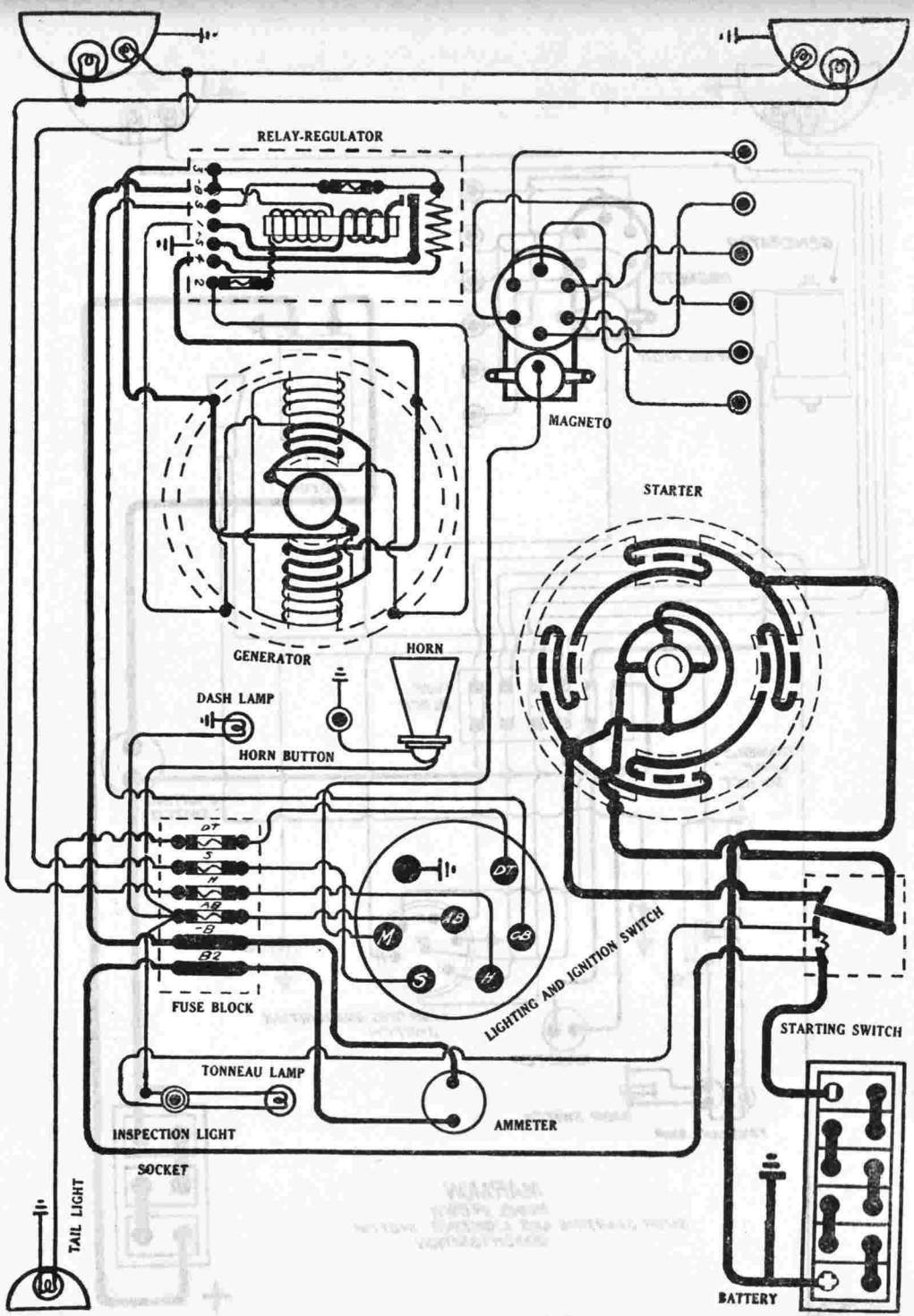
GENERATOR.—Generator current regulation is by reverse series field and a regulating resistance. This regulating resistance is connected in shunt with the reverse series field. When cold, this unit has a very small resistance, but when hot, it has a greatly increased resistance. When cold, it forms practically a short circuit across the series field terminals, allowing but little current to flow through the series field. As the current through the resistance increases, its temperature and resistance increases, causing more current to flow through the reverse winding, reducing the output. As the resistance of the regulating coil increases in proportion to the current through it, the output is held practically constant at speeds above that necessary to produce the maximum output. The output is varied by changing the regulating resistance unit. The maximum charging rate of 10 amperes is reached at 25 miles per hour.

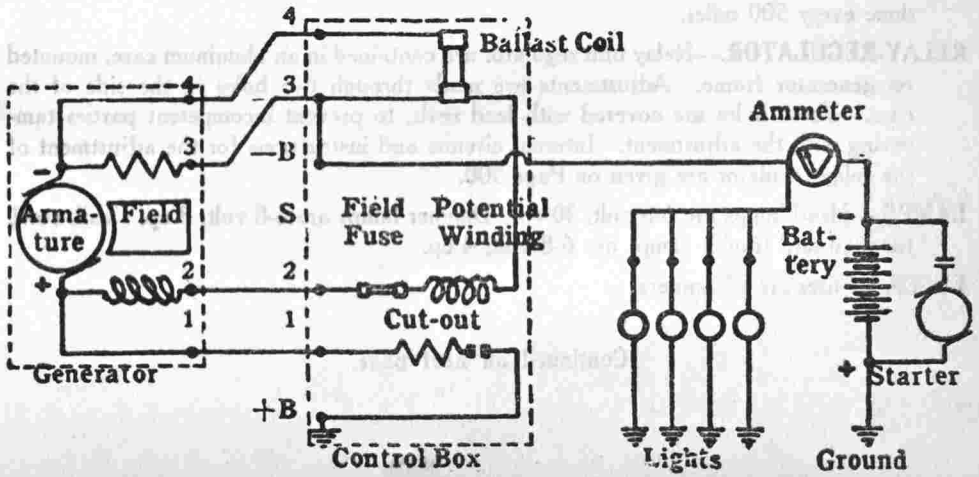
OILING.—Put 4 or 5 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour and opens at 6-8 miles per hour. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 12-16 volt, 30 cp. Dimmer lamps are 12-16 volt, 6 cp. Tail lamp is 12-16 volt, 6 cp. Dash and tonneau lamps are each 12-16 volt, 6 cp.

FUSES.—Fuses are 20 ampere.





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MARMON

MODEL 34 (1918-19)

BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH IGNITION

BATTERY.—Battery is 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .014 to .016 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 3 or 4 drops of light engine oil in each of the magneto oilers every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is one inch before the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .032 inch.

STARTER.—Type AD-200, M-923. Rotation is counter-clockwise, looking at the commutator end. Starter is connected to the engine through a Bijur automatic pinion shift.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Type K-643, M-792. Rotation is counter-clockwise, looking at the commutator end. Generator voltage regulation is by vibrator regulator. Maximum current output is 15 to 18 amperes, decreasing to 4-6 amperes as battery becomes fully charged. Maximum charging rate is reached at 1000-1400 R.P.M. of the armature or 12-15 miles per hour. Lights may be operated direct from the generator, battery disconnected. It does not matter which battery terminal is connected to the generator, as the latter will automatically assume the right polarity to charge the battery.

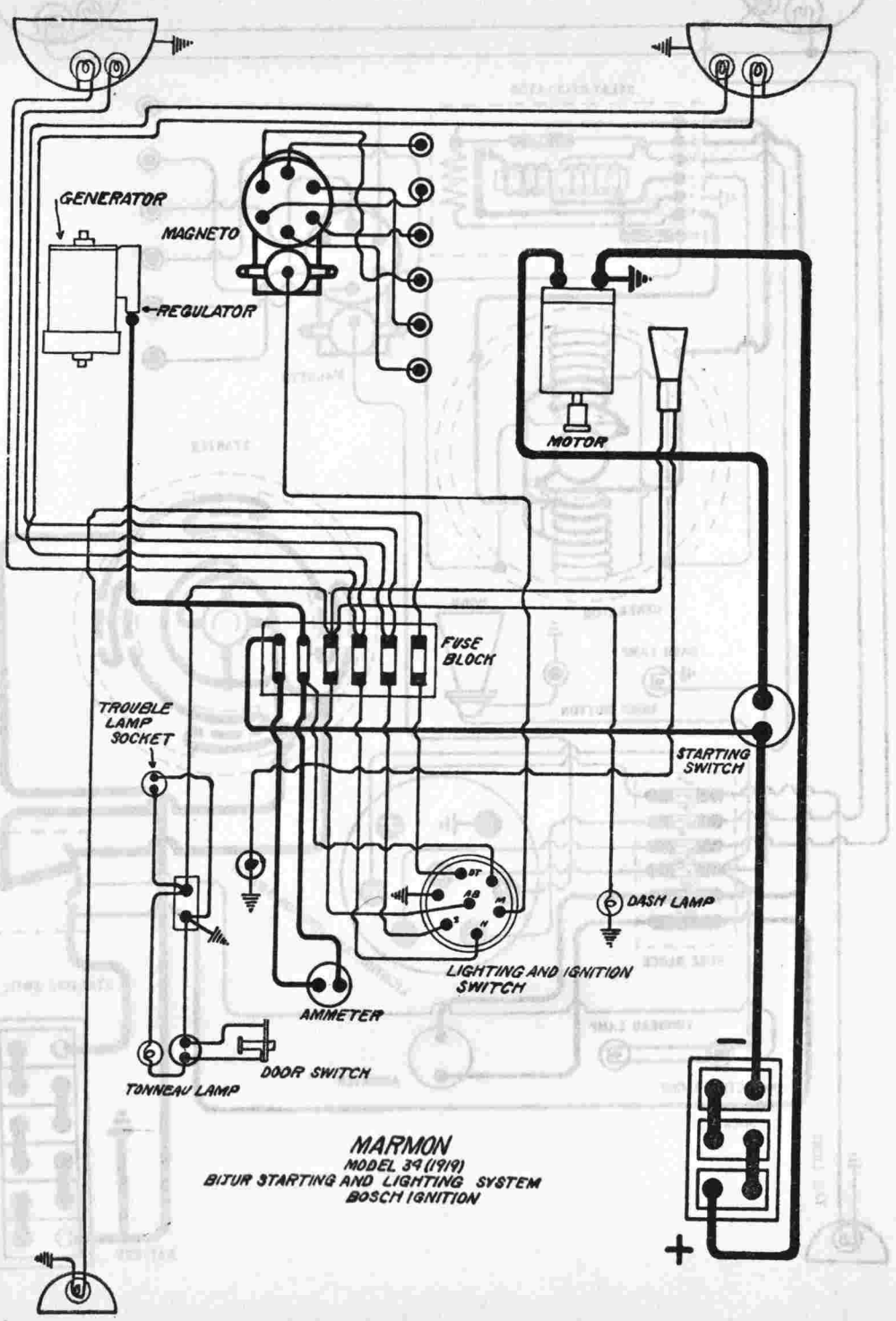
OILING.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY-REGULATOR.—Relay and regulator are contained in an aluminum case, mounted on generator frame. Adjustments are made through two holes in the side of the case. These holes are covered with lead seals, to prevent incompetent parties tampering with the adjustment. Internal circuits and instructions for the adjustment of the relay-regulator are given on Page 500.

LAMPS.—Head lamps are 6-8 volt, 30 cp. Dimmer lamps are 6-8 volt, 8 cp. Tail, cowl, tonneau and trouble lamps are 6-8 volt, 4 cp.

FUSES.—Fuses are 20 ampere.

Continued on next page.



MARMON

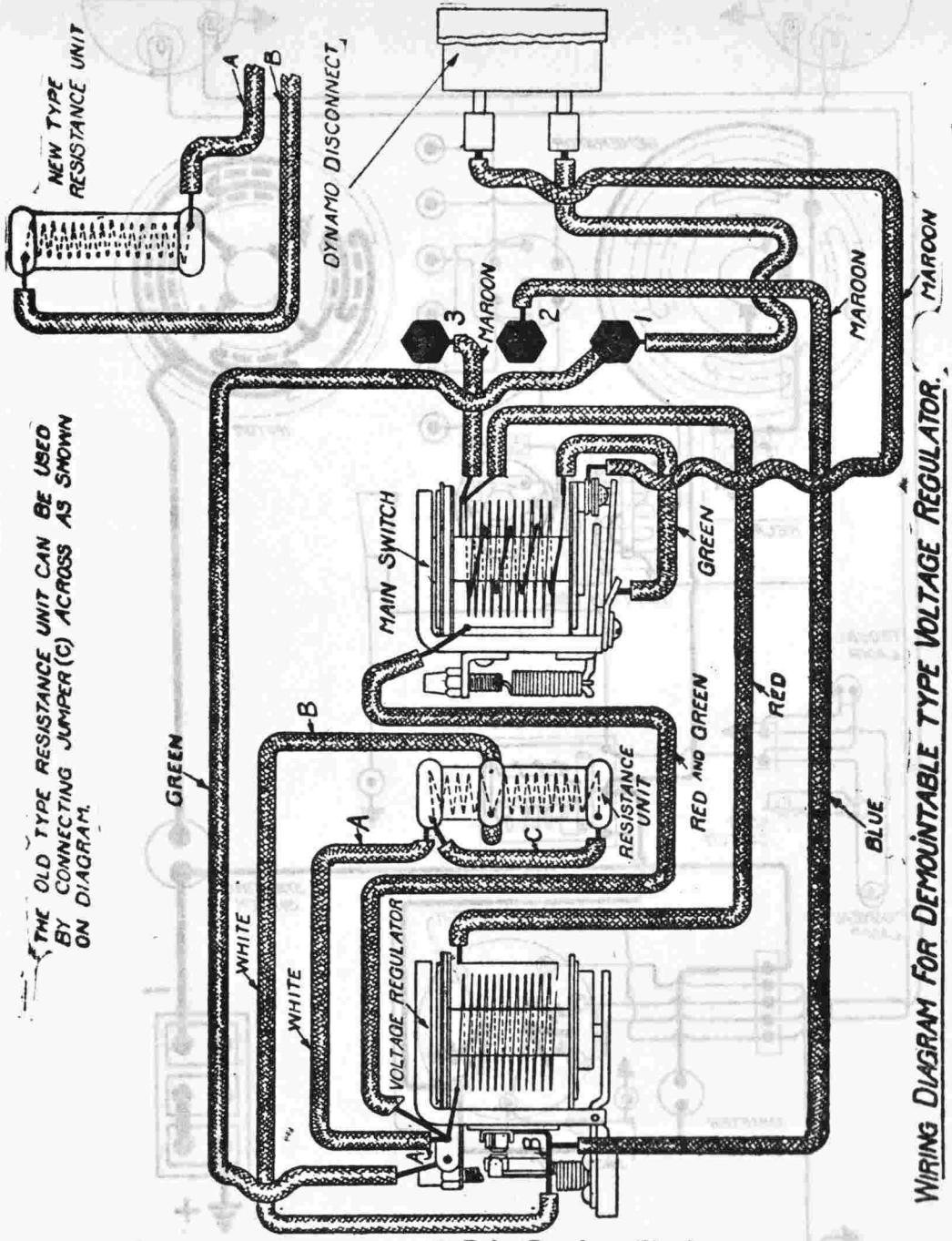
MODEL 34 (1918-19)

BIJUR GENERATING, STARTING AND LIGHTING SYSTEM

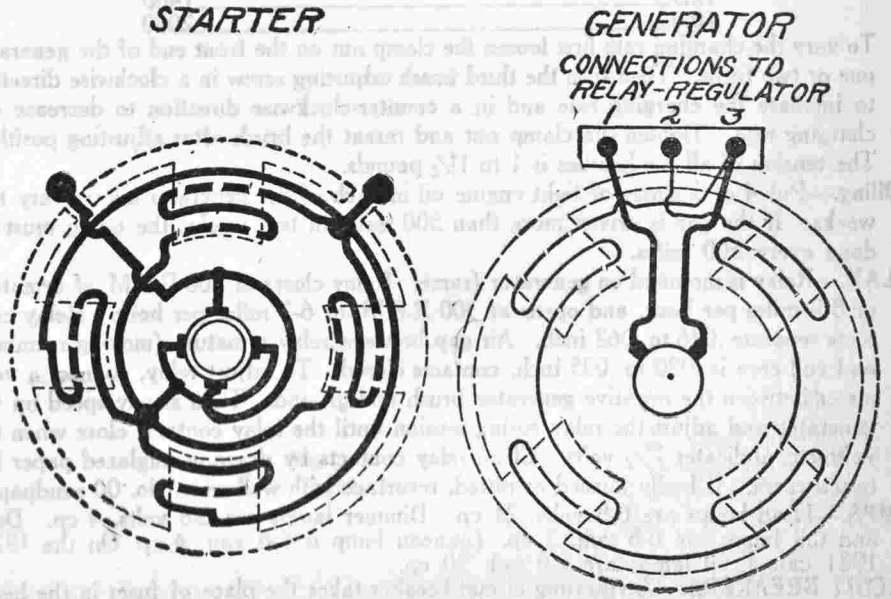
BOSCH IGNITION

Continued from preceding page.

RELAY-REGULATOR.—The internal circuits of the Bijur relay-regulator are shown in Plate 500. The ground connection for this type of generator (employing the grounded return or single wire system), is made through the regulator box disconnecting plug by means of a fillister head screw, which locks the plug into place in the plug receptacle. Special instructions for the adjustment of the relay-regulator are necessary, as the usual procedure where the two-wire system is used is not applicable to this type. If the relay contacts do not close when the voltage of the generator reaches 6.5 volts, as indicated by a voltemter connected across the main brushes of the generator, the relay requires adjustment. Remove the disconnecting plug (plug to which the line wire is attached). Insert the adjusting wrench in the hole in the relay regulator case nearest the plug end and make a trial adjustment of the spring tension. Turn the wrench to the right to raise the cut-in voltage, and to the left to decrease the cut-in voltage. Replace the disconnecting plug and ascertain the result of the adjustment. Continue making trial adjustments in this manner until the desired relay action is obtained. Be sure that the disconnecting plug is always removed before the wrench is inserted in the adjusting holes, or a direct short-circuit of the battery is liable to occur. Adjust the regulator in the same manner, making trial adjustments with the disconnecting plug removed, until the specified action is obtained. To adjust the regulator the generator must be driven at 1000-1400 R.P.M., charging a battery of 1.250 solution or higher. The regulator should be adjusted to limit the voltage of the generator to 7.75 volts. This voltage must be maintained at all higher speeds. Turn the adjusting nut to the right to raise the voltage and to the left to lower the voltage.



Relay-Regulator Circuits



Starter and Generator Internals

DELCO GENERATING, STARTING AND LIGHTING SYSTEM — DELCO IGNITION

BATTERY:—(1920-21) Willard Type SJRN-6, 6 volt, 162 ampere hour **(1922) Prest-O-Lite, Type 617 SHC,** 6 volt 170 ampere hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model No. 2135. Circuit Breaker Model No. 5742. Distributor contacts separate .020-.0275 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth, and finish on a medium hard oilstone.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler at the side of the distributor unit every two weeks. If the track of the rotor button is not well polished apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles. Pack the distributor housing with soft cup grease to the level of the distributor gears once each year.

Timing.—Breaker contacts begin to separate when the flywheel mark "1 & 6TC" is exactly opposite the indicator, spark control lever 4 to 5 inches advanced from the fully retarded position on the 1922 cars and in the fully retarded position on the 1920 and 1921 cars.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .022 to .027 inch.

STARTER.—Model No. 172. Starter is connected to the engine through a Bendix drive. Current during the cranking operation is 100 to 300 amperes. Pressure of brushes on the commutator is 2¼ pounds. Running free, the starter takes 50 amperes at 6 volts. Stall torque is 18 pound-feet, the current being 450 amperes at 4 volts. The direction of rotation is counter-clockwise, viewed from the commutator end.

Oiling.—Put 4 or 5 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Model No. 168. Generator current regulation is by third brush system. The direction of rotation is clockwise, viewed from the commutator end. The maximum charging rate is 14 to 16 amperes, reached at 1000 R. P. M.

Amperes	Hot Test	R.P.M.
0.0		285
9.5		500
14.0		1000
12.5		1400
10.0		2000

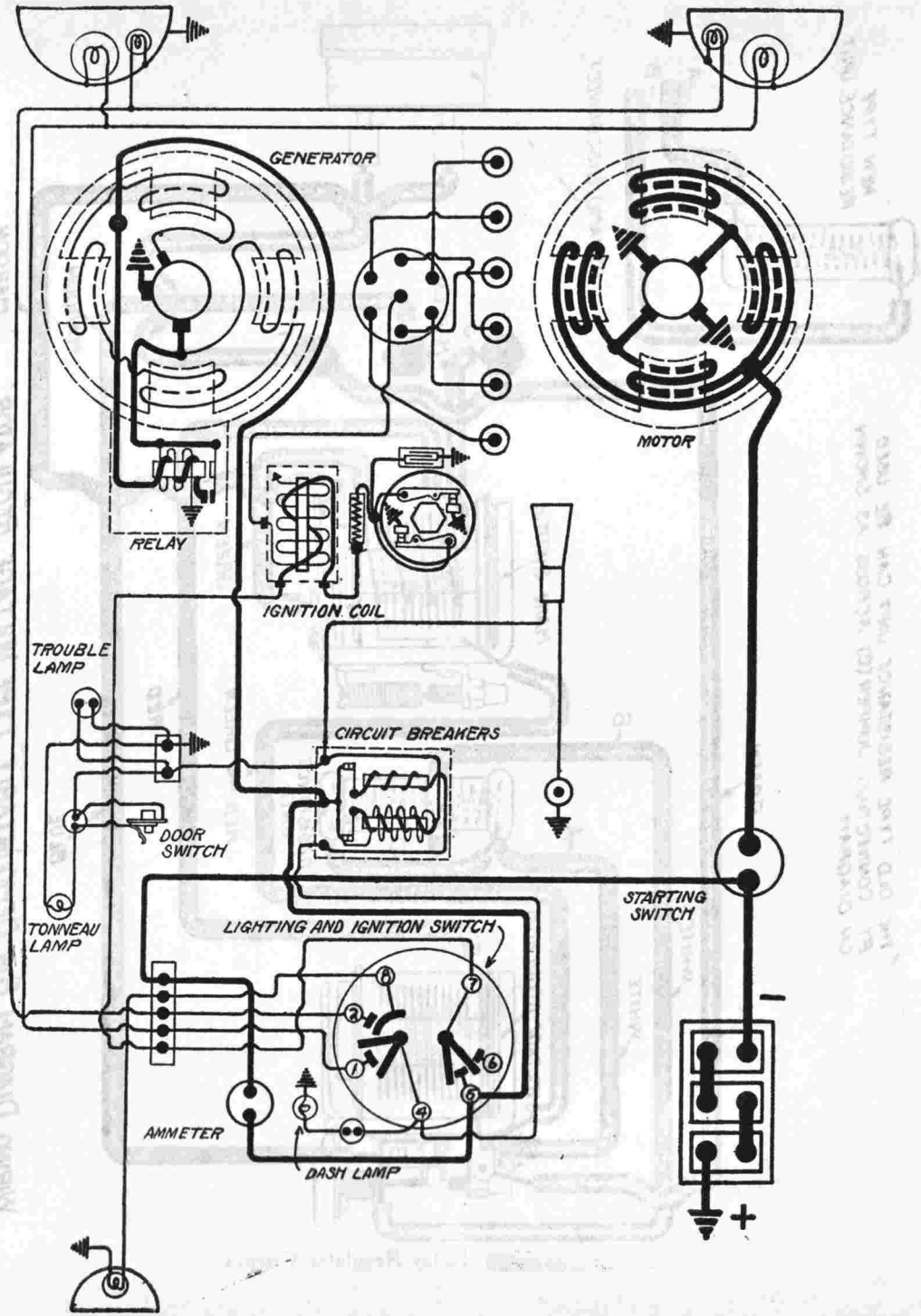
To vary the charging rate first loosen the clamp nut on the front end of the generator one or two turns. Then turn the third brush adjusting screw in a clockwise direction to increase the charging rate and in a counter-clockwise direction to decrease the charging rate. Tighten the clamp nut and reseat the brush after adjusting position. The tension of all the brushes is 1 to 1½ pounds.

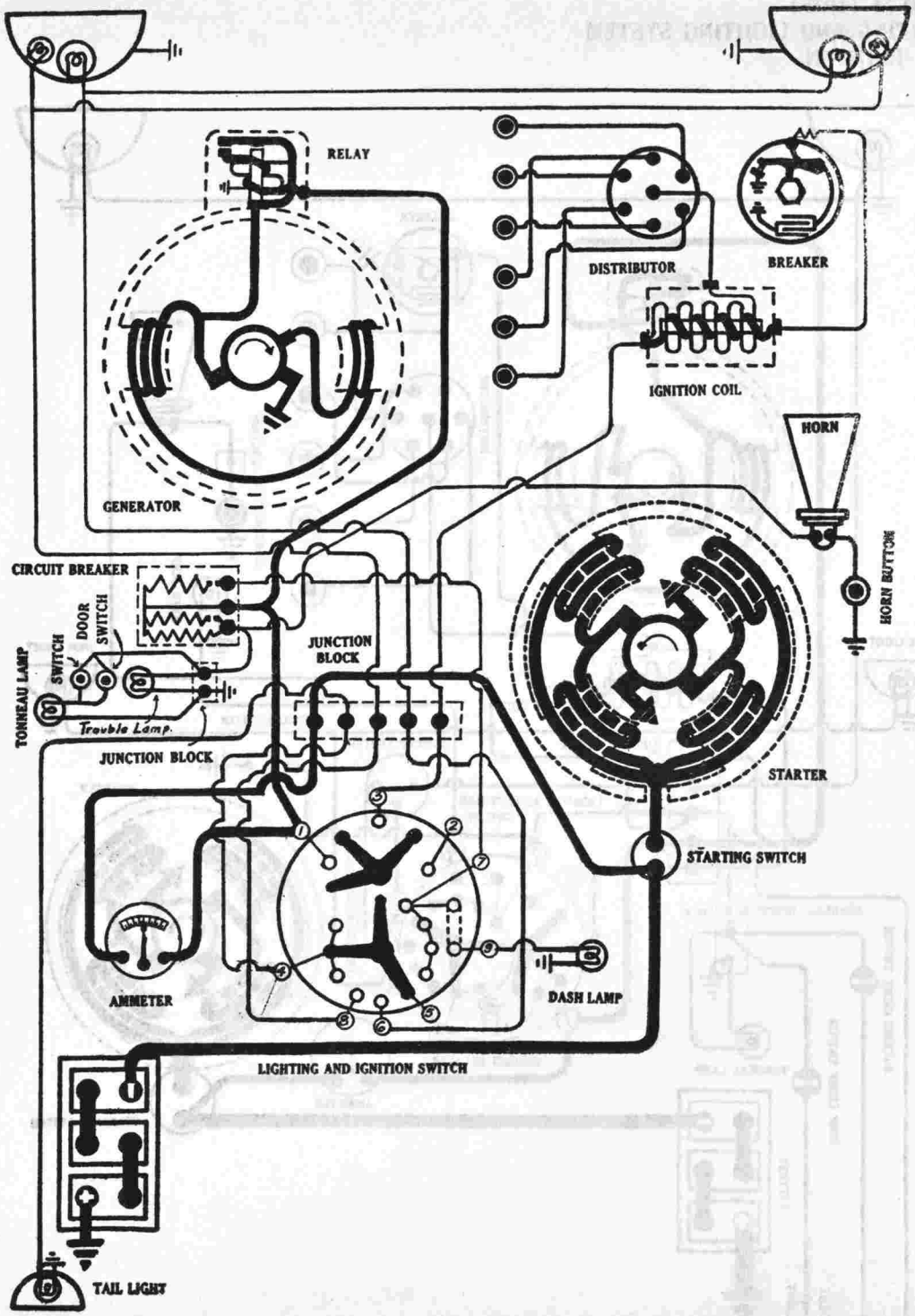
Oiling.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on generator frame. Relay closes at 500 R.P.M. of armature or 8-9 miles per hour, and opens at 300 R.P.M. or 6-7 miles per hour. Relay contacts separate .046 to .062 inch. Air gap between relay armature (moving member) and coil core is .020 to .035 inch, contacts closed. To adjust relay, connect a voltmeter between the negative generator brush and ground. Then slowly speed up the generator and adjust the relay spring tension until the relay contacts close when the voltmeter indicates 7½ volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper.

LAMPS.—Head lamps are 6-8 volts, 21 cp. Dimmer lamps are 6-8 volts, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp. Tonneau lamp is 6-8 volt, 4 cp. On the 1920, 1921 cars head lamps are 6-8 volt 30 cp.

CIRCUIT BREAKERS.—A vibrating circuit breaker takes the place of fuses in the head, dimmer, tail and dash lamp circuits. It requires a current of 25 amperes to start this device vibrating. While vibrating the current is 3-5 amperes. A locking circuit breaker takes the place of fuses in the horn, tonneau, and trouble lamp circuits. A current of 25 amperes will cause this device to open the circuit. The circuit breaker





MODEL 34-B (1923-24)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM

BATTERY.—Prest-O-Lite, Type 617-SHC, 6 volt, 170 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model 2177. Breaker contacts separate .020 to .025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine flat jeweler's file or on the flat side of a medium hard oilstone.

Oiling.—Put 8 or 10 drops of light engine oil in each distributor oiler every two weks or each 500 miles. Pack the distributor gear housing up to the level of the distributor gears with medium heavy cup grease twice each year. Place a small amount of grease about the size of a match head on the breaker cam and polish the rotor track with a small amount of grease every 1000 miles.

Timing.—Breaker contacts begin to separate when piston No. 1 is on top dead center on compression stroke with spark control lever advanced 5¾ inches from the fully retarded position. To set timing, crank engine until piston No. 1 reaches top dead center on compression stroke. Then loosen timing adjustment screw and turn the the breaker cam until contact points just begin to separate. Tighten the adjustment screw and replace the distributor head, being careful that the rotor button is directly under the segment connected to the spark plug of cylinder No. 1.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

STARTER.—Model No. 254. The starter is connected to the engine through a mechanically operated pinion shift combined with the starting switch. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Test Data

Torque	Amperes	Volts
0	60	6
24 ft. lbs.	Lock	2.75

Brush pressure on all brushes should be 2¼ to 2¾ pounds.

Oiling.—Put 8 or 10 drops of light engine oil in each of the two starter oilers every 1000 miles or each month. Saturate the wick in the oiler in the starter end gear with engine oil once each year. Clean and repack the motor clutch with vaseline every year.

GENERATOR.—Model No. 253. Generator current regulation is by the third brush system. The direction of rotation is clockwise, looking at the commutator end. The maximum charging rate is 17 amperes, reached at 1600 R.P.M. of the generator.

Generator

Cold Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
4	800	4	800
9	1000	8	1000
15-18	1600	14-16	1600
17	2000	15	2000

To adjust the charging rate, remove the cover band and shift the third brush plate by means of the handle. Shifting the third brush in the direction of the armature rotation (clockwise) increases the output and in the opposite direction (counter-clockwise) decreases the output The third brush plate is held in any desired position by means of friction clamp washers. The brush tension of all brushes is 1¼ to 1¾ pounds each.

Oiling.—Put 8 or 10 drops of light engine oil in each of the two generator oilers every 500 miles or each two weeks.

RELAY.—Model 5754. Relay is mounted on top of the generator. Relay closes at 6-8 miles per hour or 6¾ to 7½ volts and opens with a discharge current of 0 to 3 amperes. Relay contacts separate .025 to .035 inch. Air gap between the relay armature and the coil core is .025 to .035 inch, contacts closed. To raise the cut-in voltage increase the spring tension and to lower the cut-in voltage decrease the gap.

LIGHTING.—Combination Switch Model No. 1241. Head lamps are 6-8 volt, 21 cp. S.C. Dimmer lamps and tonneau lamp are each 6-8 volt, 4 cp. S.C. Dash and tail lamps are each 6-8 volt, 2 cp. S.C. Stop light is 6-8 volt, 21 cp. S.C. Dome lamp is 6-8 volt, 2 cp. D.C.

CIRCUIT BREAKER.—Model Nos. 5742-5759. A vibrating circuit breaker takes the place of fuses in the head, dimmer, tail and dash lamp circuits. It requires a current of 25-30 amperes to start the circuit breaker vibrating. While vibrating the current is 10-15 amperes. A lock-out circuit breaker is placed in the horn, tonneau lamp and trouble lamp circuits. A current of 25-30 amperes causes it to open the

MARMON

MODEL D-74 (1925)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Prest-O-Lite, Type 617-SHC. 6 volt. 170 ampere-hour. The positive (+) terminal is grounded.

IGNITION:—Coil Model 2177. Breaker contacts separate .020 to .025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine flat jeweler's file or on the flat side of a oilstone. Ignition current through coil is 3.5 amperes at 6 volts with engine running and 1.5 amperes at 6 volts with engine stopped.

Mounting:—Distributor is mounted on the generator. To remove distributor, disconnect primary lead and manual advance rod. Remove distributor head with high tension cables intact. Remove manual advance stop screw and lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in each distributor oiler every two weeks or each 500 miles. Pack the distributor gear housing up to the level of the distributor gears with medium heavy cup grease twice each year. Place a small amount of grease about the size of a match head on the breaker cam and polish the rotor track with a small amount of grease every 1000 miles.

Timing:—Breaker contacts begin to separate when piston No. 1 is on top dead center on compression stroke with spark control lever advanced 5¾ inches from the fully retarded position. To set timing, crank engine until piston No. 1 reaches top dead center on compression stroke. Then loosen timing adjustment screw and turn the breaker cam until contact points just begin to separate. Tighten the adjustment screw and replace the distributor head, being careful that the rotor button is directly under the segment connected to the spark plug of cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plug Gaps:—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter is 2 inches; stem diameter is .373 inch; stem length is 6 1/32 inches. Tappet clearance is .006 inch. Spring pressure is 50-35 pounds. Inlet valves open at top dead center and close at 35 degrees after lower dead center.
EXHAUST VALVES:—Head diameter is 2 inches; stem diameter is .373 inch; stem length is 6 1/32 inches. Tappet clearance is .010 inch. Spring pressure is 50-35 pounds. Exhaust valves open at 51 degrees before lower dead center and close 6 degrees after top dead center.

STARTER:—Model No. 254. The starter is connected to the engine through a mechanically operated pinion shift combined with the starting switch. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data

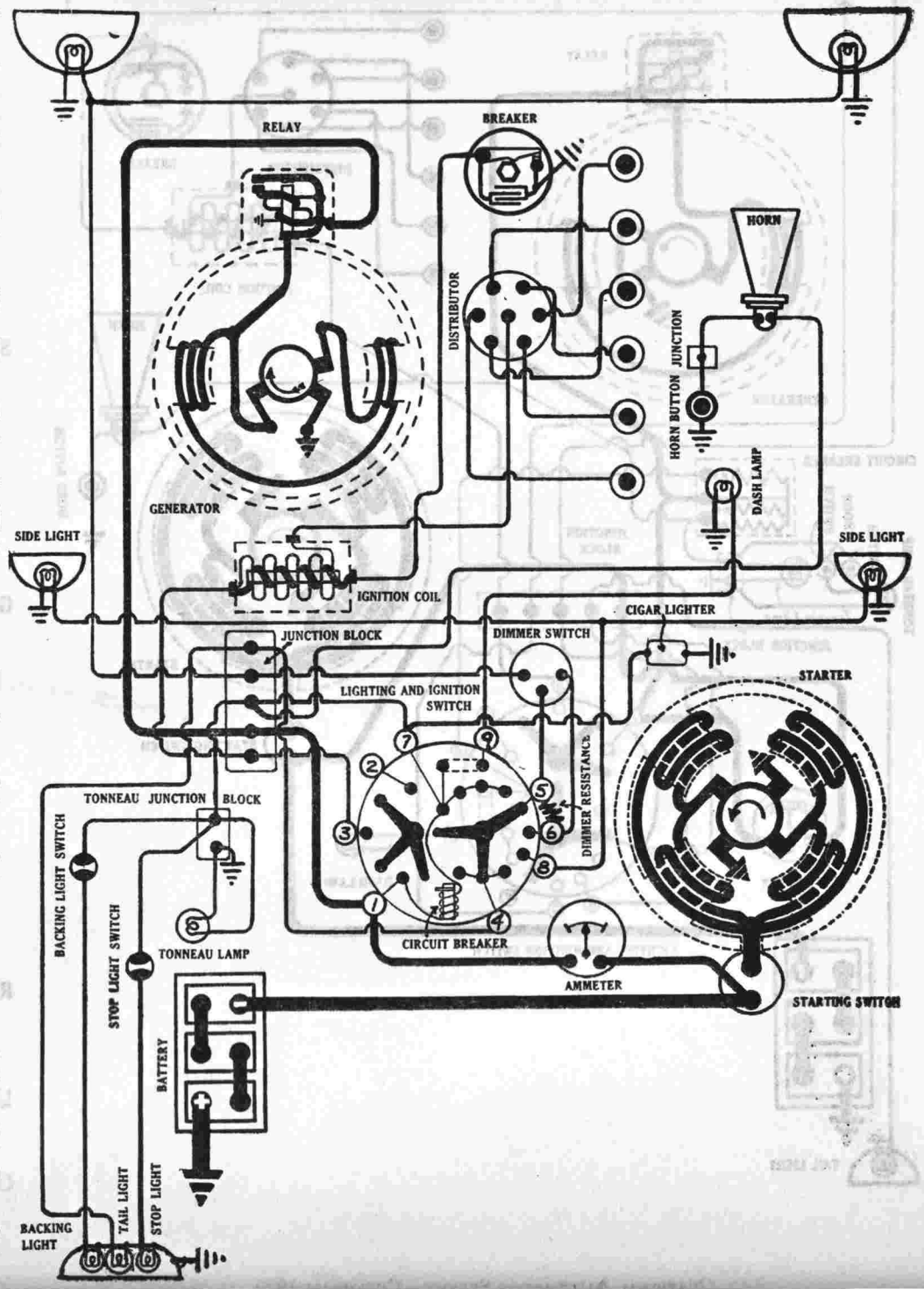
Torque	Amperes	Volts
0	60	6
24 ft. lbs.	Lock	2.75

Brush pressure on all brushes should be 2¼ to 2¾ pounds.

Mounting:—Starter is mounted at the right of the engine. To remove starter, disconnect lead from starter terminal. Loosen starter hold-down band and lift unit from engine.

Oiling:—Put 8 or 10 drops of light engine oil in each of the two starter oilers every 1000 miles or each month. Saturate the wick in the oiler in the starter end gear with engine oil once each year. Clean and repack the motor clutch with vaseline every year.

GENERATOR:—Model No. 253. Generator current regulation is by the third brush system. The direction of rotation is clockwise, looking at the commutator end.



MARMON

MODEL D-74 (1925)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

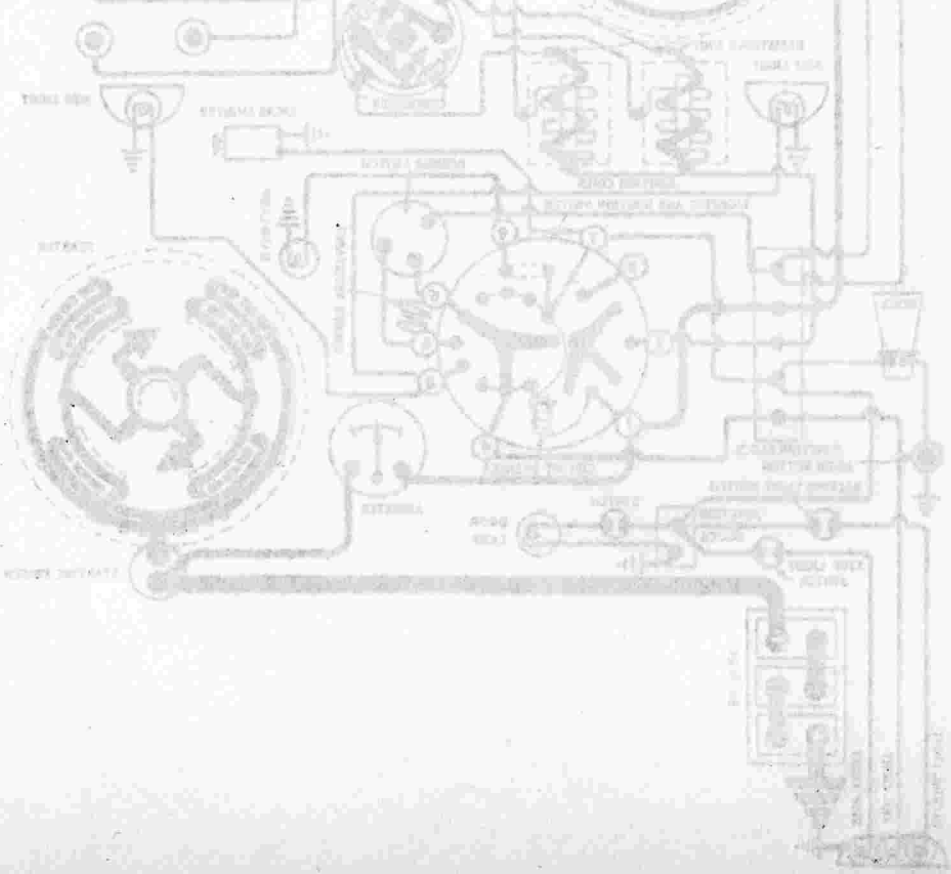
The maximum charging rate is 17 amperes, reached at 1600 R.P.M. of the generator.

Generator Data

Cold Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
4	800	4	800
9	1000	8	1000
15-18	1600	14-16	1600
17	2000	15	2000

To adjust the charging rate, remove the cover band and shift the third brush plate by means of the handle. Shifting the third brush plate in the direction of the armature rotation (clockwise) increases the output and in the opposite direction (counter-clockwise) decreases the output. The third brush plate is held in any desired position by means of friction clamp washers. The brush tension of all brushes is 1¼ to 1¾ pounds each.

Mounting:—Generator is mounted at the left of the engine. To remove generator, remove distributor head and disconnect leads from distributor cup and generator. Disconnect rod from advance lever. Loosen the generator hold-down band and lift from engine.



Oiling:—Put 8 or 10 drops of light engine oil in each of the two generator oilers every 500 miles or each two weeks.

RELAY:—Model 5754. Relay is mounted on top of generator. Relay closes at 6-8 miles per hour or 6¾ to 7½ volts and opens with a discharge current of 0 to 3 amperes. Relay contacts separate .025 to .035 inch. Air gaps between the relay armature and the coil core are .025 to .035 inch, contacts closed. To raise the cut-in voltage increase the spring tension and to lower the cut-in voltage decrease the gap.

LIGHTING:—Combination Switch Model No. 1273. Head lamps are 6-8 volt, 21 cp. S.C. Dimmer lamps and tonneau lamp are each 6-8 volt, 4 cp. S.C. Dash and tail lamps are each 6-8 volt, 2 cp. S.C. Stop light is 6-8 volt, 21 cp. S.C. Dome lamp is 6-8 volt, 2 cp. D.C.

CIRCUIT-BREAKER:—A vibrating circuit-breaker mounted on the back of the switch takes the place of fuses. It requires a current of 25-30 amperes to start this device vibrating. While vibrating the current is 10-15 amperes.

MARMON

MODEL D-74 (1926)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Prest-O-Lite, Type 617-SHK. 6 volt. Starting capacity is 170 amperes for 20 minutes. Lighting capacity is 5 amperes for 32 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model 2178. Distributor No. 17047. Breaker contacts separate .020-.0275 inch. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Double ignition is used. Two coils are used and each ignition circuit is electrically separated, although only one distributor is used. Each primary circuit is controlled by one breaker arm, both operating from a single cam. In setting breaker gaps, synchronize contacts so that they both open at the same instant. Distributor is of the semi-automatic type. Manual advance is 40°. Automatic advance begins at 550 R.P.M. and reaches a maximum of 22-26° at 2000 R.P.M. The tension of the breaker arm spring should be 16-20 ounces.

Mounting.—Distributor is mounted on the rear of the generator. To remove, remove distributor head and disconnect two primary leads and manual advance rod. Then remove hold down screw and lift unit from place.

Oiling.—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Every six months repack the distributor gear compartment with medium heavy cup grease.

Timing.—Breaker contacts begin to separate when the piston entering power stroke reaches a position 7 teeth before top dead center as measured on the flywheel with the manual spark control lever in the fully advanced position. To set timing, crank engine until piston No. 1 reaches this position. Then loosen timing adjustment screw and turn cam until contacts begin to separate. Both contacts must separate at the same instant. Tighten the screw and replace rotor, making certain that rotor button is under the segments connected to the spark plugs in cylinder No. 1.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—The spark plug diameters are 7/8-18 S. A. E. Gaps are .027-.032 inch.

STARTER.—Model 320. Starter is connected to the engine through a manually operated pinion shift incorporated in the starting switch. An over-running clutch is provided to prevent the engine driving the starter. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush is 2¼-2½ pounds each.

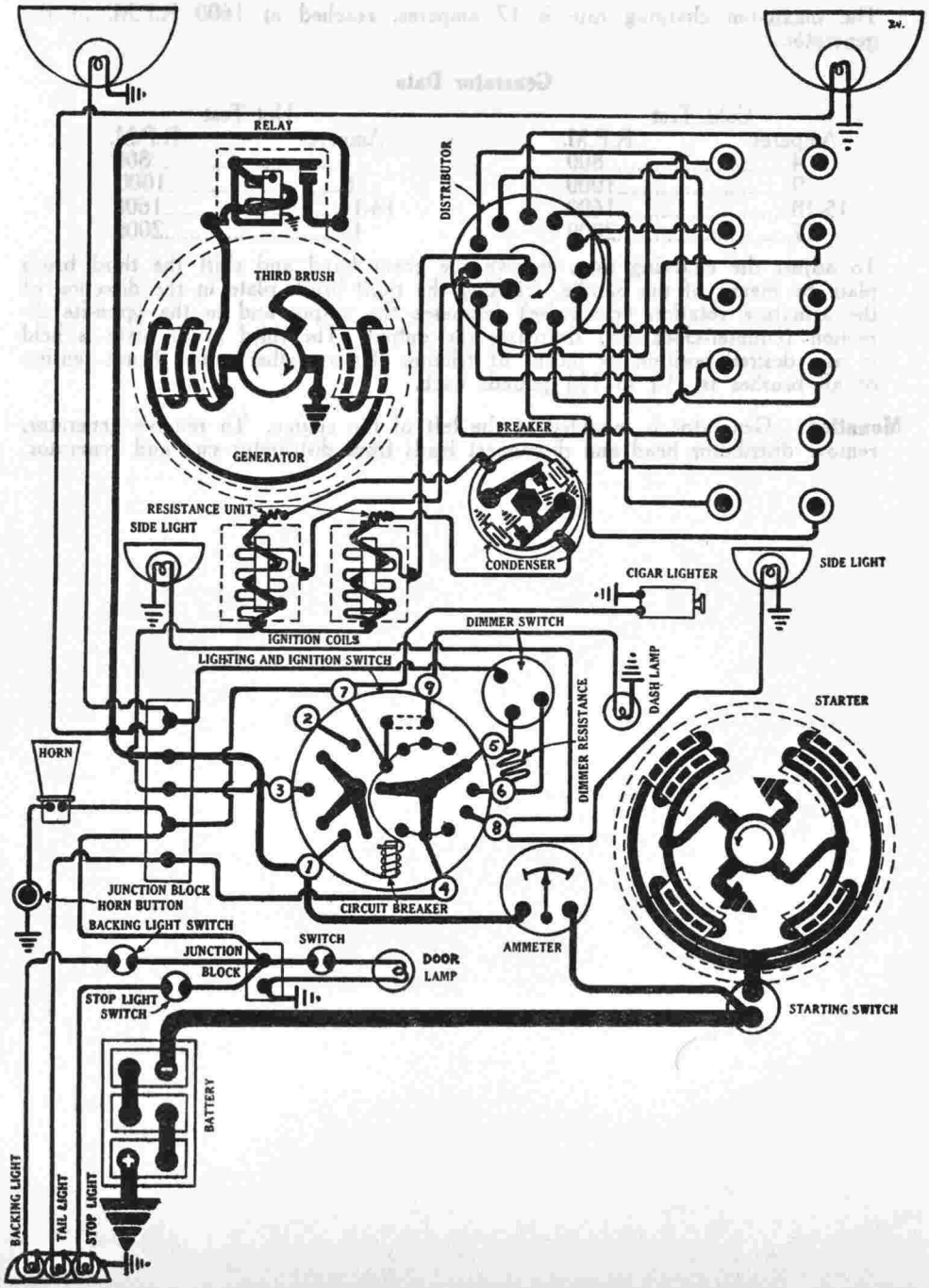
Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	60
18.25 "	Lock	3.2	—

Mounting.—Starter is mounted at right of engine. To remove, disconnect pedal rod and return spring. Then remove two hold down screws and lift starter from place.

Oiling.—Starter bearings are oilless. They require no attention.

GENERATOR.—Model 319. The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the charging rate, remove the commutator cover band and shift the third brush mounting plate by prying on the handle on the plate. Shifting the third brush in a clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. The mounting plate is held in any desired position by friction clamp washers. Generator brush tension is 1¼-1¾ pounds each.



MARMON

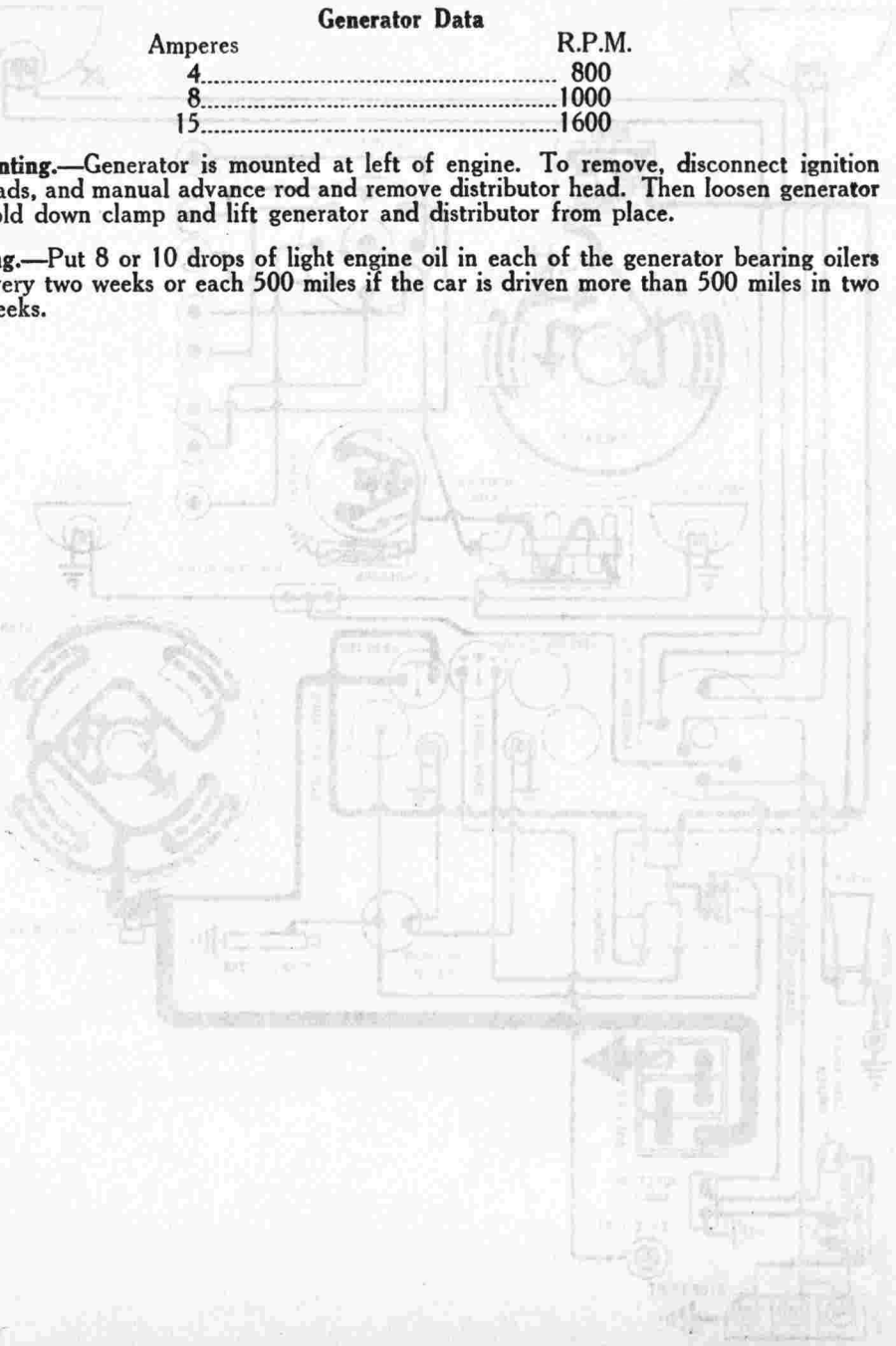
MODEL D-74 (1926)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

Generator Data

Amperes	R.P.M.
4	800
8	1000
15	1600

Mounting.—Generator is mounted at left of engine. To remove, disconnect ignition leads, and manual advance rod and remove distributor head. Then loosen generator hold down clamp and lift generator and distributor from place.

Oiling.—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.



RELAY.—Relay is mounted on top of the generator. Relay closes when the voltage of the generator reaches 6.75-7.5 volts and opens with a discharge current of 0-3 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .009-.010 inch, contacts closed.

LIGHTING.—Switch Model 1273. Head lamps are 6-8 volt, 21 cp. S. C. Stop lamp is 6-8 volt, 21 cp. S. C. Tonneau lamp is 6-8 volt, 4 cp. S. C. Dome lamp is 6-8 volt, 2 cp. D. C. Dash and tail lamps are each 6-8 volt, 2 cp. S. C.

CIRCUIT BREAKER.—A vibrating circuit breaker is mounted on the back of the switch. This device begins to operate when the current flow reaches 25-30 amperes and continues with a current flow of 10-15 amperes until the short circuit is removed.

MARMON

MODEL "L" (1927)
DELCO-REMY GENERATNG, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Presto-O-Lite, Type 613JF, 6 volt. Starting capacity is 102 amperes for 20 minutes. Lighting capacity is 5 amperes for 17.5 hours. The positive (+) terminal is grounded. Battery is mounted under the driver's seat on the left side.

IGNITION:—Coil Model 525-C. Distributor Model 658-C. Breaker uses double contacts set at an angle of 45° and opening alternately. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine, flat contact file. Breaker arm spring tension should be 17-21 ounces. Distributor is of the semi-automatic type. Manual advance is 20°. Maximum automatic advance is 25°. Condenser is mounted in cylindrical cartridge under the distributor head.

Mounting:—Distributor is mounted on left side of engine block. To remove distributor, disconnect breaker lead and high tension cables or remove distributor head. Then remove special screw through slot in manual advance arm and lift distributor from place.

Oiling:—Refill the grease cup under the distributor head with medium cup grease and turn down one turn every month or each 1000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position five teeth before top dead center (as measured on the flywheel) with the manual advance lever in the fully advanced position. To set timing, crank engine until piston No. 1 enters compression stroke. This is the up-stroke of the piston with both valves closed. Fully advance the spark control lever and crank engine until a point on the flywheel five teeth ahead of the flywheel marking "TDC-1-8" is opposite the indicator on the flywheel case. Loosen the lock nut on the breaker cam and rotate the cam until one set of contacts mounted on the breaker plate begin to separate. Tighten the lock nut. The other set of contacts should open exactly 45° after this point. They may be checked by special tool furnished by manufacturer.

Valve Timing:—INLET VALVES—Head diameter, 1 3/16 inches; stem diameter 5/16 inch; stem length, 5 23/32 inches; tappet clearance, .007 inch; spring pressure, 70 pounds closed, 133 pounds open; valve lift, 21/64 inch; intake opens at 6° before top dead center and closes 40° past lower dead center.
EXHAUST VALVES:—Head diameter, 1 inch; stem diameter 5/16 inch; stem length, 5 23/32 inches; tappet clearance, .007 inch; spring pressure, 70 pounds closed, 133 pounds open; valve lift, 21/64 inch; exhaust opens at 40° before lower dead center and closes at 6° after top dead center. The guide stems are removable. No oversize valve stems are made.

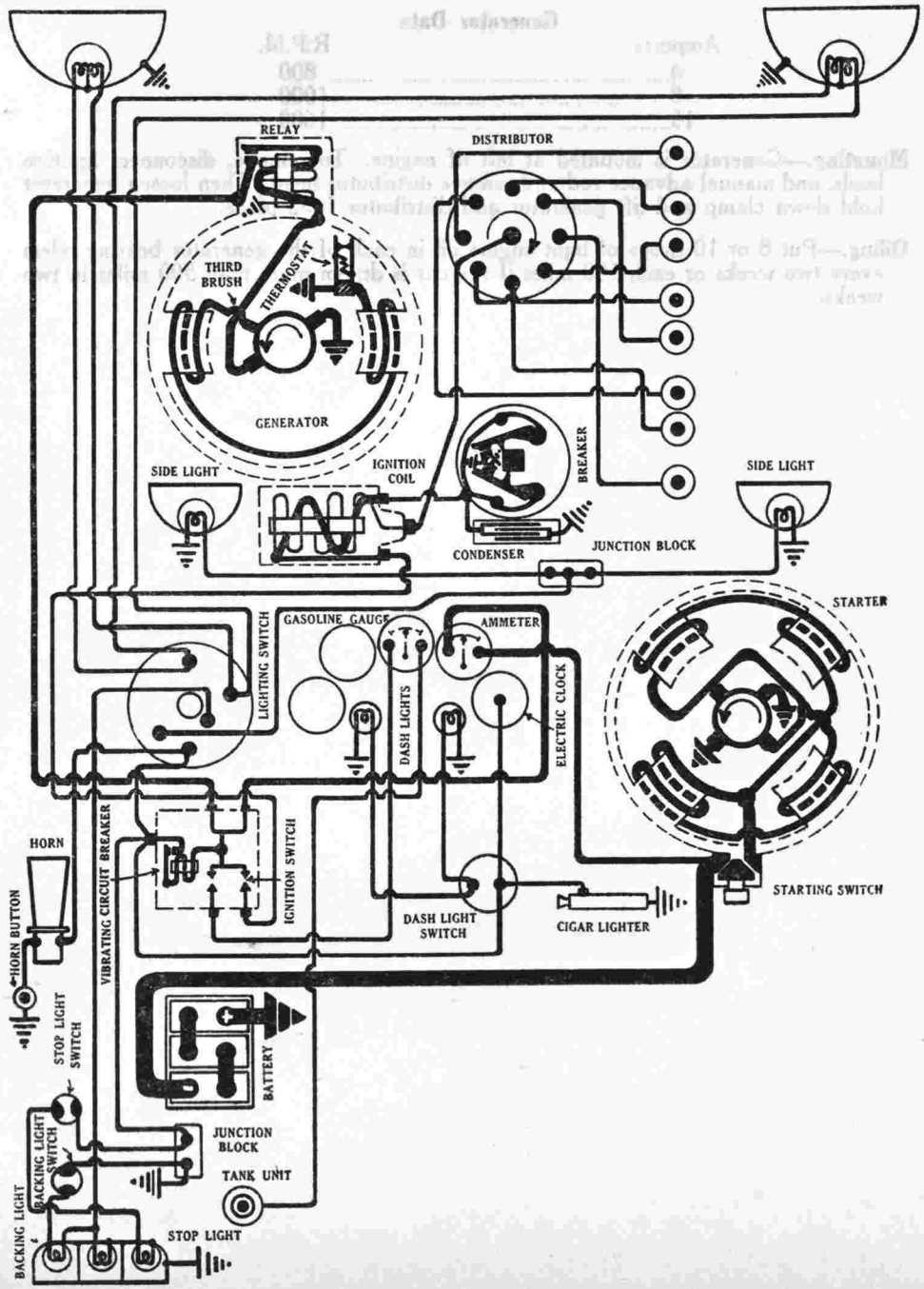
Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Caps are .020 inch.

STARTER:—Model 726-A. Starter is connected to the engine through a mechanical pinion shift and overrunning clutch. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension is 24-28 ounces each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570



MARMON

MODEL "L" (1927)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

Mounting:—Starter is flange mounted at right of engine. To remove starter disconnect starter cable and remove three flange mounting screws holding starter to housing. Then slide starter forward and lift from place.

Oiling:—Oilless bearings are used. They require no attention.

GENERATOR:—Model 949-F. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system in conjunction with a thermostat. Thermostat contacts open at 162°F cutting a resistance of .75 ohms into the shunt field circuit and reducing the output approximately 40 per cent. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Maximum charging rate of 19-21 amperes (cold)) is reached at 1450 R.P.M. of the generator armature or approximately 20 M.P.H

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.5	1450	9-12	7.5	2000

Shuntfield current is 4 amperes at 6 volts. Generator brush spring tension should be 14-18 ounces each.

Mounting:—Generator is cradle mounted at left of engine. To remove generator, disconnect generator lead. Then remove bolt from rubber coupling and remove nut from clamp strap stud. Then lift generator from place.

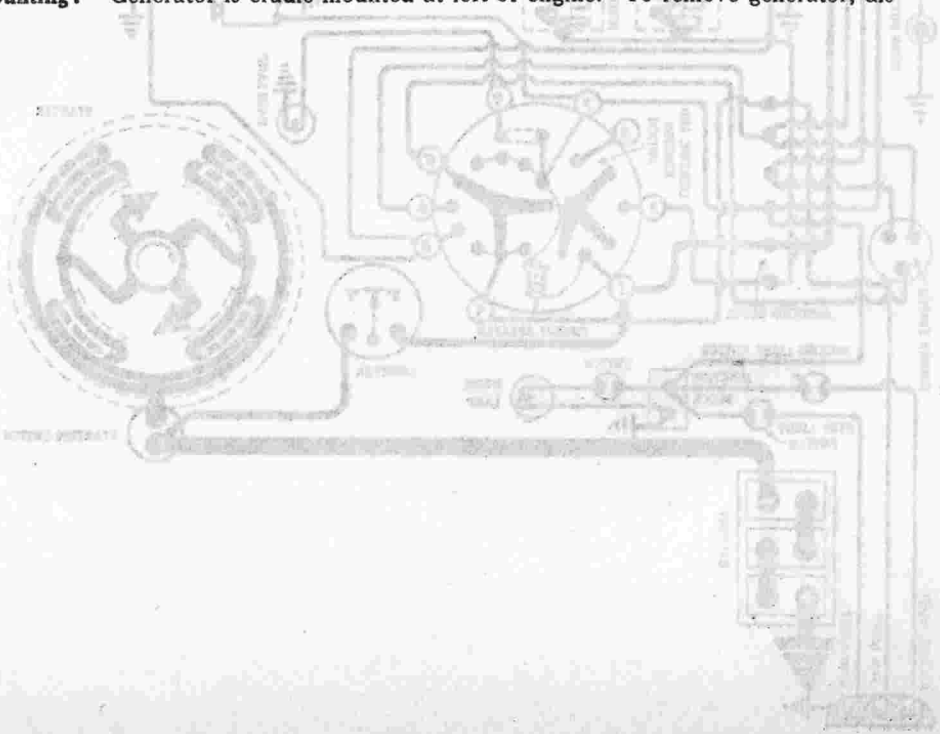
Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay closes at approximately 10 M.P.H. when the voltage of the generator reaches 7-7.5 volts and opens at 8 M.P.H. with a discharge current of 0-2.5 amperes. Charging current is 2 amperes at closing of contacts. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING:—Lighting switch is mounted on the lower end of the steering column. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament for dimming. Stop and backing lamps are each 6-8 volt, 21 cp. S. C. Tonneau, cowl, dome and corner lamps are each 6-8 volt, 3 cp. D. C. Side, dash and tail lamps are each 6-8 volt, 3 cp. S. C.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the cowl. It protects the lighting circuits. A current of 25-30 amperes will cause this device to operate. While vibrating the current is 10-15 amperes.

ACCESSORIES:—National gas gauge; Connecticut cigar lighter; National clock; Stewart vacuum gas pump.



MARMON

MODEL E-75 (1927-28)

DELCO-REMY GENERATNG, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 617-SHK, 6 volt. Starting capacity is 170 amperes for 20 minutes. Lighting capacity is 5 amperes for 32 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model 2178. Distributor No. 17047. Breaker contacts separate .020-.0275 inch. Resurface contacts with a fine, flat jeweler' sfile or on a medium hard oilstone. Double ignition is used. Two coils are used and each ignition circuit is electrically separated, although only one distributor is used. Each primary circuit is controlled by one breaker arm, both operating from a single cam. In setting breaker gaps, synchronize contacts so that they both open at the same instant. Distributor is of the semi-automatic type. Manual advance is 40°. Automatic advance begins at 550 R.P.M. and reaches a maximum of 22-26° at 2000 R.P.M. The tension of the breaker arm spring should be 16-20 ounces.

Mounting:—Distributor is mounted on the rear of the generator. To remove, remove distributor head and disconnect two primary leads and manual advance rod. Then remove hold down screw and lift unit from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Every six months repack the distributor gear compartment with medium heavy cup grease.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 7 teeth before top dead center as measured on the flywheel with the manual spark control lever in the fully advanced position. To set timing, crank engine until piston No. 1 reaches this position. Then loosen timing adjustment screw and turn cam until contacts begin to separate. Both contacts must separate at the same instant. Tighten the screw and replace rotor, making certain that rotor button is under the segments connected to the spark plugs in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—The spark plug diameters are 7/8-18 S.A.E. Gaps are .027-.032 inch.

Valve Timing:—INLET VALVES:—Head diameter, 2 inches; stem diameter, .373 inches; tappet clearance, .007 inch; two springs combined pressure, 85-95 pounds closed, 135-145 pounds open; intake opens 13° past top dead center and closes 48° past lower dead center.

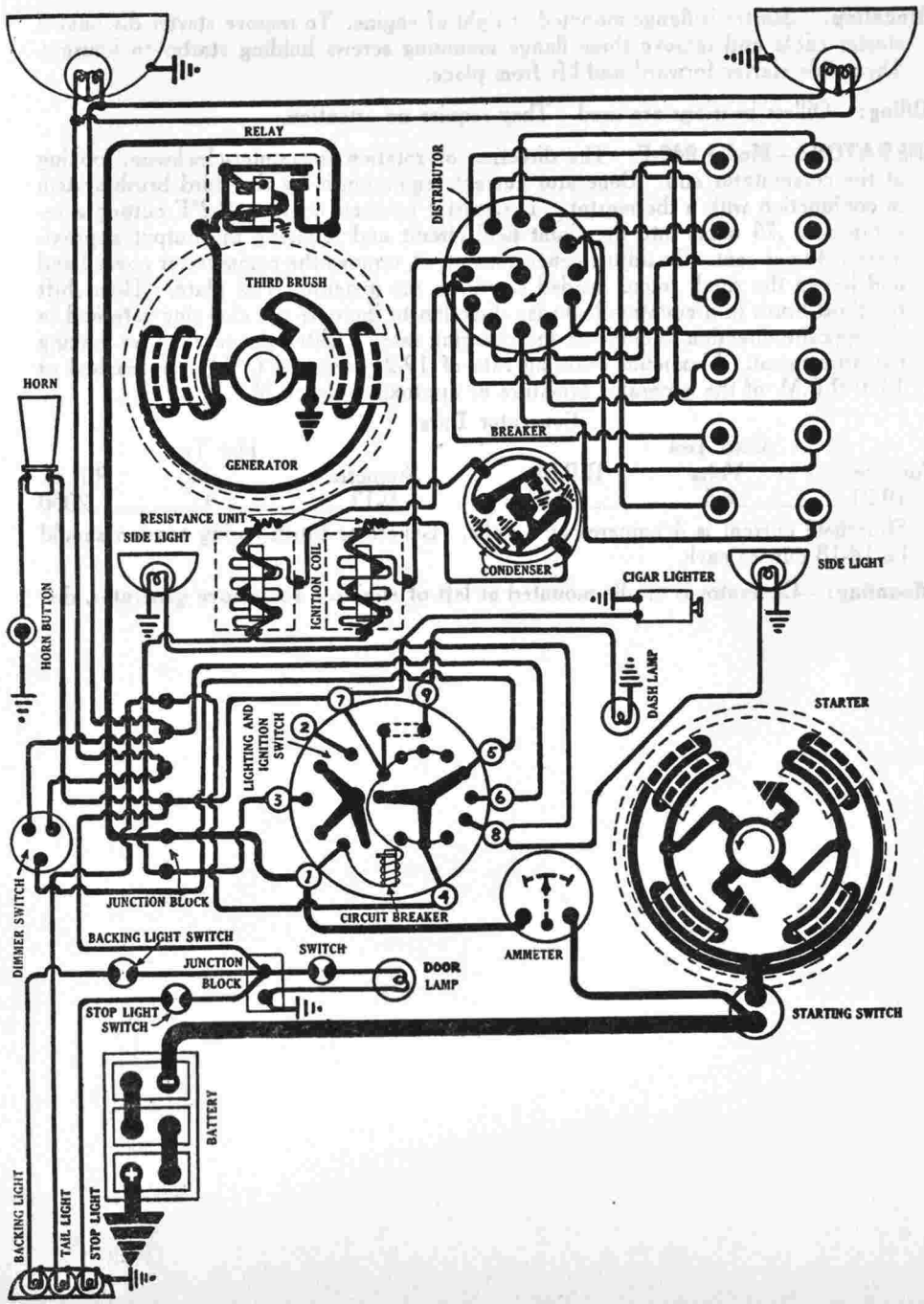
EXHAUST VALVES:—Head diameter, 2 inches; stem diameter, .372 inch; tappet clearance, .007 inch; two springs combined pressure, 85-95 pounds closed, 135-145 pounds open. Exhaust opens 38° before lower dead center and closes at 7° past top dead center. Stem guides are removable. No oversize valve stems are made.

STARTER:—Model 320. Starter is connected to the engine through a manually operated pinion shift incorporated in the starting switch. An over-running clutch is provided to prevent the engine driving the starter. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension is 2¼-2½ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	60
18.25 "	Lock	3.2	---

Mounting:—Starter is mounted at right of engine. To remove, disconnect pedal rod and return spring. Then remove two hold down screws and lift starter from place.



MARMON

MODEL E-75 (1927-28)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

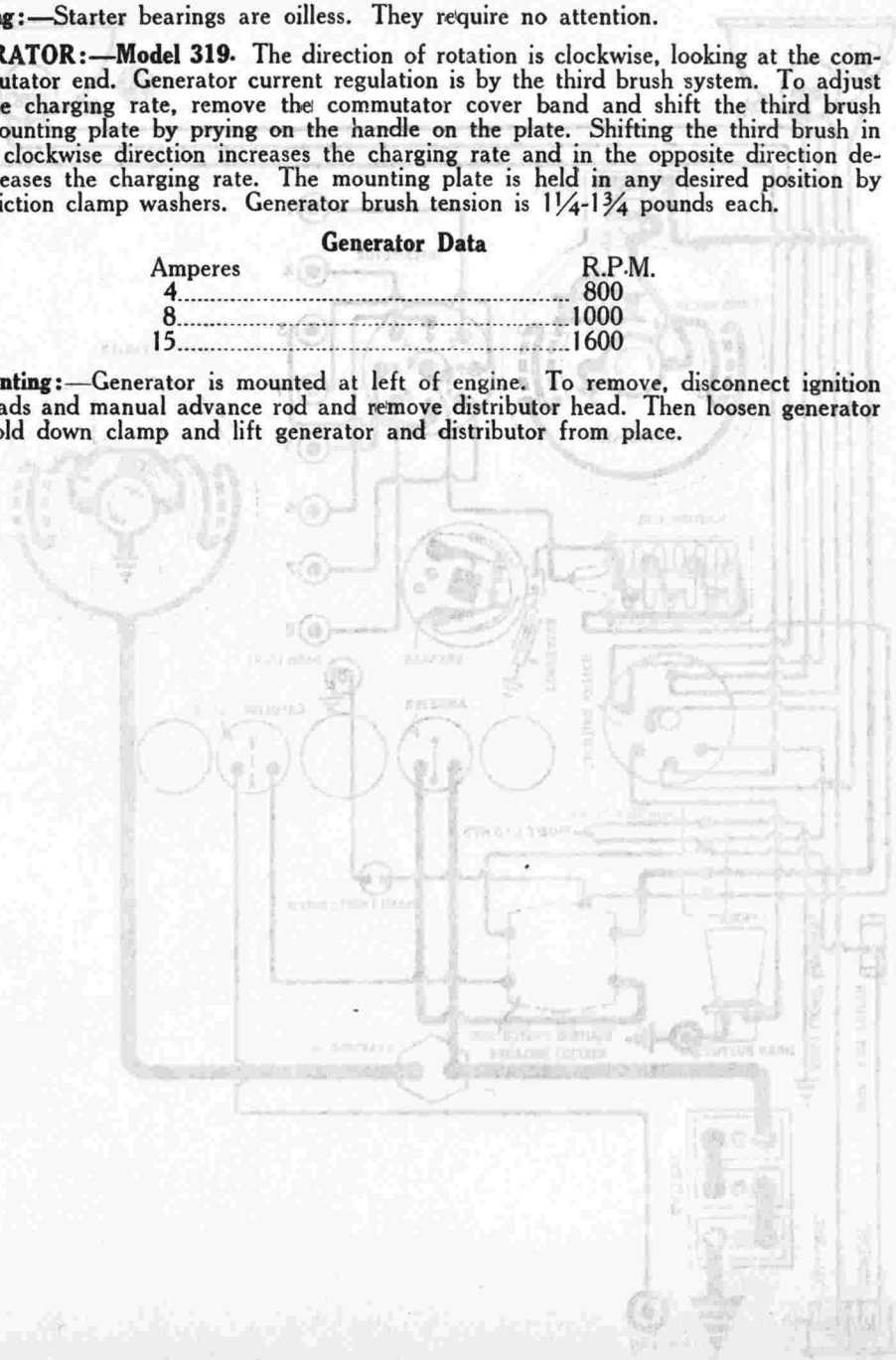
Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model 319. The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the charging rate, remove the commutator cover band and shift the third brush mounting plate by prying on the handle on the plate. Shifting the third brush in a clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. The mounting plate is held in any desired position by friction clamp washers. Generator brush tension is 1¼-1¾ pounds each.

Generator Data

Amperes	R.P.M.
4	800
8	1000
15	1600

Mounting:—Generator is mounted at left of engine. To remove, disconnect ignition leads and manual advance rod and remove distributor head. Then loosen generator hold down clamp and lift generator and distributor from place.



Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Relay is mounted on top of the generator. Relay closes when the voltage of the generator reaches 6.75-7.5 volts and opens with a discharge current of 0-3 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .009-.010 inch, contacts closed.

LIGHTING—Switch Model 1273. Head lamps are 6-8 volt, 21 cp. double filament twin beam. Stop and backing lamps are 6-8 volt, 21 cp. S.C. Tonneau, dome and corner lamps are 6-8 volt, 3 cp. D.C. Side and dash lamps are 6-8 volt, 3 cp. S.C.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the back of the switch. This device begins to operate when the current flow reaches 25-30 amperes and continues with a current flow of 10-15 amperes until the short circuit is removed.

ACCESSORIES:—Nagel electric gas gauge; Connecticut cigar lighter; Waltham clock.

MARMON

MODEL 68 (1928)

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 615JFK, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 120 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours. Battery is mounted under the driver's seat on the left side.

IGNITION:—Coil Model 525-C. Coil is mounted on the left side of the engine block. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

Distributor Model 658-C. Breaker contacts separate .022 inch. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until gap is .022 inch with breaker arm on lobe of cam. Breaker arm spring tension is 17-21 ounces. Breaker has two sets of contacts on a single four-sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval for the Marmon engine and it must be accurately set. (See Timing.) Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 500 R.P.M. of engine. Maximum automatic advance is 25 degrees reached at 2600 R.P.M. Total advance 45 degrees (engine).

Mounting:—Distributor is mounted on the top of the engine block. To remove distributor, disconnect primary lead and manual advance rod and remove distributor head with cables intact. Then remove manual advance stop screw in advance arm and lift distributor from place.

Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down one turn every 750 miles. Once each month remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light oil.

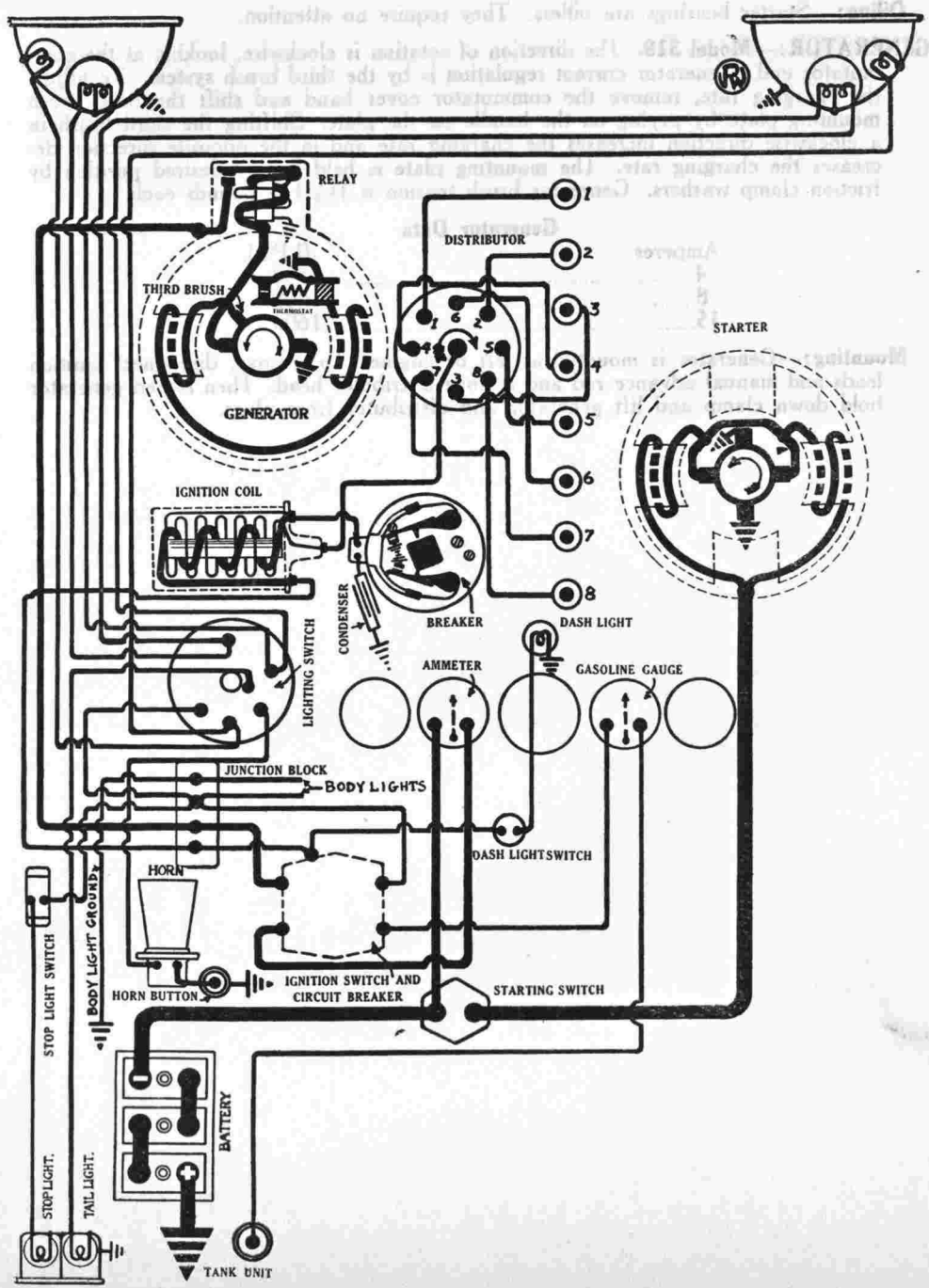
Timing:—Synchronization of Contacts. To synchronize contacts to secure correct firing interval use Delco-Remy tool, Part No. 820738, and follow directions on Page S-30. Contacts can be synchronized without use of the tool after distributor is timed to engine by cranking engine over 90 degrees from firing position of piston No. 1 when piston No. 6 will reach firing position. The second set of contacts should separate at this point. If they do not, loosen lock screws and turn eccentric adjusting screw until contacts begin to separate. Check contact gap with breaker arm on lobe of cam. If it is not within limits of .018-.024 inch, reset at .022 inch and repeat synchronizing operation.

Timing Distributor to Engine. Breaker contacts begin to separate when the piston entering power stroke reaches a position 2 teeth on the flywheel before top dead center with the manual advance lever fully advanced. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance spark control lever. Continue to crank engine until flywheel mark 'IGN' is opposite the pointer on the flywheel case. This mark is two teeth before the top dead center mark on the flywheel. Loosen the advance arm clamp screw and turn the distributor until the contacts begin to separate. Tighten the clamp screw and make certain that the segment opposite the rotor is connected to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 6-2-5-8-3-7-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1 15/32 inches; stem diameter, 5/16 inch; stem length, 4 61/64 inches. Tappet clearance, .006-.008 inch. Spring pressure, 70 pounds. Valve lift, 21/64 inch. Inlet valves open 6 degrees before top dead center and close 40 degrees after lower dead center.



MARMON

MODEL 68 (1928)

DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

EXHAUST VALVES:—Head diameter, 1 11/32 inches; stem diameter, 5/16 inch; stem length, 4 61/64 inches. Tappet clearance, .006-.008 inch. Spring pressure, 70 pounds. Valve lift, 21/64 inch. Exhaust valves open 40 degrees before lower dead center and close 6 degrees after top dead center. Valve stem guides are not removable. Oversize valve stems are not made.

STARTER:—Model 714-C. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
12 "	Lock	3.63	475

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove 3 flange mounting cap screws. Then pull starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light oil in the commutator end oiler every month or each 750 miles. The drive end bearing is oilless.

GENERATOR:—Model 949-X. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field combined with a thermostat. Thermostat contacts open at 162°F. cutting the resistance across the thermostat contacts in series with the shunt winding and reducing the output approximately 40%. To adjust generator output, loosen the small round-headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting the charging rate is 9-12 amperes (hot) reached at 2000 R.P.M. or 25 miles per hour.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
21	8.5	1450	12	7.5	2000

Motoring generator draws 6 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Generator brush spring tension is 14-18 ounces.

Mounting:—Generator is mounted at left of engine by special swinging bracket and is driven by the fan belt. To remove generator, disconnect lead and remove clamp nut on top front of generator. Swing generator toward engine and slip off fan belt. Remove two bolts from special bracket under generator and lift generator from place.

To Adjust Fan Belt. Loosen clamp bolt at top of generator. Swing generator out from engine until proper belt tension is secured. Tighten clamp bolt. Be careful not to make belt too tight. This will cause generator bearing trouble.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 750 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay contacts close at 575 R.P.M. or 10 M.P.H. when the generator voltage reaches 6.75-7.5 volts and open at 8 M.P.H. with a discharge current of 0-2.5 amperes. Charging current is approximately 2 amperes at closing of contacts. Contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Briggs and Stratton Switch, Model Special. Switch is located on lower end of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Stop and backing lights are each 6-8 volt, 21 cp. S.C. Mazda No. 1129. Dash and tonneau lights are each 6-8 volt, 3 cp. D.C. Mazda No. 64. Side, tail and dome lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

CIRCUIT BREAKER:—A vibrating circuit breaker is located on the back of the ignition switch. It begins to vibrate when the current reaches 25-30 amperes, limiting the current to 10-15 amperes until the short circuit is removed.

MARMON

MODEL 78 (1928)

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 615JFK, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 120 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours. Battery is mounted under the driver's seat on the left side.

IGNITION:—Coil Model 525-C. Coil is mounted on the left side of the engine block. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

Distributor Model 658-M. Breaker contacts separate .022 inch. Set contact gap with breaker arm on lobe of cam by loosening lock screw on stationary contact plate and turning eccentric adjusting screw until proper gap is obtained. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Breaker has two sets of contacts on a single four-sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval for the Marmon engine and it must be accurately set. (See Timing.) Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 40 degrees reached at 3000 R.P.M. Total advance 60 degrees (engine).

Mounting:—Distributor is mounted on special flange at left side of engine block. To remove distributor, disconnect primary lead and manual advance rod and remove head with cables intact. Then remove manual advance stop screw in advance arm and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one turn every month or each 750 miles. Once each month remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light oil.

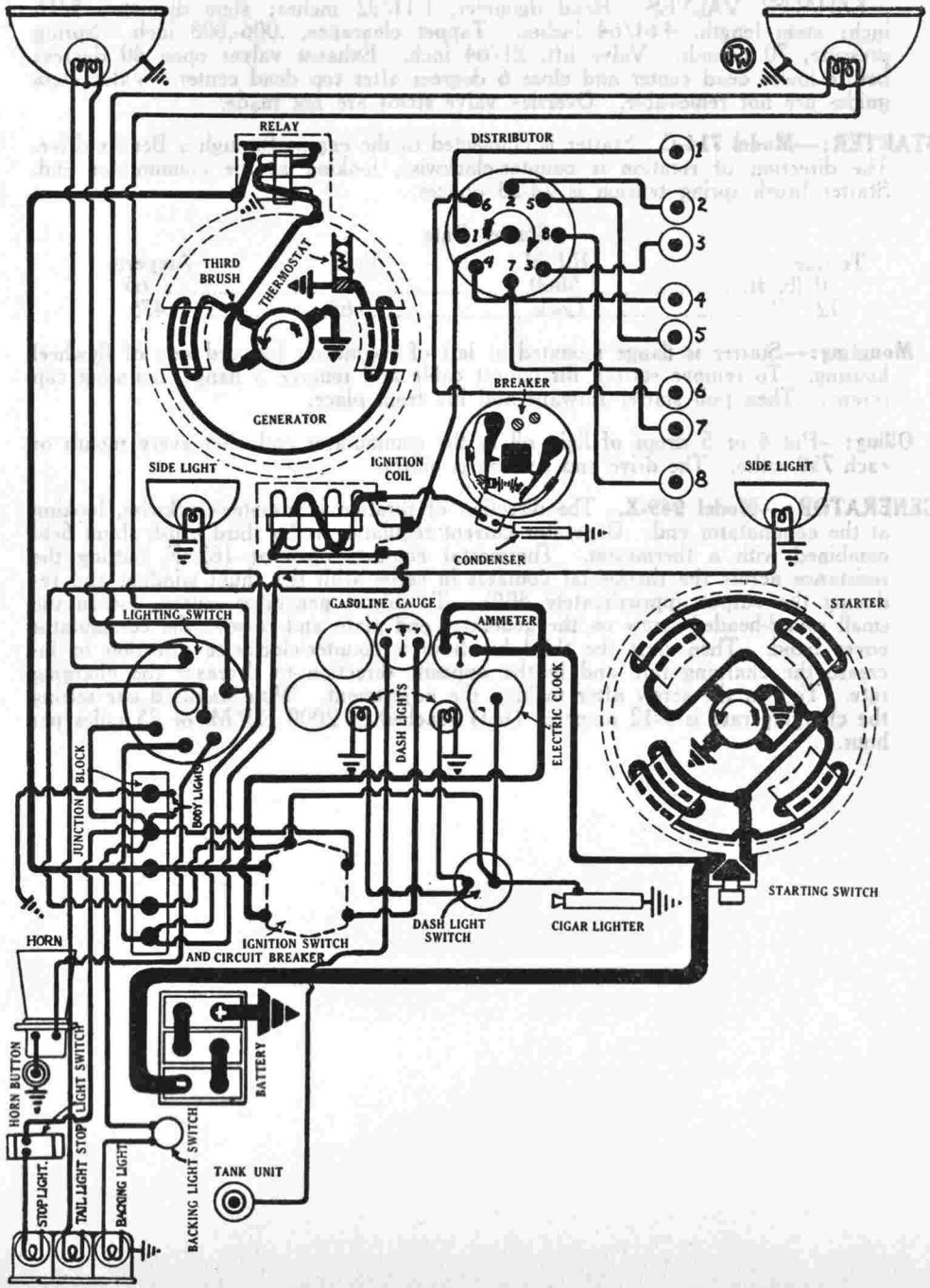
Timing:—Synchronization of Contacts. To synchronize contacts to secure correct firing interval use Delco-Remy tool, Part No. 820738, and follow directions on Page S-30. Contacts can be synchronized without use of the tool after distributor has been timed to the engine by cranking engine over 90 degrees from firing position of No. 1 piston when piston No. 6 will reach firing position. The second set of contacts should separate at this point. Loosen lock screws and turn eccentric adjusting screw until contacts begin to separate. Tighten the lock screws and check the contact gap. If it is outside limits of .018-.024 inch with breaker arm on lobe of cam, reset at .022 inch and repeat synchronizing operation.

Timing Distributor to Engine. Breaker contacts begin to separate when the piston entering power stroke reaches a position 5 teeth on the flywheel before top dead center with the manual advance lever fully advanced. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance spark lever. Continue to crank engine until the fifth tooth on the flywheel before the top dead center mark 'DC1-8' is opposite the indicator on the flywheel housing. Loosen the advance arm clamp screw and rotate the distributor until one set of contacts begin to open. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 6-2-5-8-3-7-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1 29/64 inches; stem diameter, 5/16 inch; stem length, 5 23/32 inches. Valve lift, 21/64 inch. Spring pressure, 130 pounds. Tappet clearance, .008 inch. Inlet valves open 6 degrees before top



dead center and close 40 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 17/64 inches; stem diameter, 5/16 inch; stem length, 5 23/32 inches. Valve lift, 21/64 inch. Spring pressure, 130 pounds. Tappet clearance, .008 inch. Exhaust valves open 40 degrees before lower dead center and close 6 degrees after top dead center. Valve stem guides are not removable. Oversize valve stems are not made.

STARTER:—Model 726-A. Starter is connected to the engine through a disc clutch and a manually operated pinion shift connected to the starting switch. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and pedal rod and remove nuts from 3 flange mounting bolts. Then pull starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light oil in the oiler on the commutator end of the starter every month or each 750 miles. The drive end bearing is oilless.

GENERATOR:—Model 949-F. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 162°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round-headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the charging rate is 12 amperes (hot) reached at 2000 R.P.M. or approximately 25 miles per hour.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
21	8.5	1450	9-12	7.5	2000

Motoring generator draws 6 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Generator brush spring tension is 14-18 ounces.

Mounting:—Generator is cradle mounted at left of engine and is driven by the fan belt. To remove generator, disconnect water pump drive coupling and remove nut from stud on generator strap. Then slip off fan belt and lift generator from place.

Fan Belt Adjustment. The tension of the fan belt must be sufficient to drive both the fan and generator without slipping. To tighten fan belt, loosen three cap screws in fan lock ring and rotate eccentric fan adjuster by means of a punch or pin inserted in the fan ring holes until the proper belt tension is obtained. Then tighten the 3 cap screws.

Oiling:—Put 4 or 5 drops of light oil in each of the generator bearing oilers every 750 miles or each month.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay closes at 575 R.P.M. or 10 M.P.H. when the generator voltage reaches 6.75-7.5 volts and opens at 8 M.P.H. with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Briggs and Stratton Switch, Special Model. Switch is mounted at lower end of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Stop and backing lights are each 6-8 volt, 21 cp. S.C. Mazda No. 1129. Side, dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63. Dome and tonneau lights are each 6-8 volt, 3 cp. D.C. Mazda No. 64.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the back of the ignition switch. It begins to vibrate at 25-30 amperes and continues limiting the current to 10-15 amperes until the short circuit is removed.

MAXWELL

MODEL 25 (1915-16-17)

Simms-Huff Starting and Lighting System
Simms Magneto Ignition

Battery.—Battrey is 12 volt, 35 ampere-hour. The negative (—) terminal of one set of three cells is permanently grounded. The negative (—) terminal of the other half of the battery is grounded when the starting switch is in the generating position.

Ignition.—Magneto breaker contacts should open .015 inch.

Care.—Clean contacts with gasoline frequently. Should contacts become badly burned or pitted, they should be resurfaced with a very fine, flat jeweler's file or a small strip of worn No. 00 sand paper.

Timing.—The breaker contacts should begin to separate when the upper dead center mark on the flywheel is 1¼ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

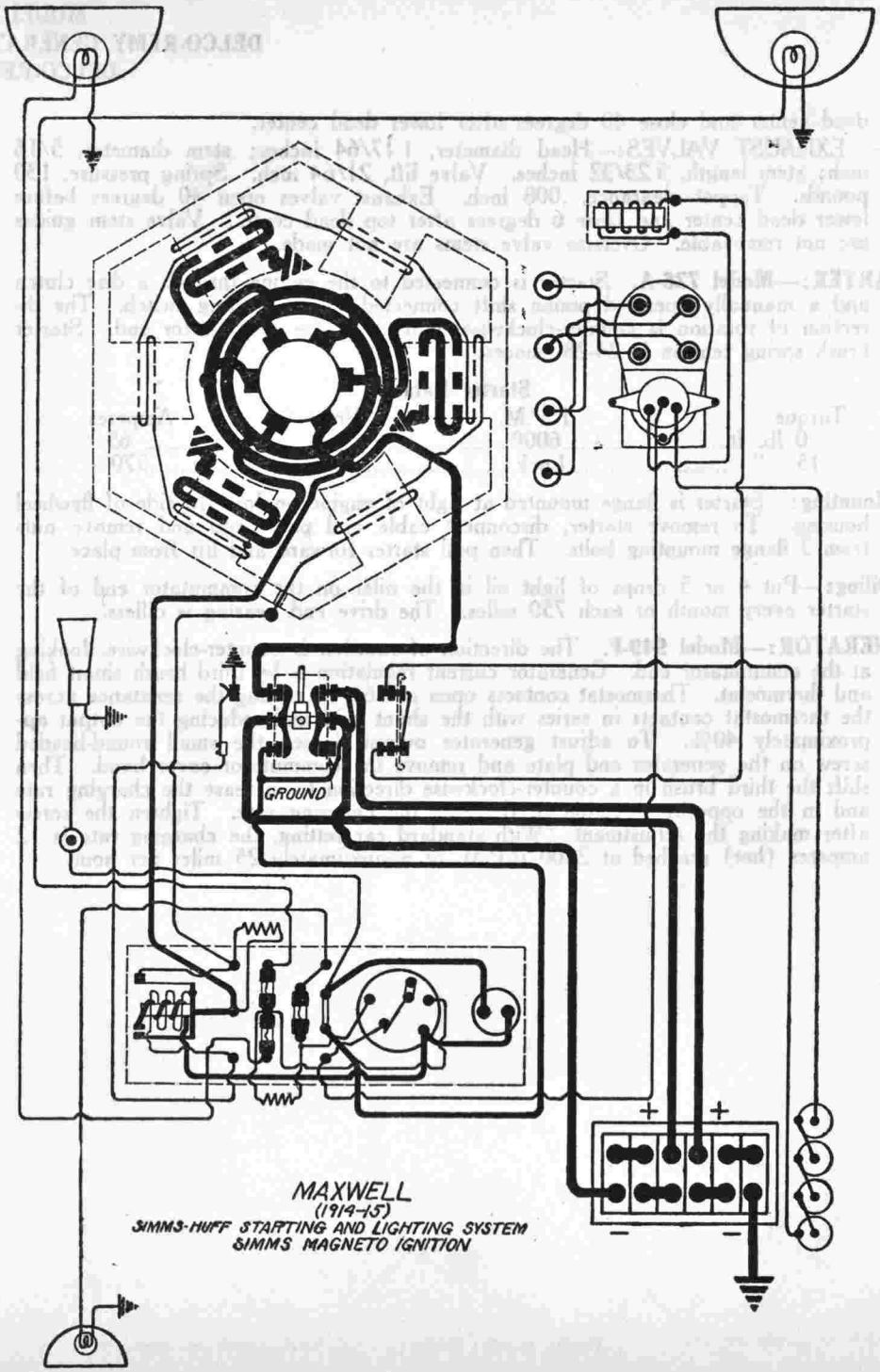
Spark Plug Gaps.—The proper spark plug gap is .020 inch to .023 inch, no wider.

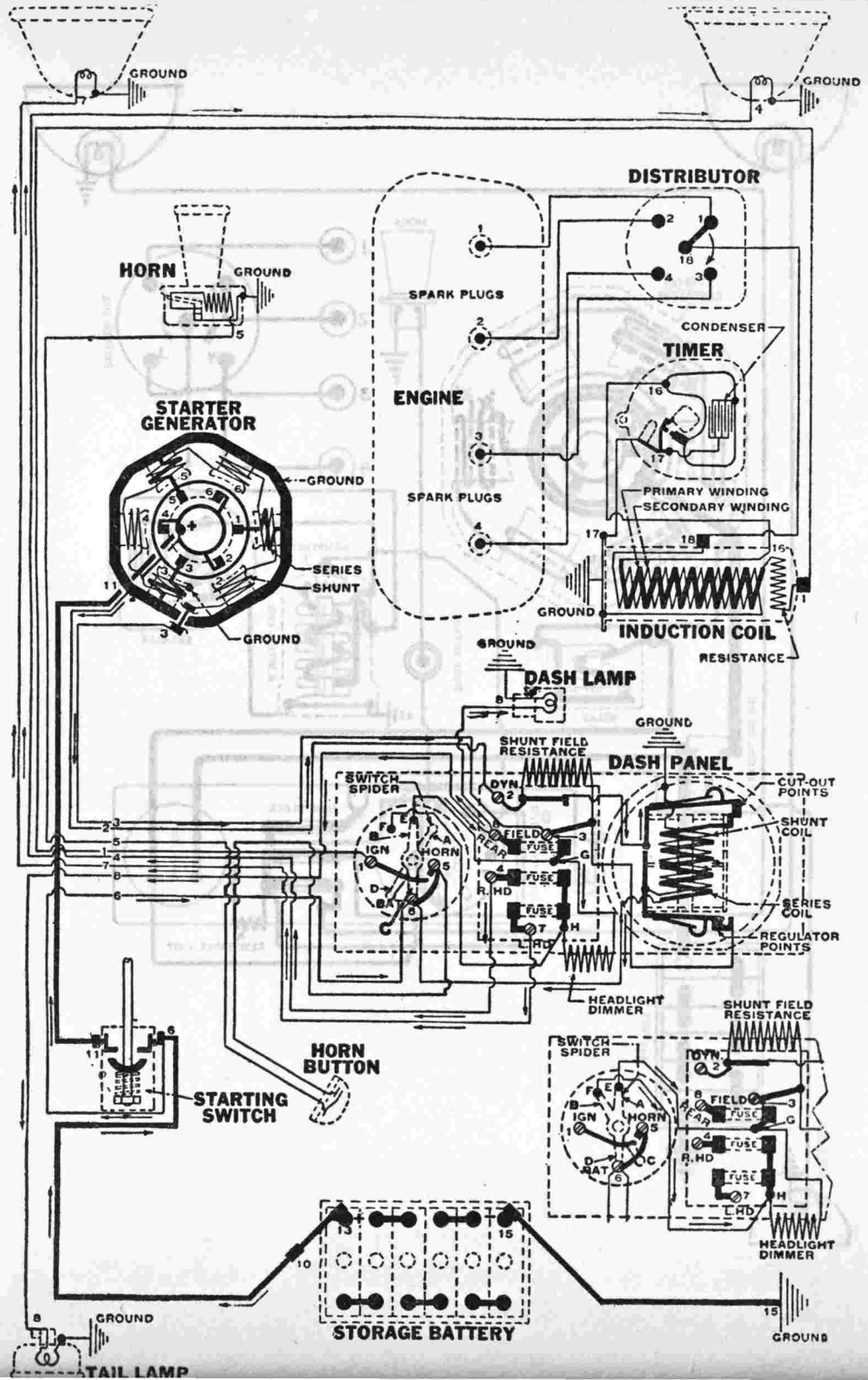
Oiling.—Put 3 or 4 drops of light machine oil in each of the magneto oilers every month If the machine is driven more than 1000 miles per month, the oiling must be done every 1000 miles.

Starter.—The motor and generator are combined into one unit. When the starting pedal is depressed the pinion on the rear end of the motor-generator shaft is drawn into mesh with the flywheel gear and the two halves of the battery connected in series and to the motor windings of the unit. The motor-generator then runs as a motor, cranking the engine. When the starting pedal is released, a spring draws the pinion out of mesh and the armature is driven as a generator by the fan belt. The motor should develop 24 foot pounds lock torque. The starting switch is also provided with two terminals to connect the dry cells into the magneto circuit to aid starting. The machine acts as a cumulative-compound wound motor, that is the current flows through both the shunt and the series windings, producing increased torque. There are three series coils, wound on alternate poles. Each coil is grounded to the frame at its inner end.

When the starting pedal is released, the switch automatically connects the two halves of the battery in parallel, thus forming a 6 volt battery. Generator operates at 6.5-7 volts pressure.

Generator.—The voltage regulation is by a combined vibrating regulator and reverse series field. The regulator is mounted on the dash. The maximum charging rate should be 10-15 amperes, charging the two halves of the battery in parallel. This rate should be reached at 16-18 miles per hour. If the regulator contacts stick, or fail to operate properly, a very high charging rate will be indicated on the ammeter. Should the ammeter indicate the limit on the "Discharge" side of the scale when the engine is stopped, the relay contacts are probably sticking.





MAXWELL

Model 25 (1918 And Early 1919)

Simms-Huff Starting and Lighting System

Atwater Kent Ignition

Battery.—Battery is 12 volt, 35 ampere hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts should separate .005 inch to .008 inch. They are made of tungsten. They will operate properly though quite rough. Should they become burned or corroded, affecting the ignition, remove and resurface them by drawing across a piece of fine emery cloth laid on a flat surface, as on the bed of a drill press, finishing on a hard oil stone.

Timing.—Break should occur when the upper dead center mark on flywheel is 1¼ inches past the indicator, spark lever fully retarded.

Spark Plug Gaps.—The spark plug gaps should be .027 inch to .030 inch.

Firing Order.—The firing order is 1, 3, 4, 2.

Oiling.—Every two weeks put several drops of light engine oil in the oil hole which is exposed when distributor cap is removed. At the same time put a very small amount of vaseline on the cam, applying with a toothpick. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Starter-Generator.—Starter is connected to the engine through a pinion shifted mechanically by the operator. It should develop 24 pound-feet lock torque. Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current.

Generator.—Current regulation is by reverse series field and vibrator regulator. Charging rate should be 12 amperes when running at 1200 R. P. M. Maximum charging rate should be 15 amperes. If the ammeter reading falls off as the engine speed is increased, it is an indication that the belt is slipping and requires adjustment of tension. On generators below No. 27,000, the resistance of the shunt fields should be 6.5 ohms, and on machines with serial numbers above 27,000, it should be 4.8 ohms, providing there are no grounds or short circuits in the windings. Running freely as a motor the unit should draw 7 amperes at 6 volts pressure. Higher current indicates damp, grounded or short circuited windings or mechanical obstructions reducing the speed. Less current indicates defective connections, dirty brushes or dirty commutator.

Oiling.—Put several drops of light engine oil in each of the motor-generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay-Regulator.—Relay and regulator are combined and are mounted on the rear of the dash panel. The relay, which is of the indicating type, should close when generator voltage reaches 14 volts. Two carbon contacts operate in parallel with the main relay contacts, which are of copper. It is important that the copper contacts separate before the carbon contacts, so that no arcing can take place at the former. If they do not, "sticking" of the relay or failure to open will result. If maximum output does not come up to 15 amperes at high engine speeds, make certain that generator drive-belt is not slipping and that commutator and brushes are clean and in good contact before adjusting regulator. Charging rate may then be increased by increasing spring tension of regulator armature (moving member). If output exceeds 15 amperes at high speeds, the regulator contacts are not opening as they should and spring tension should be decreased. Clean contacts by drawing a piece of soft paper between them.

Lamps.—Head lamps are 12-16 volt, 21 cp. Tail lamp is 12-16 volt, 2 cp. Dash lamp is 12-16 volt, 2 cp. On 1918 cars head lamps are 12-16 volt, 24 cp.

FUSES:—Fuses are 20 amperes.

MAXWELL

MODEL 25 (LATE 1919)

SIMMS HUFF GENERATING, STARTING SYSTEM
ATWATER KENT IGNITION

BATTERY:—Prest-O-Lite. Type 127-WHN. 12 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 55 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 9 hours.

IGNITION:—Type CC. Breaker contacts separate .006-.008 inch. They are made of tungsten. Resurface contacts with a fine flat jeweler's file or on a medium hard oilstone.

Oiling:—Remove the distributor cap and put 3 or 4 drops of light oil in the exposed oilhole every two weeks or each 500 miles. Put a small amount of vaseline on the face of the breaker cam every month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-3-4-2.

SPark Plugs:—Spark plug gaps are .025 inch.

STARTER-GENERATOR:—Model SMS-2. Starter and generator are combined in one unit. Starter is connected to the engine through a mechanical shift operated by the driver. Starter cranks the engine at 150 R.P.M. drawing 60 amperes at 12 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	12	7
4 "	650	12	60
16 "	Lock	10	200

GENERATOR:—The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush shunt field combined with the bucking resistance of the current flowing through the starter windings. The generator field is wound in two sections of three field coils each connected in parallel to the third brush or control brush which is mounted between two of the main brushes. The control brush is not connected to either of the main brush rings. To adjust generator output, move the control brush toward the nearest positive main brush or counter-clockwise to increase the charging rate and in the opposite direction to decrease the charging rate. Maximum charging rate is 10-12 amperes reached at 1750-1900 R.P.M.

Generator Data

Amperes	Volts	R.P.M.
1.5	14.5	1400
10-12	—	1750-1900
10	—	3000

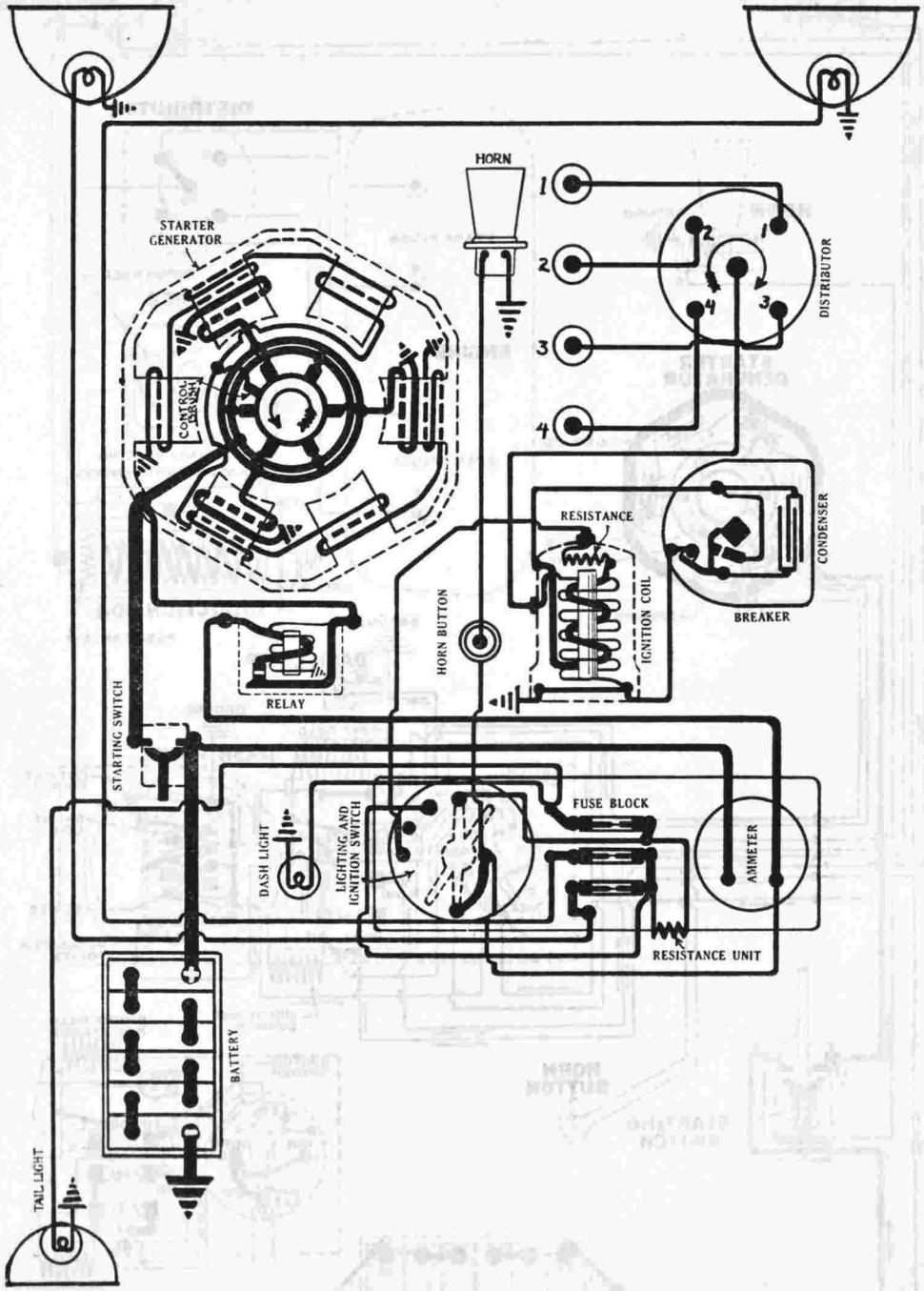
Motoring generator draws 7 amperes at 12 volts.

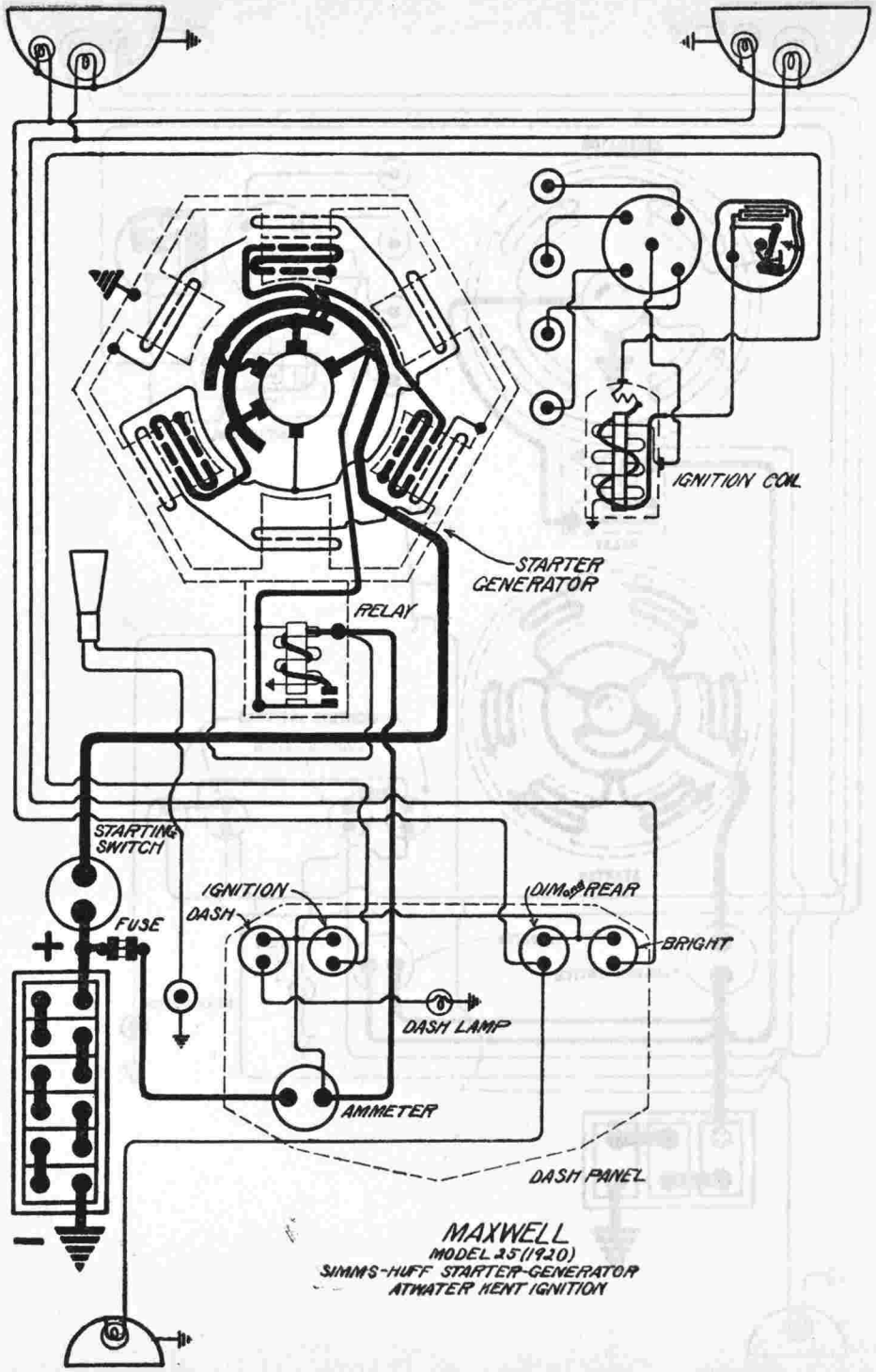
Oiling:—Put 5 or 6 drops of light oil in each of the starter-generator oilers every two weeks or each 500 miles.

RELAY:—Relay is mounted on the starter-generator. Relay closes at 1350--1400 R.P.M. or 11-13 M.P.H. when generator voltage reaches 14.5 volts and opens at 10 M.P.H. or 1300 R.P.M. with a discharge current of 0-1 amperes. Relay contacts separate .025 inch. Air gap is .035 inch with contacts closed.

LIGHTING.—Briggs and Stratton Switch Panel No. 1440. Head lights are 12-16 volt, 21 cp. S.C. Dimmer lights are 12-16 volt, 4 cp. S.C. Dash and tail lights are each 12-16 volt, 2 cp. S.C.

FUSES:—Lighting fuses on switch panel are 20 amperes.





MAXWELL

MODEL 25 (1920). SERIAL NOS. 266,801 TO 294,601

SIMMS-HUFF GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY.—Prest-O-Lite, Type 127-WMN, 12 volt, 35 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Type CC. Breaker contacts separate .006 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Remove the distributor cap every two weeks and put 4 or 5 drops of light engine oil in the oil hole exposed. Put a small amount of vaseline on the cam, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER-GENERATOR.—Model SMS-3. Starter and generator are combined to form a single unit. The unit is connected to the engine through a pinion shifted by the operator when operating as a starter, and is driven by the fan belt when operating as a generator. Running freely, starter takes 5 amperes at 13 volts, armature revolving at 1110 R.P.M.

GENERATOR.—Generator current regulation is by the third brush system. Maximum current output is 12 amperes, reached at 1750-1900 R.P.M. of the armature or 15-20 miles per hour. Charging rate reduces to 10 amperes at 3000 R.P.M. of the armature or 30 miles per hour.

OILING.— Put 5 or 6 drops of light engine oil in the starter-generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 11-13 miles per hour or 1350-1400 R.P.M. of the armature and opens at 10 miles per hour or 1300 R.P.M. of the armature. Relay contacts separate .025 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 12-16 volt, 21 cp. Dimmer lamps are 12-16 volt, 4 cp. Dash and tail lamps are 12-16 volt, 2 cp.

FUSES.—Fuse is 20 ampere.

MAXWELL

MODEL 25 (1920). SERIAL NOS. 294,601 UP
SIMMS-HUFF GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY.—Prest-O-Lite, Type 613-WHN, 87.5 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Type CC. Breaker contacts separate .006 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oilstone.

OILING.—Remove the distributor cap every two weeks and put 4 or 5 drops of light engine oil in the oil hole exposed. Put a small amount of vaseline on the cam, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1¼ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .027 inch.

STARTER.—Type B. Starter is connected to the engine through a Bendix drive. Direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 170-200 R.P.M., taking 130 amperes.

Starter Data

Torque	R.P.M.	Amperes	Volts
0 lb. ft.	4000	50-60	6.0
1.65 lb. ft.	1400	140	5.0
13-16 lb. ft.	Lock	600	4.1

Brush tension is 2½ to 3½ pounds.

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month

GENERATOR.—Type G. Generator current regulation is by the third brush system. Direction of rotation is counter-clockwise, looking at the commutator end. Maximum charging rate is 15 amperes, reached at 1500 R.P.M. of the armature, or 22-25 miles per hour.

Generator Data

Amperes	Hot Test	R.P.M.	Amperes	Cold Test	R.P.M.
0		600	0		560
12		1500	15		1500

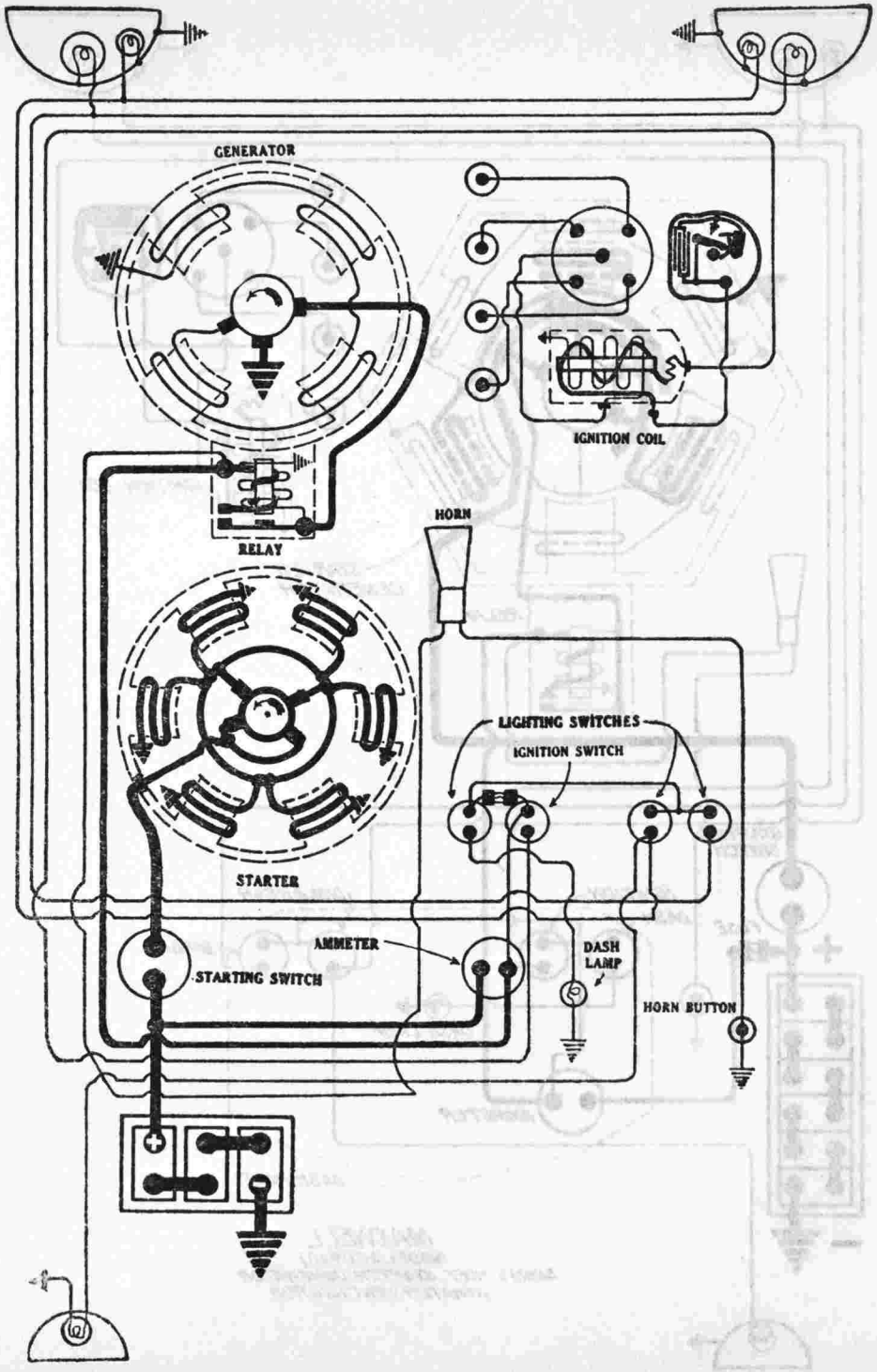
Field current is 3 amperes at 6 volts. Brush tension of all the brushes is 1 to 2 pounds. Charging rate is varied by adjustment of the third brush setting. Move the third brush in the direction of armature rotation to increase the charging rate and in the opposite direction to decrease the charging rate.

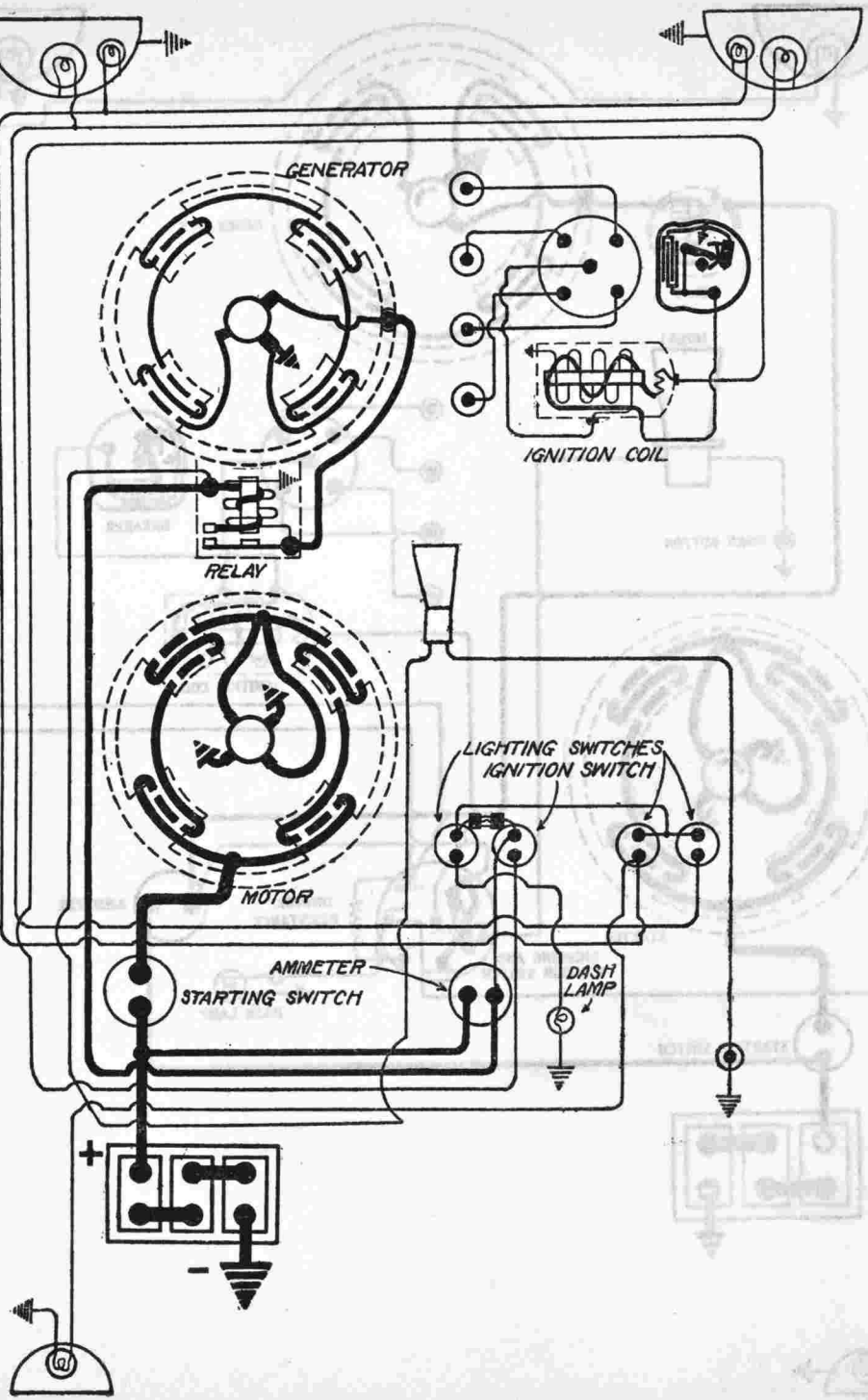
OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 500-550 R.P.M. of the armature and opens at 7-8 miles per hour or 450-500 R.P.M. of the armature. Relay contacts separate .025 inch. Air gap between relay armature and coil core is .040 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Fuse is 20 ampere.





MAXWELL

MODEL 25 (1920). SERIAL NOS. 294,601 UP

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

ATWATER KENT IGNITION

BATTERY.—Prest-O-Lite, Type 613-WHN, 6 volt, 87.5 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Type CC. Breaker contacts separate .006 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Remove the distributor cap every two weeks and put 4 or 5 drops of light engine oil in the oil hole exposed. Put a small amount of vaseline on the cam, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1¼ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .027 inch.

STARTER:—Model No. MH-1029. Starter is connected to engine through a Bendix drive. Starter cranks the engine at 150 R.P.M., taking 120-150 amperes.

Starter Data

Torque	R.P.M.	Amperes
2 lb. ft.	1280	135
6 lb. ft.	600	275
8 lb. ft.	400	335
10 lb. ft.	180	390
12 lb. ft.	Lock	500

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR:—Model No. GJ-1031. Generator current regulation is by third brush system. Maximum current output is 12-16 amperes, reached at 1400-1700 R.P.M. of the armature or 20-25 miles per hour.

Generator Data

Amperes	Cold Test R.P.M.	Amperes	Hot Test R.P.M.
0	500	0	580
8	750	6	840
12	960	9	1050
16	1400	12	1360
16.5	1700	12.7	1700
12	3400	10	3400

Above readings are obtained with generator charging a battery of 1.300 solution. Move the third brush in the direction of armature rotation to increase the charging rate and in the opposite direction to decrease the charging rate. Reseat the brush after adjusting position.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 500-600 R.P.M. of the armature and opens at 6-8 miles per hour or 450-500 R.P.M. of the armature. Relay contacts separate .025 inch. Air gap between relay armature and coil core is .040 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

MAXWELL

MODEL 25 (1921-22)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY.—Prest-O-Lite, Type 613-WHN, 87.5 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Type CC. On models using C.C. breaker head the contacts separate .008 to .010 inch, while models using type 46 breaker head require .016 to .018 inch opening. The contacts are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the fiat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Remove the distributor cap every 1000 miles and put 4 or 5 drops of light engne oil in the oil hole exposed and put a small amount of vaseline on the cam, applying with a tooth pick.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1¼ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER:—Model MG-1021. Starter is connected to engine through a Bendix drive. Direction of rotation is counter-clockwise looking at the commutator end. Starter cranks the engine at 120-150 R.P.M. taking 110-130 amperes.

Starter Data

Torque	R.P.M.	Amperes
2 lb. ft.	1280	135
6 lb. ft.	600	275
8 lb. ft.	400	335
10 lb. ft.	180	390
12 lb. ft.	Lock	500

Brush tension is 2 pounds.

Oiling.—Put 5 or 6 drops of light engine oil n the starter oilers every month.

GENERATOR:—Model GJ-4004. Generator current regulation is by third brush system. Direction of rotation is counter-clockwise, looking at the commutator end. Maximum current output is 12 to 16 amperes, reached at 1300 R.P.M. or 25 miles per hour.

Generator Data

Hot Test				Cold Test		
Amperes	R.P.M.	Volts		Amperes	R.P.M.	Volts
0	600	6.9	Cuts in	0	540	6.9
4.6	800	7.4		7.0	800	7.6
8.2	1000	7.8		10.7	1000	8.0
10.4	1200	8.1		13.2	1200	8.4
12.3	1800	8.3	Peak	16.0	1800	8.5
11.9	2200	8.2		15.6	2200	8.45

The brush tension is 1¼ pounds.

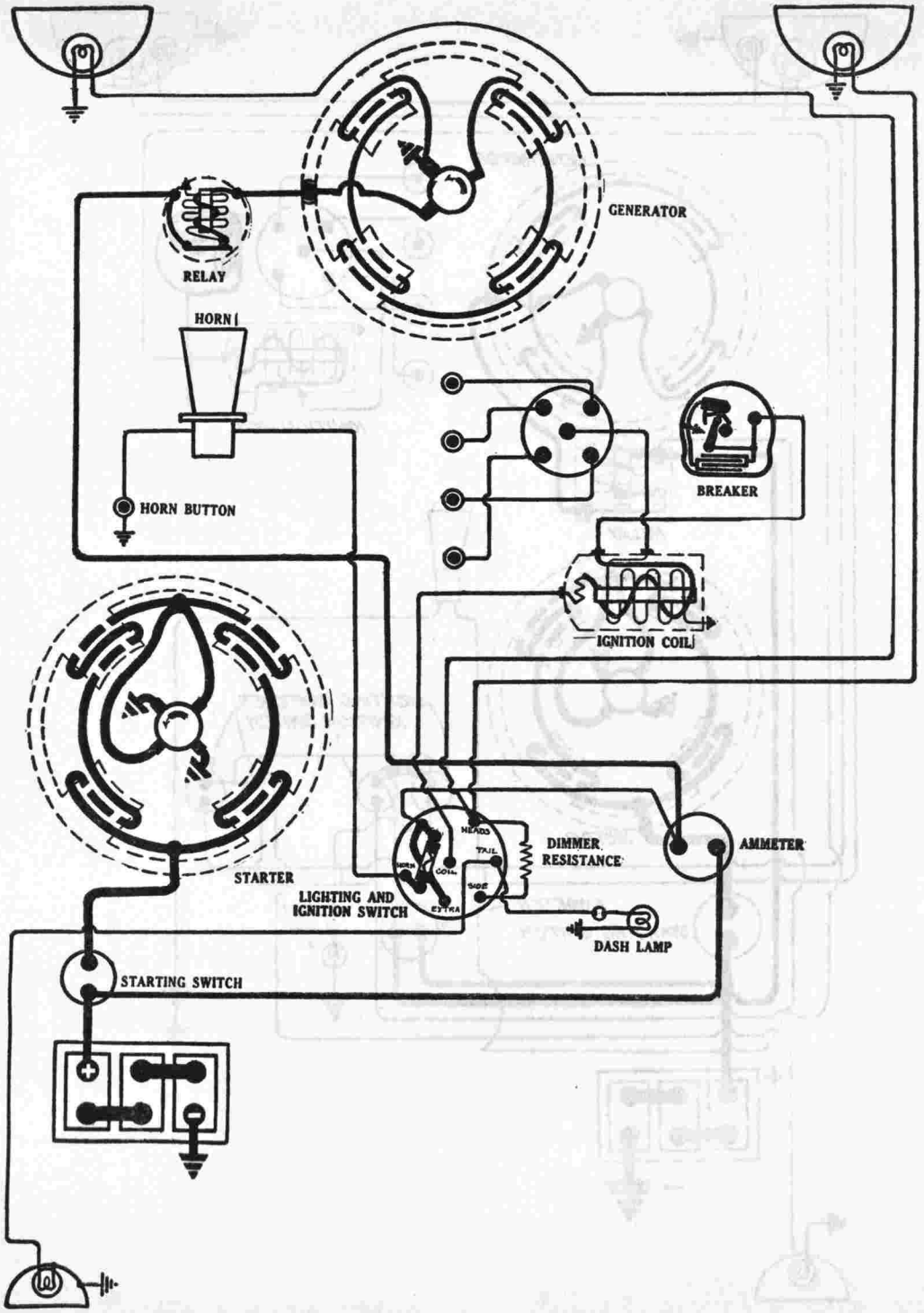
Move the third brush in the direction of armature rotation to increase the charging rate and in the opposite direction to decrease the charging rate. Reseat the brush after adjusting position.

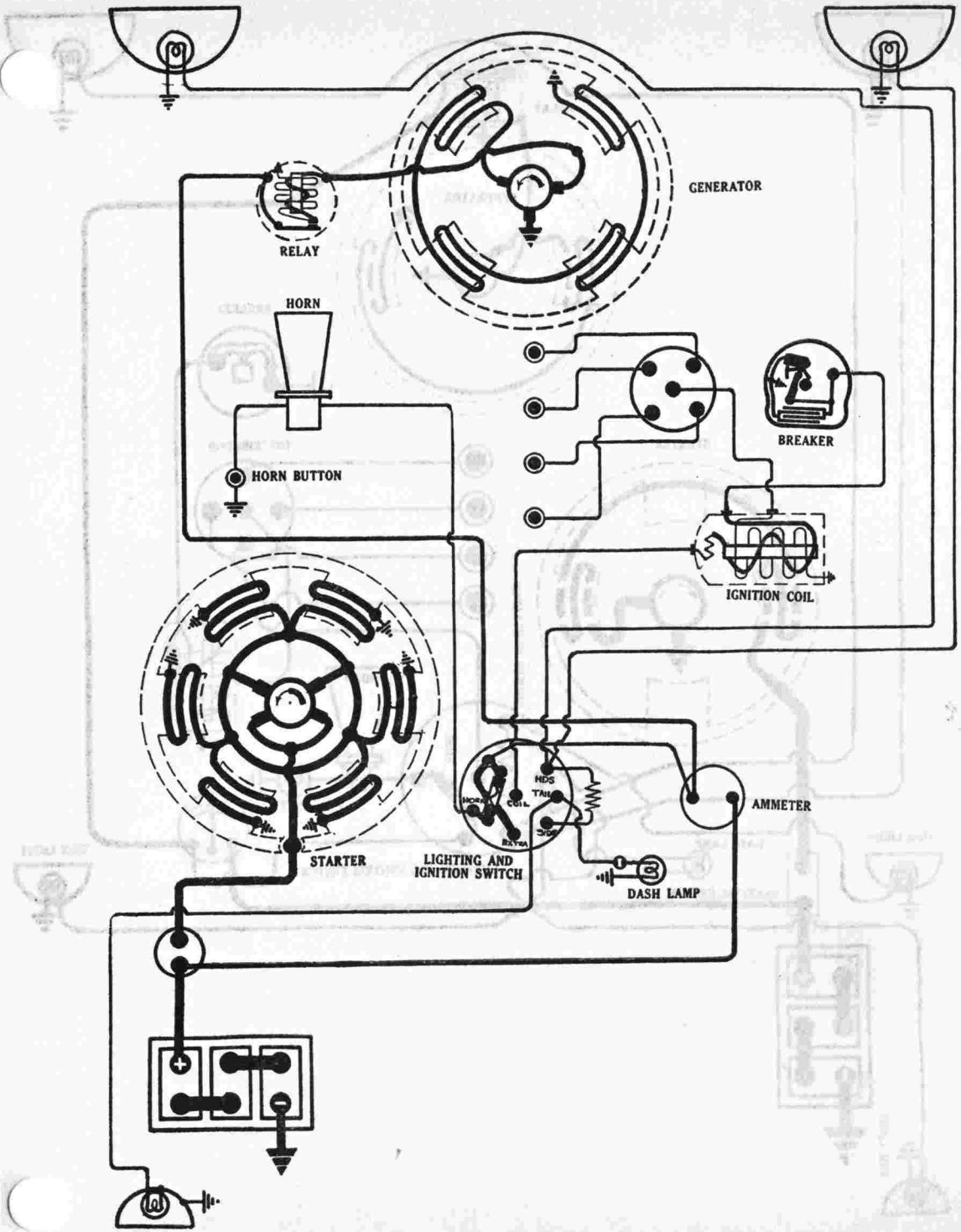
Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes when the voltage of the generator reaches 6.5 to 7.5 volts, and opens when there is a discharge current of 0 to 2 amperes. Relay contacts separate .025 inch. Air gap between the relay armature and coil core is .040 inch. Clean relay contacts by drawing unglazed paper betewen them. If badly burned or pitted resurface them with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting them into service.

LAMPS.—Head lamps are 6-8 volt 21 cp. Dash and tail lamps are 6-8 volt 2 cp.

FUSES.—Fuse is 20 ampere.





MAXWELL

MODEL 25 (1921-22)

SIMMS-HUFF GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY.—Prest-O-Lite, Type 613-WHN, 87.5 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Type CC. On models using CC breaker head the contacts separate .008 to .010 inch, while models using type 46 breaker head require .016 to .018 inch opening. The contacts are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Remove the distributor cap every 1000 miles and put 4 or 5 drops of light engine oil in the oil hole exposed, and put a small amount of vaseline on the cam, applying with a toothpick.

Timing.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1¼ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Type B. Direction of rotation is counter-clockwise looking at the commutator end. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 170-200 R.P.M. taking 130-150 amperes.

Starter Data

Torque	R.P.M.	Amperes	Volts
0	4000	50-60	6.0
1.65	1400	140	5.0
13-16	Lock	600	4.1

The brush tension is 2½ to 3½ pounds.

Oiling.—Put 3 or 4 drops of light engine oil in the commutator end oiler every 1000 miles.

GENERATOR.—Type GL. Generator current regulation is by the third brush system. The direction of rotation is counter-clockwise, looking at the commutator end. Maximum charging rate is 14.3 amperes reached at 1500 R.P.M. of the armature, or 21 miles per hour.

Generator Data

Hot Test				Cold Test		
Amperes	R.P.M.	Volts		Amperes	R.P.M.	Volts
0	6.7	600	Cuts in	0	6.7	580
7	7.8	900		8.8	8.0	900
11.6	8.2	1200		13.2	8.4	1200
12.8	8.3	1500		14.3	8.5	1500
7.8	7.9	2500		10.0	8.1	2500

Move the third brush in the direction of armature rotation to increase the charging rate, or in the opposite direction to decrease the charging rate. The brush tension is 1 to 2 pounds. Shunt field should draw 3 amperes at 6 volts.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every 1000 miles.

RELAY.—Relay closes when the voltage of the generator reaches 6.5 to 7.5 volts, and opens when there is a discharge current of 0 to 2 amperes. Relay contacts separate .025 inch. Air gap between the relay armature and coil core is .040 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt 21 cp. Dash and tail lamps are 6-8 volt 2 cp.

FUSES.—Fuse is 20 ampere.

MAXWELL

MODEL 25 (1922) "GOOD" MODEL (1923-24)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY:—Westinghouse, Type 6-OB-13. 6 volt, 105 ampere hour. The starting capacity is 125 amperes for 20 minutes. The lighting capacity is 5 amperes for 21 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 284-L, Distributor Model No. 369C. Breaker contacts separate .020 to .025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, resurface them on a medium hard oilstone.

Oiling.—Fill distributor grease cup with soft grease and turn down two or three turns once a month. If car is driven over 1000 miles in a month, this attention must be given once to every 1000 miles.

Timing.—Contact points begin to separate when No. 1 piston is 3/64 of an inch past top dead center on power stroke; as measured on flywheel is 10 degrees past top dead center, spark control lever and breaker assembly fully retarded. To adjust points to open at this position, loosen clamp which locks sparks lever to distributor head, and rotate distributor head until points begin to open with rotor under segment connected to spark plug No. 1.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plugs:—Spark plug diameters 7/8 inch. Gaps are .027-.030 inch.

STARTER.—Starter Model 712-A. The direction of rotation is counter-clockwise, looking at commutator end. The connection to engine is by a Bendix drive. The motor running free at 4000 R.P.M., taking 50-60 amperes, 6 volts. Cranking engine at 150 R.P.M. Lock torque is 11 pound feet taking 450 amperes at 3.6 volts.

Oiling.—Put 4 or 5 drops of light engine oil into starter oiler once a month. If car is driven over 1000 miles in a month, this care must be given every 1000 miles.

GENERATOR:—Model No. 961-A, 951-A. Direction of rotation looking at the commutator end is counter-clockwise. Generator running freely at 440 R.P.M takes 6.5 amperes at 7.1 volts. Shunt field current is 5 amperes at 6 volts. The third brush system is used for current regulation. To adjust generator output, loosen locknut on outside of generator end plate and shift the third brush. Moving the brush in the direction of generator rotation increases the charging rate and in the opposite direction decreases the output. Before adjusting charging rate, make certain that fan belt is not slipping. If the fan moves even part of a revolution when the relay points are closed or if a higher speed than 20-25 M.P.H. is required to reach the maximum charging rate the fan belt is loose and slipping.

Generator Data.

Cold Test.			Hot Test.		
Amperes.	Volts.	R.P.M.	Amperes.	Volts.	R.P.M.
7	7.1	925			
15-17	8.1	1800	11	7.85	1975

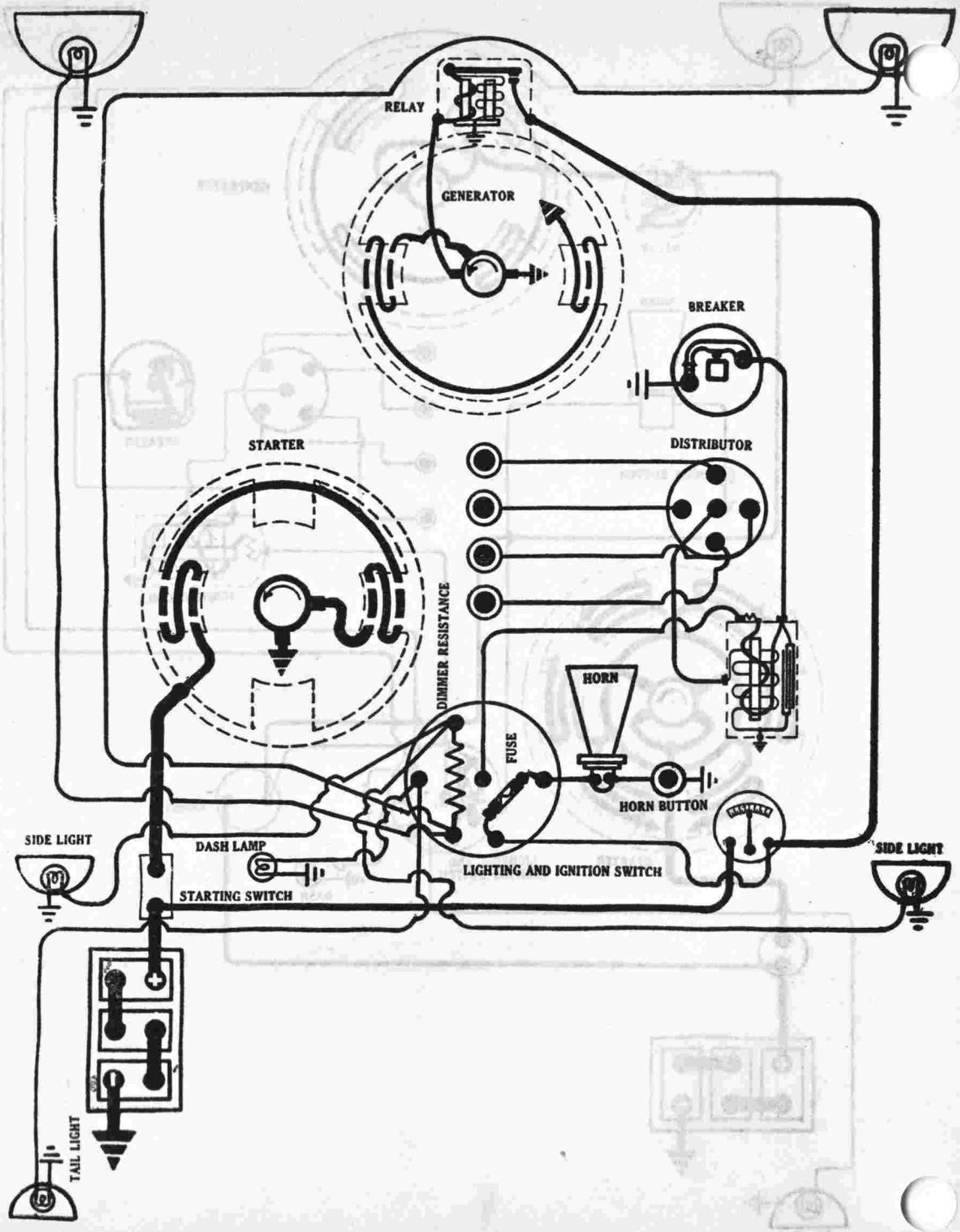
Generator brush tension should be 22-28 ounces each.

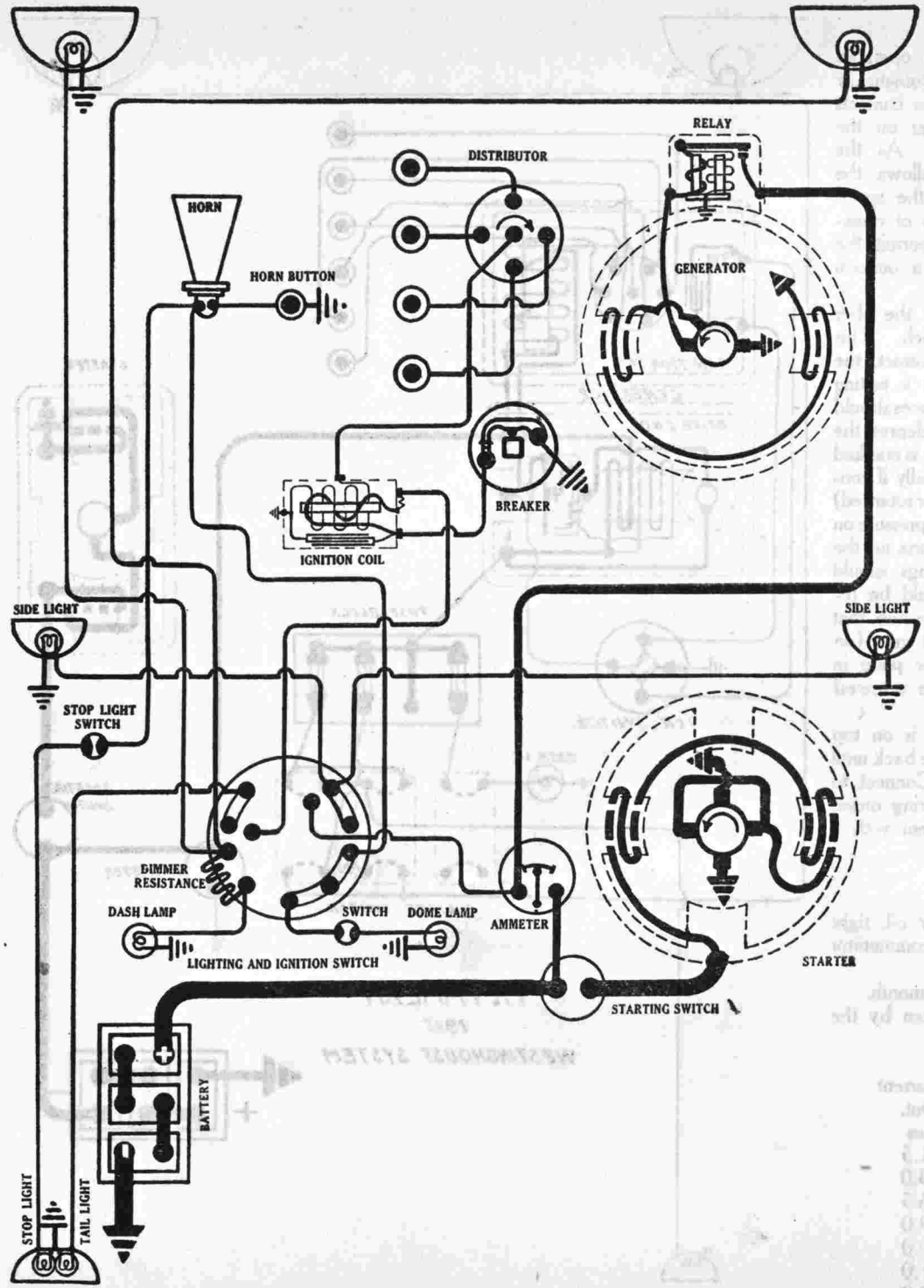
Oiling.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every 1000 miles or each monh.

RELAY.—Relay points close 8-10 M.P.H., 7 volts; and opens at 7-8 M.P.H., 0-3 amperes discharge. Relay contacts separate .014-.025 inch. Air gap between relay armature and coil core is .014 inch, contacts closed.

LIGHTING.—Head lamps are each 6-8 volt, 21 cp. S.C. Dash, tail and stop lamps are 6-8 volt, 2 cp. S.C. Dome and side lamps are each 6-8 volt, 4 cp. S.C.

FUSES.—Fuses are 20 amperes.





MAXWELL

MODEL 25 (1925)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY:—Westinghouse, Type 6-OB-13. 6 volt. 105 ampere hour. The starting capacity is 125 amperes for 20 minutes. The lighting capacity is 5 amperes for 21 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. 284-L. Distributor Model No. 369C. Breaker contacts separate .020 to .025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, resurface them on a medium hard oilstone.

Oiling:—Fill distributor grease cup with soft grease and turn down two or three turns once a month. If car is driven over 1000 miles in a month, this attention must be given once to every 1000 miles.

Timing:—Contact points begin to separate when No. 1 piston is 3/64 of an inch past top dead center on power stroke; as measured on flywheel is 10 degrees past top dead center, spark control lever and breaker assembly fully retarded. To adjust points to open at this position, loosen clamp which locks spark lever to distributor head, and rotate distributor head until points begin to open with rotor under segment connected to spark plug No. 1.

Firing Order:—The firing order is 1-3-4-2.

Spark Plugs:—Spark plug diameters 7/8 inch. Gaps are .027-.030 inch.

STARTER:—Model 712-B. The direction of rotation is counter-clockwise, looking at commutator end. The connection to engine is by a Bendix drive. The motor running free at 5000 R.P.M. taking 65 amperes at 5 volts. Cranking engine at 150 R.P.M. requires 150 amperes at 5 volts. Lock torque is 11 pound feet with 450 amperes at 3.6 volts. Starter brush tension is 20-24 ounces each.

Oiling:—Put 4 or 5 drops of light engine oil into starter oiler once a month. If car is driven over 1000 miles in a month, this care must be given every 1000 miles.

GENERATOR:—Generator Model 961-A. The direction of rotation, looking at commutator end, is counter-clockwise. Generator running freely at 440 R.P.M. takes 6.5 amperes at 7.1 volts. Shunt field current is 5 amperes at 6 volts. The third brush system is used for current regulation. To adjust generator output, loosen locknut on outside of generator end plate and shift the third brush. Moving the brush in the direction of generator rotation increases the charging rate and in the opposite direction decreases the output. Before adjusting charging rate, make certain that fan belt is not slipping. If the fan moves even part of a revolution when the relay points are closed or if a higher speed than 20-25 M.P.H. is required to reach the maximum charging rate the fan belt is loose and slipping.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7.1	925	11	7.85	1975
15-17	8.1	1800			

Generator brush tension should be 22-28 ounces each.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every 1000 miles or each month.

RELAY:—Relay points close 8-10 M.P.H., 7 volts, and opens at 7-8 M.P.H., 0-3 amperes discharge. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014 inch, contacts closed.

LIGHTING:—Clum Light Switch. Model 10461. Head and stop lamps are 6-8 volt, 21 cp. S.C. Dash, tail and dome lamps are each 6-8 volt, 3 cp. S.C. Side lamps are 6-8 volt, 2 cp. S.C.

FUSES:—Fuses are 20 amperes.

Westinghouse Starting and Lighting System
Westinghouse Ignition

Battery.—Battery is 6 volt, 130 ampere-hour. The positive (+) terminal is grounded.

Ignition.—The ignition system and generator is combined into one unit. The breaker is operated direct from the armature shaft. The centrifugal weights perform the double duty of automatically advancing and retarding the spark in relation to the engine speed, and of closing the timer contacts at the proper time. As these weights are revolved, they bear against the fiber bumper on the contact arm, pushing it down and causing the contact points to be brought together. As the weights are moved further, their bearing surface passes off the fiber bumper, which allows the spring to force contact arm upwards, causing the contacts to be quickly separated. As the speed increases, the weights are thrown out from the center, and automatically advance the time of opening of the contacts, hence advancing the spark. The weights are so shaped that they permit the contacts to be closed a greater part of the revolution, as the spark advances, resulting in a uniform spark at all speeds.

Adjustment.—When the engine is not running and one of the weights is depressing the fiber bumper, the air gap between the bumper lever and the stop should be 3/64 of an inch. This distance must be correct before the contact clearance is adjusted. With this distance correct, the contacts should be separated .005 to .008 inch when the contact arm or bumper lever is resting on the stop. Interrupter weights should turn freely on their supporting pins and their surfaces should clear the back of the spring support by .01 inch. After adjustments, see that both weights depress the contact lever sufficiently that positive connection between the contacts is assured when engine is cranked very slowly by hand. If they do not, there will be a tendency of missing at low speed, especially if contacts are worn or otherwise not in first-class condition. When the wei ghts are in the inner (or retarded) position, the spring should just touch the fiber covered pins without exerting any appreciable pressure on them. If it is necessary to adjust these springs, always do so by bending the supporting arms, not the springs themselves. Distributor brushes should move freely in their holders. The springs should exert just enough pressure on them to force their ends ½ inch from holder. They should be retained by the springs so that they do not tend to fall out. The gears should be so meshed that the mark on the edge of the distributor (large) gear lines up with the tooth on the small gear (on the armature shaft) which is slightly beveled. The two screws holding the distributor plate in place make connection between the ignition coil and the generator. They must both be screwed firmly in place to complete the coil circuit.

Timing.—To time generator to engine, first turn engine until the piston of No. 1 cylinder is on top dead center, both valves closed, then remove distributor plate and turn generator armature back until the mark on the distributor brush holder lines up with the mark on the end bracket. Connect to engine in this position and connect spark plug gap to the distributor according to the firing order. Should timer contacts become badly burned or pitted, affecting the ignition, resurface them with a fine, flat jeweler's file or a strip of worn No. 00 sand paper.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be about .023 inch.

Starter.—Starter is connected to the engine through a Bendix drive. Cold engine, heavy oil, tight bearings or other obstructions or damp grounded or short circuited armature coils or commutator bars will cause excessive current and low speed during the cranking operation.

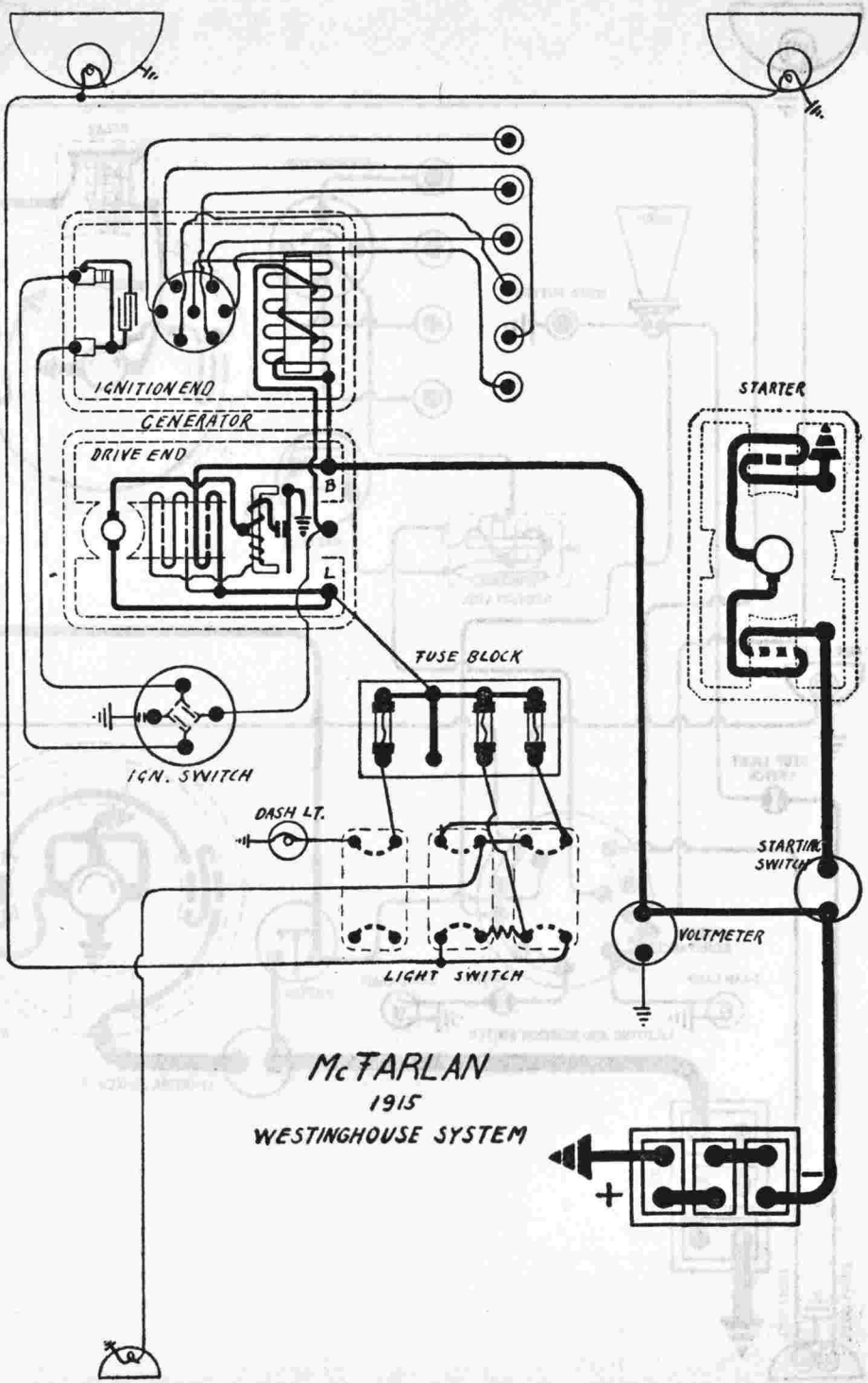
Oiling.—Put several drops of light engine or machine oil in each of the starter oilers every month.

Generator.—Generator charging current regulation is by reverse series field. Current taken by the lamps does not flow through the series field so has but little effect on the charging rate.

GENERATOR DATA, FRAME NO. 240

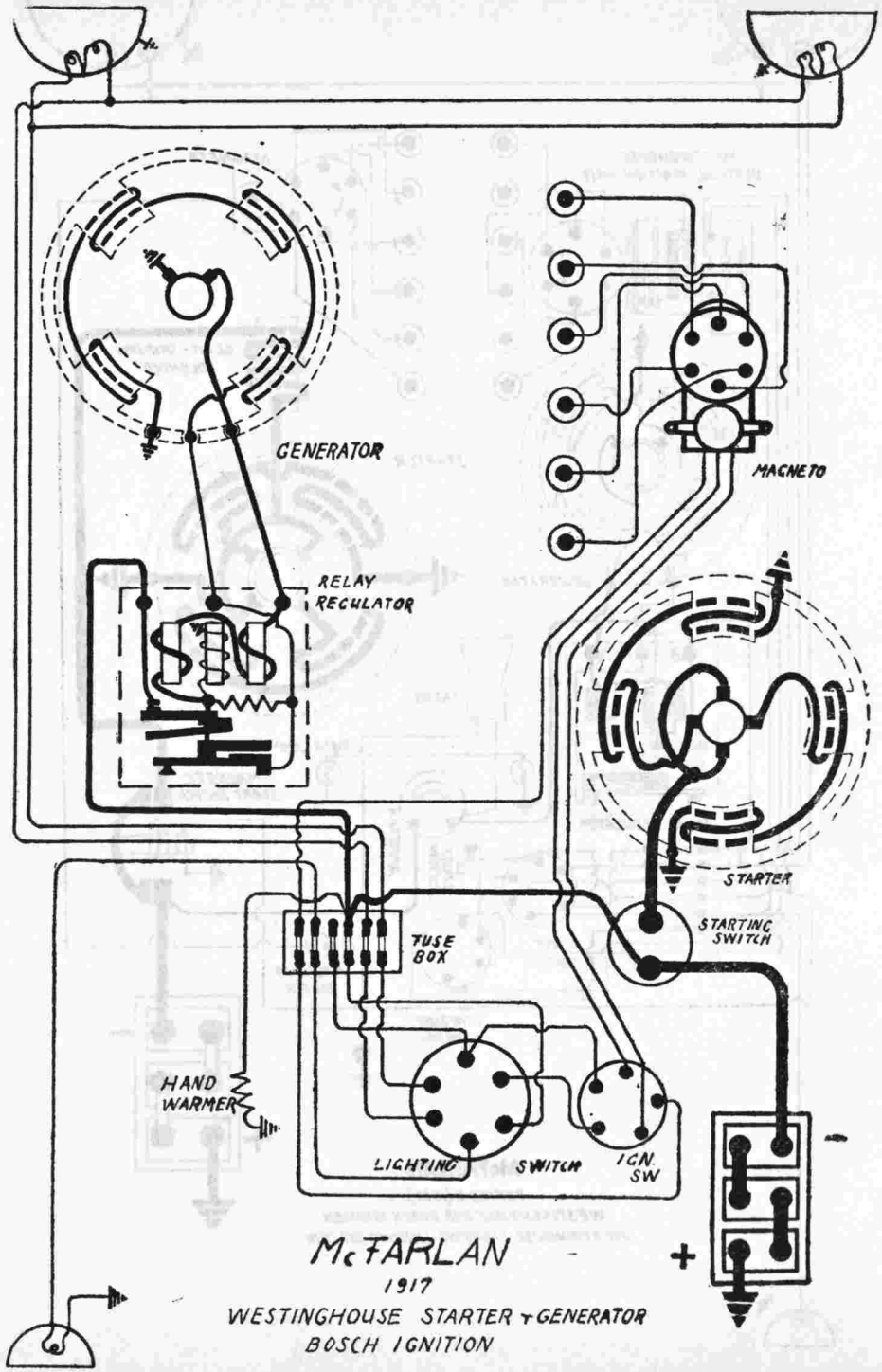
Speed in R. P. M.	Total Output Charging and Lamp Current. Amperes	Charging Current Lamps Out. Amperes
400	2	1.0- 1.5
500	5- 6	2.5- 3.0
750	10	6.0- 6.5
1000	13	8.5- 9.0
1250	15-16	9.5-10.0
1500	16-17	10.5-11.0
2000	18	11.0-12.0
3000	19	12.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.



McFARLAN

MODELS T AND X (1916) SERIAL NOS. 9000 TO 10000
MODEL 120-127 (1927). SERIAL NOS. 10,000 TO 11,000
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH MAGNETO IGNITION



BATTERY.—Battery is 6 volt, 130 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Magneto breaker contacts separate .014 to .016 inch. When the condition of the contacts affects the ignition, resurface with a fine jeweler's file or worn No. 00 sandpaper.

OILING.—Put 2 or 3 drops of light machine oil in the magneto oilers every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever one inch from the fully retarded position. (First see that the breaker assembly is fully retarded when the control lever is in the fully retarded position.)

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .018 to .022 inch.

STARTER:—Frame No. 750. Starter is connected to the engine through a magnetically shifted pinion. The starting switch is also of the magnetic type, controlled by a push button on the dash. The lock torque developed by the starter is 22 pound-feet, current being 485 amperes at 3.9 volts. Torque at 1000 R.P.M. is 3½ pound-feet, current being 135 amperes at 5.5 volts. Running freely, starter takes 36 amperes at 6.25 volts, armature revolving at 4800 R.P.M. Pressure or brushes on the commutator is 1 to 1½ pounds. The pinion must be pulled into mesh by a current of 125 amperes, and must not be held in by 36 amperes.

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR.—Frame 400-R. Generator voltage regulation is by vibrating regulator. Maximum charging rate is 15 amperes, decreasing as the battery becomes charged. Charging rate is 12 amperes at 7 volts, when generator is driven at 1400 R.P.M., charging a battery of 1.250 solution.

OILERS.—Put 4 or 5 drops of light engine oil in the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY-REGULATOR.—Relay and regulator are combined into one unit. Relay closes at 575-600 R.P.M. of the armature or 8-10 miles per hour and opens at 550-575 R.P.M. of the armature or 6-8 miles per hour. Adjust relay by bending the two brass prongs at the end of the moving member so that the contacts open when the discharge current from the battery is 1-3 amperes, and close when the voltage of the generator reaches 6.6 to 7 volts, battery disconnected. To adjust the regulator, connect a voltmeter between the "A" generator terminal and ground. Operate the generator at 1400 R.P.M., charging a battery of 1.250 solution. Then adjust the regulator spring tension by means of the thumb screw, until the voltmeter indicates 7 volts. Air gap between moving member and coil core is .045 to .055 inch. Air gap between relay armature and coil core is .055 to .060 inch. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 27 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Small fuses are 10 ampere. Large fuses are 30 ampere.

MODELS 120-127 (1917-18) 122-160 (1919)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH AND WESTINGHOUSE IGNITION

BATTERY.—Battery is 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Bosch magneto. Breaker contacts separate .014 to .016 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

IGNITION.—Westinghouse. Breaker contacts separate .008 inch. When the condition of the points affects the ignition, resurface with a fine flat, jeweler's file or worn No. 00 sandpaper. Adjust the distributor brush springs so that the brushes extend ¼ inch from their holders when the distributor cap is removed, retaining them, however, so that they do not fall out. Brushes must move freely in their holders. See that the brushes on the top and bottom of the rotor are in place when installing rotor.

OILING.—Put 2 or 3 drops of light engine oil in each of the magneto oilers and put 2 or 3 drops of light engine oil in the oil cup at the side of the battery ignition unit every month. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

TIMING.—Battery breaker contacts begin to separate when dead center line on flywheel rim is ½ inch before the indicator, and magneto breaker contacts begin to separate when the dead center line on flywheel is at the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Frame No. 775. Starter is connected to the engine through a magnetic pinion shift. Starter cranks the engine at 75 R.P.M.

Starter Data

Torque	R.P.M.	Amperes	Volts
4.0 lb. ft.	1000	160	5.6
8.0 lb. ft.	600	245	5.0
12.0 lb. ft.	490	320	4.8
16.0 lb. ft.	200	390	4.6
22.5 lb. ft.	Lock	500	4.5

OILING.—Put 4 or 5 drops of light engine oil in each of starter bearing oilers every month.

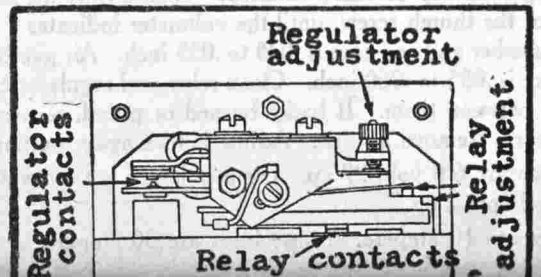
GENERATOR.—Frame No. 400-R. Generator voltage regulation is by vibrator regulator. Maximum charging rate is 15-20 amperes, at 25 miles per hour with discharged battery. Charging rate decreases as battery becomes charged.

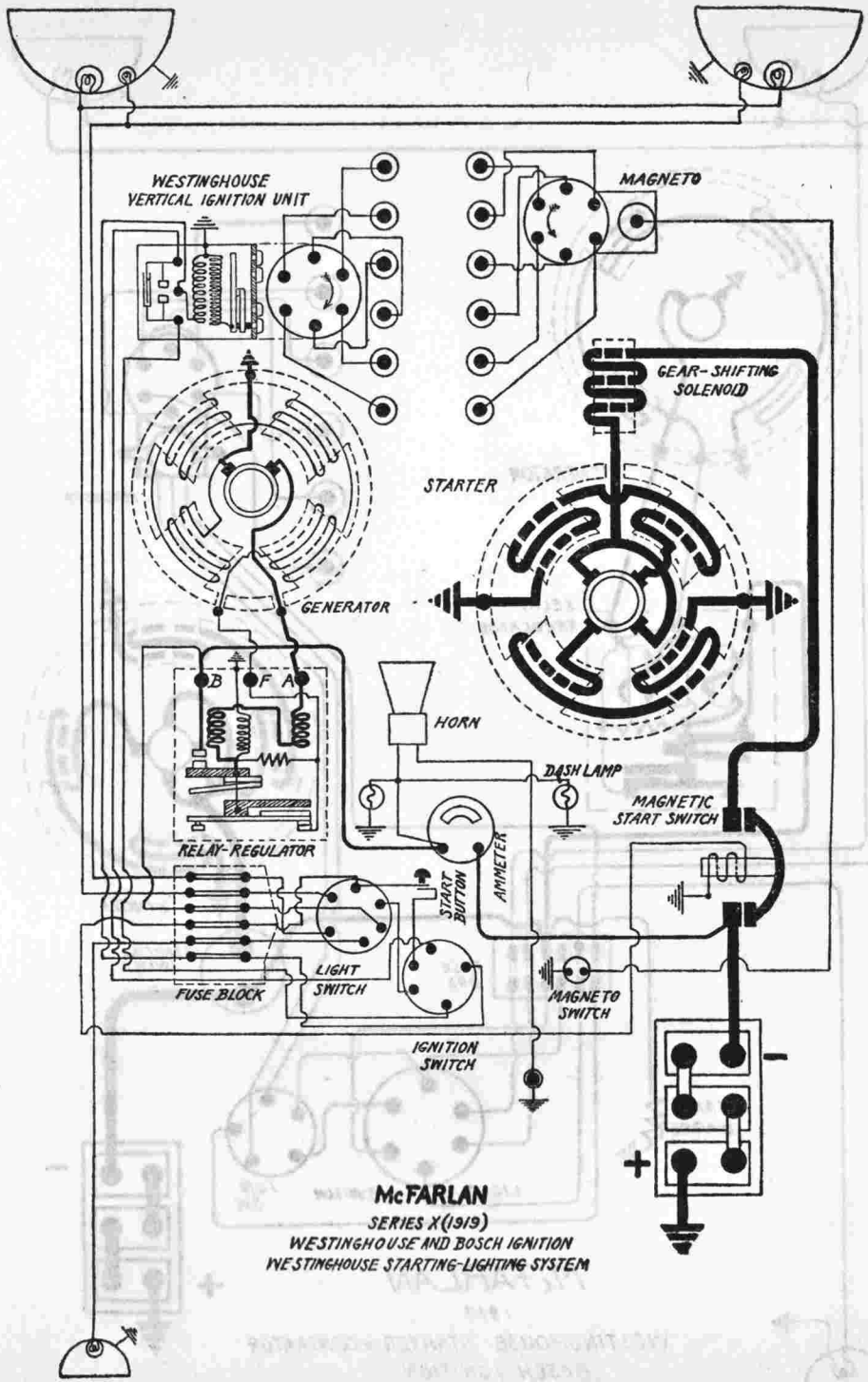
OILING.—Put 4 or 5 drops of light engine oil in each of generator bearings every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

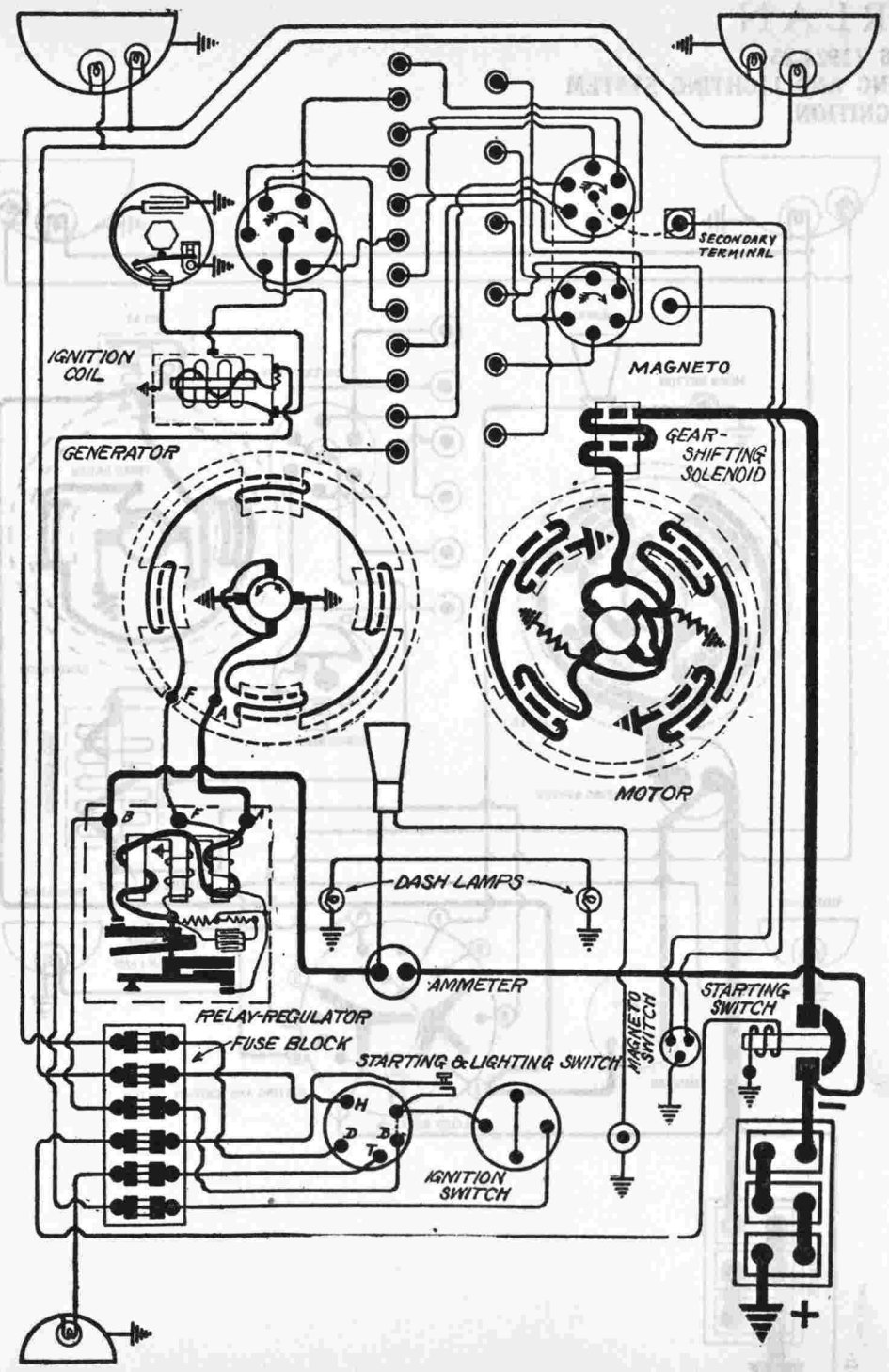
RELAY-REGULATOR.—Relay closes at 575 R.P.M. of armature, or 8-10 miles per hour. Generator current at closing of relay is .5 to 1 ampere. Relay opens at 7-9 miles per hour, with a reverse current of 0-3 amperes. Relay is adjusted by bending the two brass prongs (Plate 473A). Position of the inner prong determines the spring tension, while the other prong determines the air gap between coil core and moving member. The air gap is .005 to .010 inch. Regulator is adjusted by turning thumb screw. Turn in a clockwise direction to increase the generator output and in a counter clockwise direction to decrease it. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well-worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Fuses are 15 ampere.







McFARLAN

TWIN VALVE SIX, MODEL 127 (1920-21-22-23)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WESTINGHOUSE AND BOSCH IGNITION

BATTERY.—Willard, 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Westinghouse, Type SC. Breaker contacts separate .012 to .016 inch. They are made of tungsten. When the condtion of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone. The bumper on the contact spring is 1/8 inch off center from the line through the centers of the shaft and terminal screw, this offset being opposite to the direction of rotation of the cam. The above adjustment is made by bending the solid arm at the terminal block. A pull of 20-25 ounces, applied to the movable contact, is required to separate the contacts .020 inch. The spring pressure is adjusted by bending the solid arm at the point of contact with the contact spring. Resistance of the primary winding of the ignition coil is 1 ohm. The resistance of the ballast resistor is .4 ohm. Resistance of the secondary winding is 4700 ohms.

IGNITION.—Bosch, Two-Spark. Breaker contacts separate .015 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 4 or 5 drops of light engine oil in the oiler at the side of the breaker box and 2 or 3 drops on the magneto oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Battery breaker contacts begin to separate when the top dead center mark on the flywheel rim is 1/2 inch before the indicator, and magneto breaker contacts begin to separate when the dead center line on the flywheel is at the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUGS.—Diameter, 7/8 inch. Spark gaps are .025 inch.

STARTER.—Frame No. 777. Starter is connected to the engine through a magnetically shifted pinion. The starting switch is also of the magnetic type, controlled by a push button on the dash. Lock torque is 27.5 pound-feet, current 750 amperes at 4 volts. Torque at 1250 R.P.M. is 3.5 pound-feet, current 230 amperes at 5.5 volts. Running freely, armature revolves at 5000 R.P.M., current 80 amperes at 5.5 volts. Brush pressure is 2 1/2 to 3 pounds. Pinion must be pulled into mesh by a current of 125 amperes or less, and must not be held in by 80 amperes. With the plunger in the "In" position, the air gap between the plunger and the cover of the pull-in coil is 5/16 inch, including the micarta washer. With the plunger in the "In" position, the spring is compressed into an over-all length of 1 11/16 inches, and exerts a pressure of 7 pounds. With the plunger in the "Out" position, the spring measures 2 13/16 inches and exerts a pressure of 2 pounds. Pressure of brushes on commutator is 2.5 to 3 pounds.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Frame 781-R. Generator voltage regulation is by vibrating regulator. Maximum charging rate is 20 amperes, reducing as the battery becomes charged. Shunt field winding takes 1.25 to 1.75 amperes at 6 to 6.3 volts. Running freely as a motor, generator takes 5 amperes at 6 to 6.3 volts.

OILING.—Put 5 or 6 drops of light engine oil in the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY-REGULATOR.—Relay closes at 425-450 R.P.M. of the armature or 6-7 miles per hour and opens at 400-425 R.P.M. of the armature or 5-6 miles per hour. Adjust relay spring tension so that the contacts open with a discharge current of 1 to 2 amperes from the battery. Adjust air gap between relay armature and coil core so that the contacts close when the voltage of the generator reaches 6.5 to 7 volts, battery disconnected. Air gap between relay armature and coil core is .055 to .060 inch. Air gap between regulator armature and coil core is .045 to .055 inch. Adjust regulator to limit the voltage to 6.5 volts with a 20 ampere resistance load, generator being driven at 1200 R.P.M. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS:—Head lamps are 6-8 volt, 32 cp. Dimmer lamps are 6-8 volt, 12 cp. Tail and dash lamps are 6-8 volt, 2 cp.

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MODEL SV-6 (1924-25)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY:—Willard, Type SJR-4, 6 volt, 120 ampere hours. Starting capacity is 125 amperes for 20 minutes. Lighting capacity is 5 amperes for 22 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model 2178. Distributor Model 5270. Breaker contacts separate .020-.025 inch. Resurface contacts with a fine flat jeweler's file or on a medium hard oilstone. Distributor is of the semi-automatic type. Manual advance is 30°. Automatic advance begins at 450 R.P.M. and reaches a maximum of 24-28° at 2000 R.P.M. Breaker arm spring tension should be 16-20 ounces.

Mounting:—Distributor is mounted at right of engine. To remove, disconnect primary lead and manual advance rod. Then remove manual advance stop screw and lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the oilers on the side of the distributor housing every two weeks or each 500 miles. Put a small bit of medium heavy grease on the face of the breaker cam under the fiber bumper and wipe out the distributor head with heavy grease, removing all excess and polishing with a soft clean cloth every month or each 1000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position. To set timing crank engine until piston No. 1 reaches that position. Then fully retard spark lever. Loosen timing adjustment screw and turn cam until breaker contacts begin to separate. Tighten the screw. Make certain that the distributor rotor button is under the segment connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Model 313. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 2¼-2¾ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	50
12 "	Lock	2.75	—

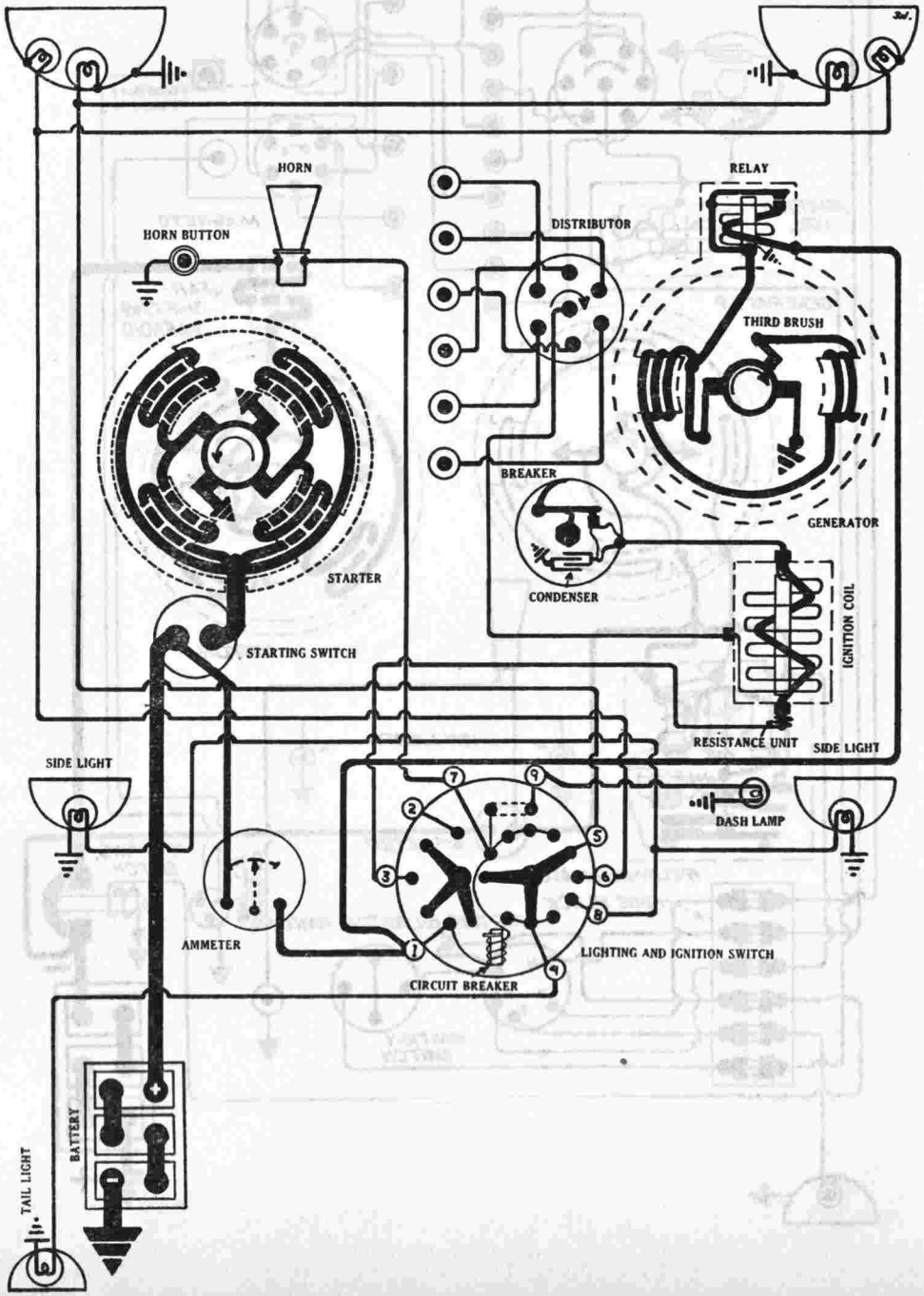
Mounting:—Starter is flange mounted at right of engine. To remove starter, disconnect starter line and remove horn. Then loosen one screw in engine pan, remove starter mounting cap screws and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless and requires no attention.

GENERATOR:—Model 258. The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the charging rate remove thecommutator cover band and shift the third brush mounting plate by means of the handle. Shifting the plate in a clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. The mounting plate is held in any desired position by friction clamp washers. Generator brush spring tension should be 1¼-1¾ pounds each.

Generator Data

Amperes	R.P.M.
4	800
16-18	1600

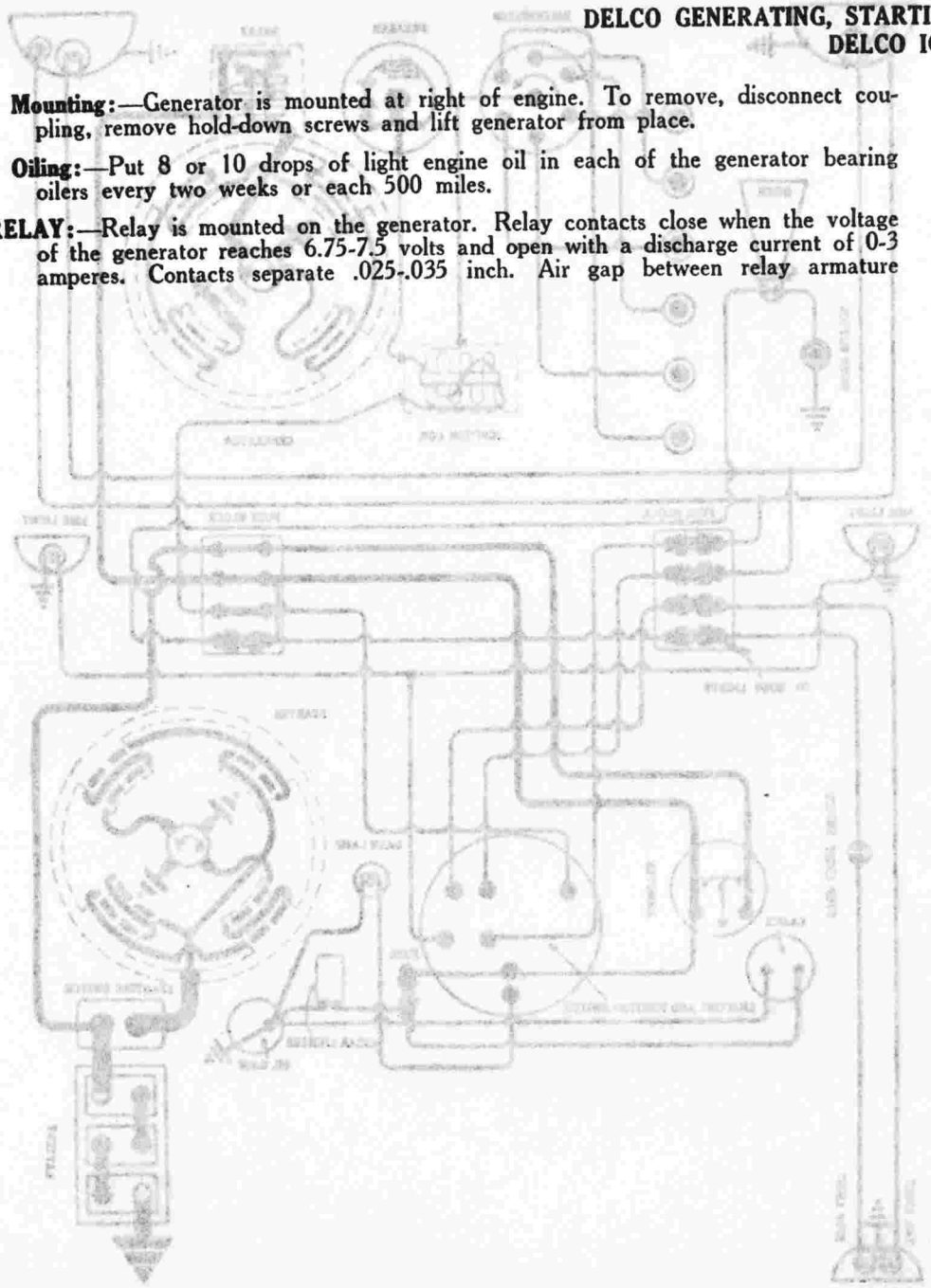


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MODEL SV-6 (1924-25)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION



Mounting:—Generator is mounted at right of engine. To remove, disconnect coupling, remove hold-down screws and lift generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 6.75-7.5 volts and open with a discharge current of 0-3 amperes. Contacts separate .025-.035 inch. Air gap between relay armature and coil core is .015-.020 inch, contacts closed.

LIGHTING.—Switch Model 1147. Head and stop lamps are 6-8 volt, 21 cp. S. C. Dimmer lamps are 6-8 volt, 4 cp. S. C. Dash, side and tail lamps are each 6-8 volt, 2 cp. S. C.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the back of the switch. A current of 25-30 amperes causes it to vibrate, limiting the current flow to 10-15 amperes until the cause of the high discharge is removed.

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SINGLE VALVE SIX (1925)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM.
WESTINGHOUSE IGNITION.

BATTERY:—Willard Type SJR-4. ..6 volt, 110 ampere hour. The positive (+) terminal is grounded.

IGNITION:—Coil Model 288,761-C. ..**Distributor Model 382,528.** Breaker contacts separate .020 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the distributor housing every 2000 miles and put a small bit of vaseline on the face of the breaker cam applying with a toothpick.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Frame 711. ..**Style 355708.** Starter is connected to the engine by means of a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The brush tension should be 2½-3 pounds each.

Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3500-6000	5.5	35-45
2.5 "	1250	5.5	—
17 "	Lock	4.	500-575

Oiling:—Put 4 or 5 drops of light engine oil in the starter oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR:—Frame 56-AT. Style 395399. The direction of rotation is clockwise looking at the commutator end. Generator current regulation is by the third brush system. To adjust the generator output loosen the nut on the generator end plate and shift the third brush. Shifting the brush in the direction of rotation increases the charging rate and in the opposite direction decreases the charging rate. Tighten the nut after making the adjustment.

Generator Data.

Cold Test (35°C)			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	500			
8	7.5	750	10-12	8.	1100-1600
15-17	8.	1100-1600	7-11	7.5	2500
7-12	7.	2500			

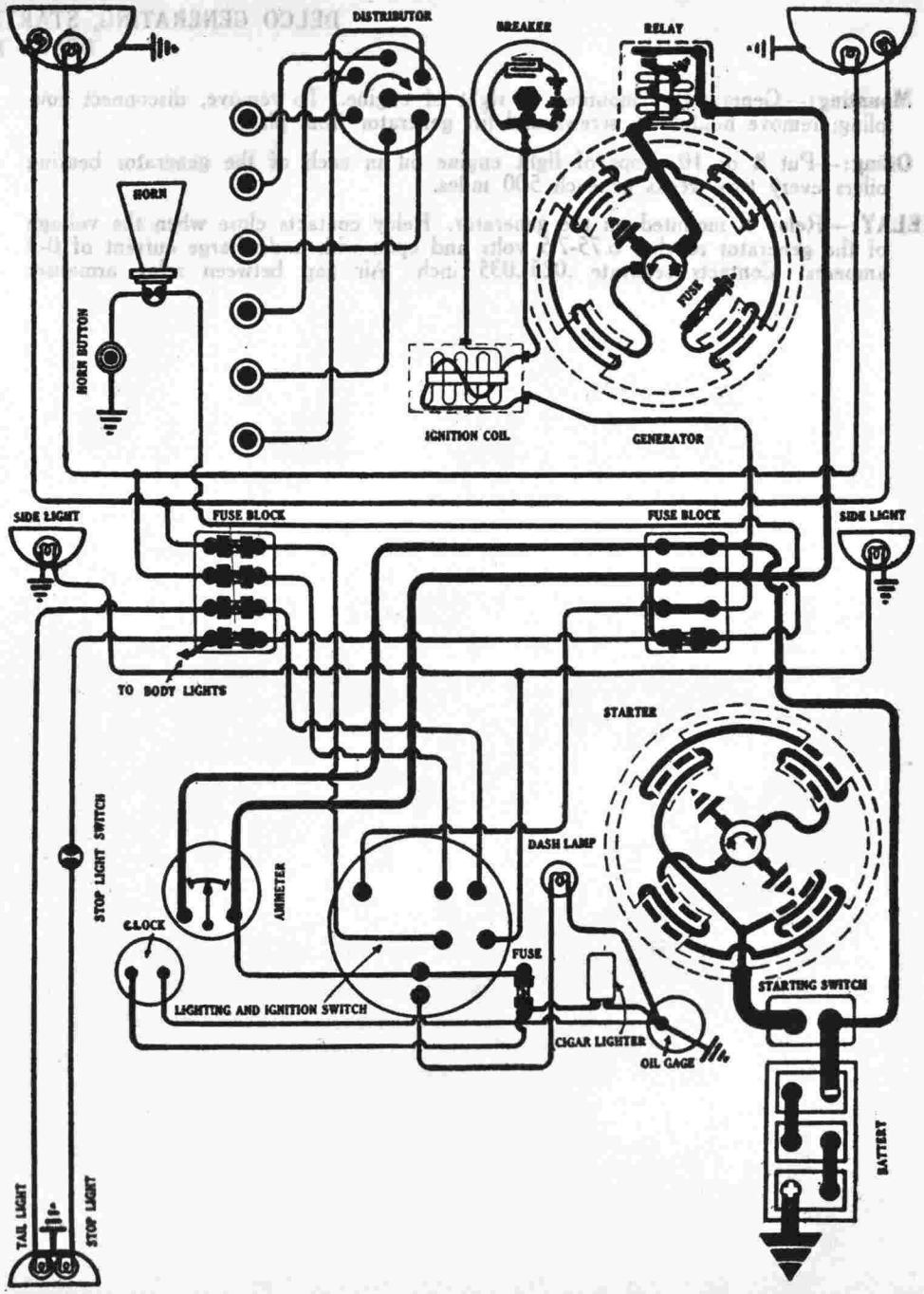
Motoring freely, generator draws 5-7 amperes at 6 volts. The shunt field current is 2.5-3 amperes at 6.5 volts.

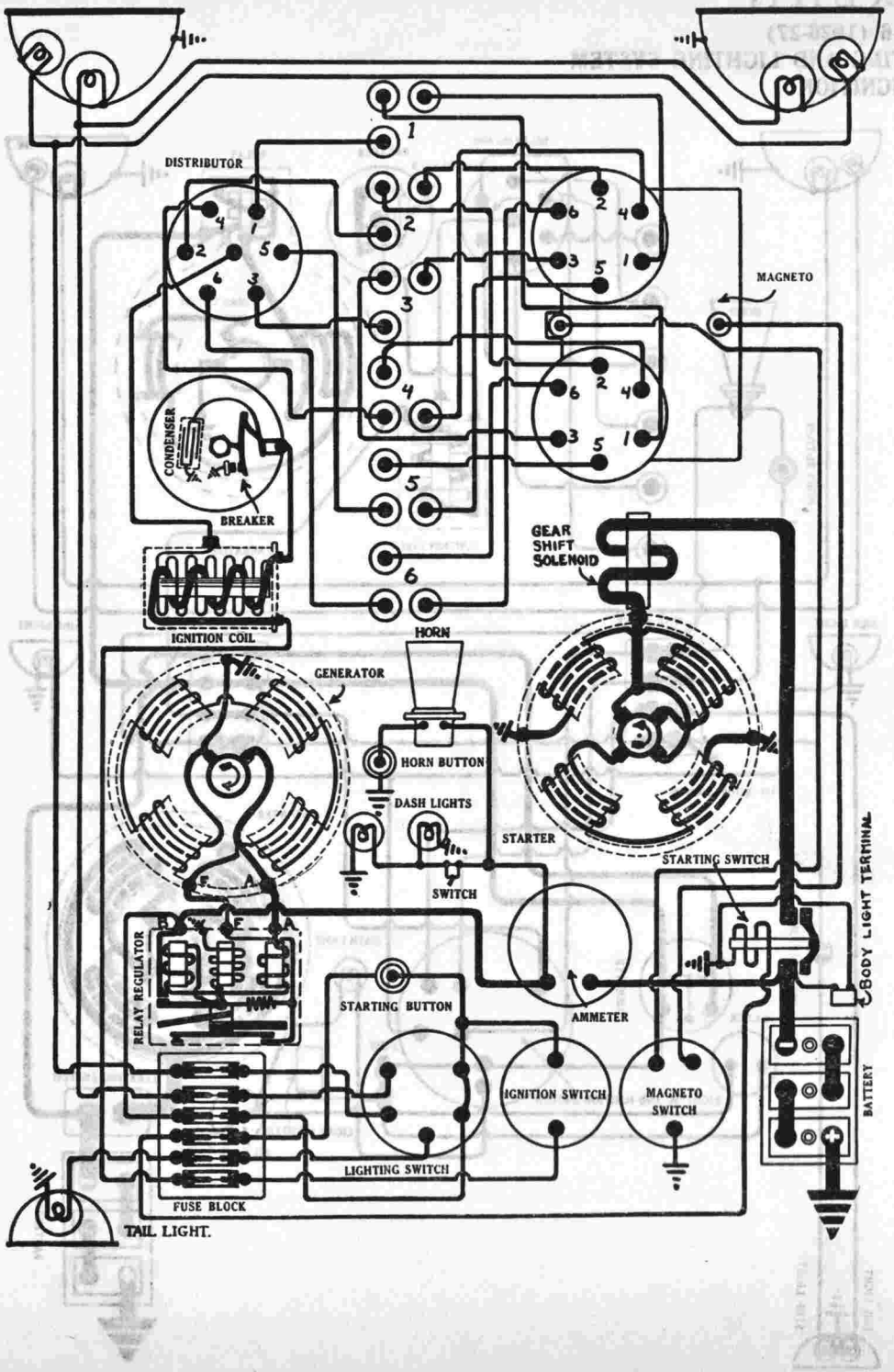
Oiling:—Put 4 or 5 drops of light engine oil in the generator oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY:—Relay contacts close at 500 R.P.M. of the generator armature when the voltage reaches 6.5 volts and open at 400 R.P.M. with a discharge current of 0-3 amperes. Contacts separate .030-.035 inch. Air gap between relay armature and coil core is .015-.025 inch, contacts closed.

LIGHTING:—Clum Switch, Model 10429. Head lamps are 6-8 volt, 21 cp.S.C. Side and tail lamps are each 6-8 volt, 4 cp.S.C. Dash lamp is 6-8 volt, 2 cp.D.C

FUSES:—Lighting fuses are 20 ampere.





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TWIN VALVE SIX (1924-25)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WESTINGHOUSE AND SPLITDORF IGNITION.

BATTERY:—Willard, Type SJR-6. 6 volt, 155 ampere hour. The positive (+) terminal is grounded.

IGNITION:—Westinghouse. Coil Model No. 331296-A. Distributor Model DN. Type 366,190. Breaker contacts separate .012 inch, They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine flat jeweler's file or on a medium hard oilstone.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the distributor housing every 2000 miles. Also place a small bit of vaseline on the face of the cam applying with a toothpick.

IGNITION:—Splitdorf. ..Type SS-6-2. Breaker contacts separate .020 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or with well worn No. 00 sandpaper.

Oiling:—Put 3 or 4 drops of light engine oil in the magneto bearing oilers every 1000 miles.

Timing:—Battery breaker contacts begin to separate when the piston entering power stroke reaches a position ½ inch before top dead center (measured on the flywheel) and magneto breaker contacts begin to separate when the piston reaches top dead center. In both cases the breaker assembly and spark control lever should be in the fully retarded position. The timing can be checked by the position of the flywheel marking in regard to the mark on the flywheel housing.

Firing Order:—The firing order is 1-5-3-6-2-4-.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

STARTER:—Frame 778, Style 290371-A. Starter is connected to the engine through a magnetically shifted pinion. The direction of rotation is counter-clockwise, looking at the commutator end. Brush pressure should be 2½-3 pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
5 lb. ft.	1140	5.5	235
31 "	Lock	4.	800

Oiling:—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR:—Frame 781-IR. ..Style 293842. The direction of rotation is clockwise looking at the commutator end. Generator regulation is by a vibrating relay regulator. The voltage remains constant and the charging rate depends upon the condition of the battery. Maximum charging rate is 20 amperes reached at 1200 R.P.M. of the armature. To increase the charging rate loosen the regulator contact spring by turning the thumb screw and increase the the spring tension to decrease the charging rate.

Generator Data

Amperes	Volts	R.P.M.
0	6.5	425
20	6.5	1200

Operating freely as a motor, generator draws 5 amperes at 6.-6.3 volts. Shunt field current is 1.25-1.75 amperes at 6.-6.3 volts. Brush pressure should be 1¼ to 1½ pounds each.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY REGULATOR: Type FC. Relay contacts close when the voltage of the generator reaches 6.5 volts at approximately 425-500 R.P.M. and open with a discharge current of 1-2 amperes. Contacts separate .012 inch. Air gap between relay armature and coil core is .055-.060 inch, contacts closed. Regular contacts separate .045-.055 inch. Air gap is .015-.019 inch.

LIGHTING:—Clum Switch .Type 10160. Head lamps are 6-8 volt, 21 cp.S.C. Side and tail lamps are each 6-8 volt, 4 cp.S.C. Dash lamp is 6-8 volt, 2 cp.D.C.

FUSES:—Lighting fuses are 30 amperes.

McFARLAN

MODEL SV-6 (1926-27)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Willard, Type SJR-4. 6 volt, 120 ampere hour. Starting capacity is 125 amperes for 20 minutes. Lighting capacity is 5 amperes for 22 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model 2178. Distributor Model 5270. Breaker contacts separate .020-.025 inch. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Distributor is of the semi-automatic type. Manual advance is 30°. Automatic advance begins at 450 R.P.M. and reaches a maximum of 24-28° at 2000 R.P.M. Breaker arm spring tension should be 16-20 ounces.

Mounting.—Distributor is mounted at right of engine. To remove, disconnect primary lead and manual advance rod. Then remove manual advance stop screw and lift distributor from place.

Oiling.—Put 8 or 10 drops of light engine oil in each of the oilers on the side of the distributor housing every two weeks or each 500 miles. Put a small bit of medium heavy grease on the face of the breaker cam under the fiber bumper and wipe out the distributor head with heavy grease, removing all excess and polishing with a soft clean cloth every month or each 1000 miles.

Timing.—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position. To set timing crank engine until piston No. 1 reaches this position. Then fully retard spark lever. Loosen timing adjustment screw and turn cam until breaker contacts begin to separate. Tighten the screw. Make certain that the distributor rotor button is under the segment connected to the spark plug in cylinder No. 1.

Firing Order.—The firing order is 1-4-2-6-3-5.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER.—Model 313. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 2¼-2¾ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	4.0	60
2 "	1750	5.5	175
13 "	Lock	3.0	450

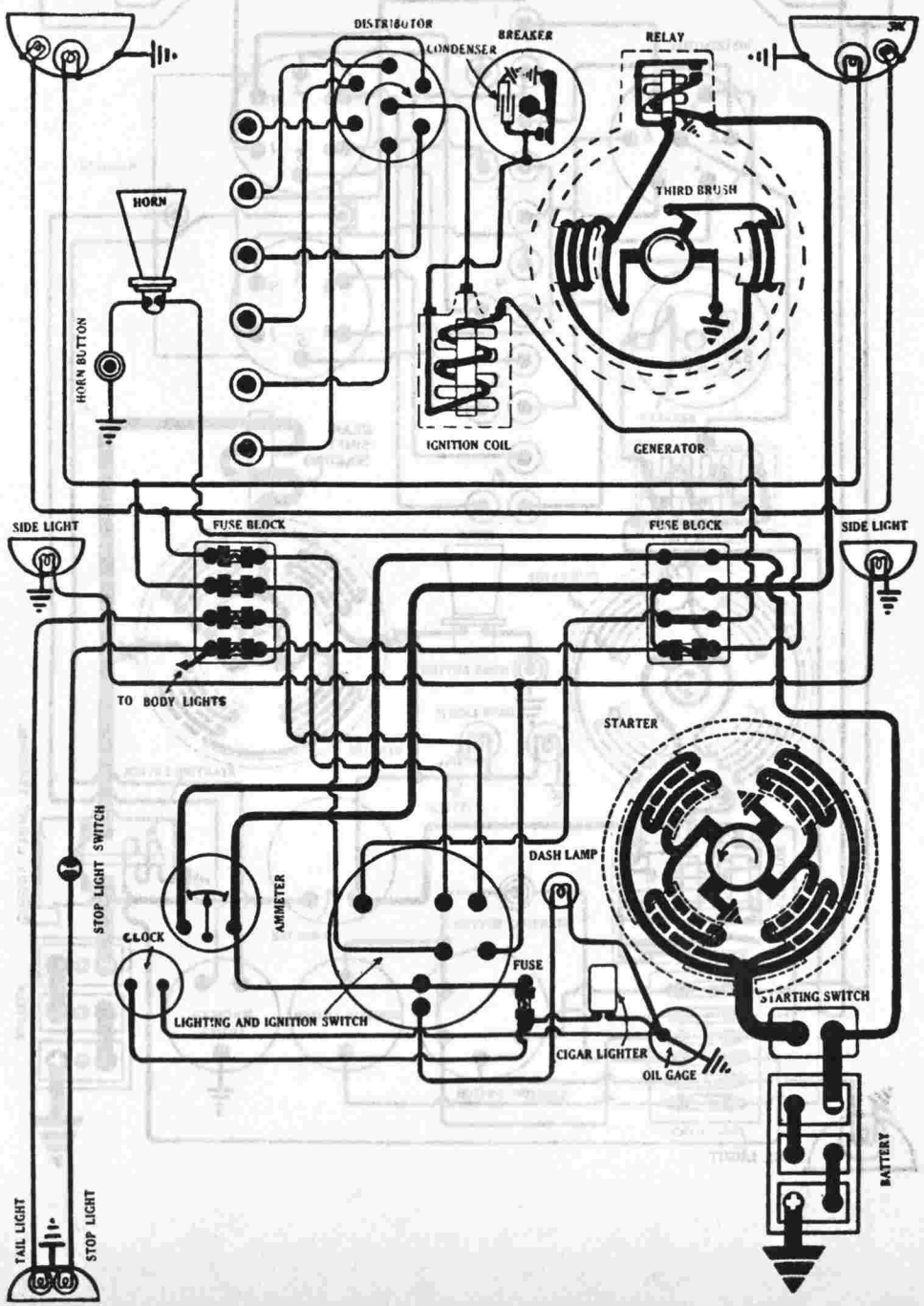
Mounting.—Starter is flange mounted at right of engine. To remove starter, disconnect starter line and remove horn. Then loosen one screw in engine pan, remove starter mounting cap screws and lift from place.

Oiling.—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless and requires no attention.

GENERATOR.—Model 258. The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the charging rate remove the commutator cover band and shift the third brush mounting plate by means of the handle. Shifting the plate in a clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. The mounting plate is held in any desired position by friction clamp washers. Generator brush spring tension should be 1¼-1¾ pounds each.

Generator Data

Amperes	R.P.M.
4	800
16-18	1600



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MODEL SV-6 (1926-27)

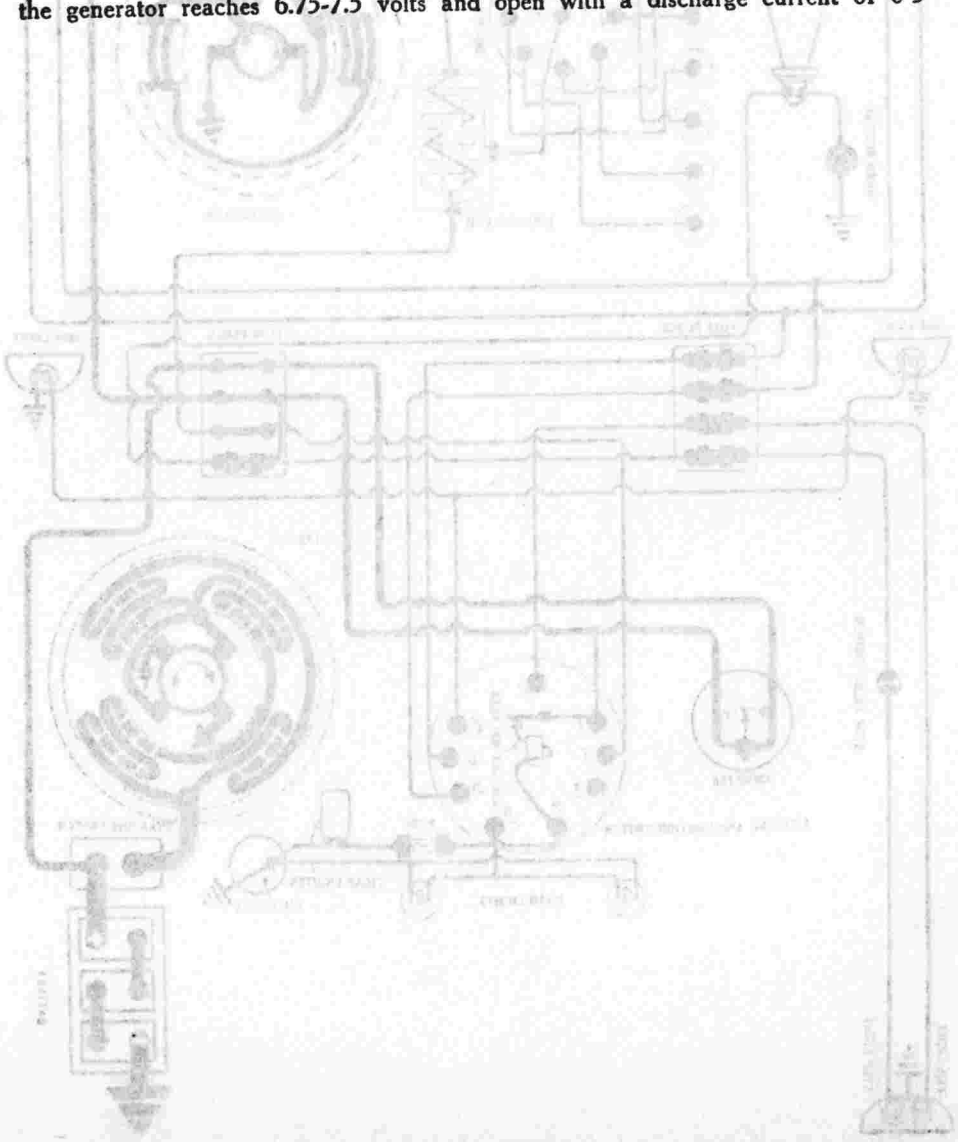
DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

Mounting.—Generator is mounted at right of engine. To remove, disconnect coupling, remove hold down screws and lift generator from place.

Oiling.—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY.—Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 6.75-7.5 volts and open with a discharge current of 0-3 amperes. Contacts separate .025-.035 inch. Air gap between relay armature and coil core is .015-.020 inch, contacts closed.



LIGHTING.—Delco Switch Model 1246. Head and stop lamps are each 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash, side and tail lamps are each 6-8 volt, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker is mounted on the back of the switch. A current of 25-30 amperes causes it to vibrate, limiting the current flow to 10-15 amperes until the cause of the high discharge is removed.

McFARLAN

EIGHT IN LINE MODEL (1925-1926)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Willard, Type SJRR-4, 6 volt. Starting capacity is 125 amperes for 20 minutes. Lighting capacity is 5 amperes for 22 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model 2178. Distributor Model 5286. Breaker contacts separate .020-.25 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine flat contact file. Distributor is of the semi-automatic type. Manual advance is 40° (engine). Automatic advance begins at 600 R.P.M. and reaches a maximum of 18-24° at 2000 R.P.M. Breaker arm spring tension is 16-20 ounces.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position. To set timing, crank engine until piston No. 1 reaches top dead center entering power stroke. Fully retard spark control lever. Loosen timing screw in center of breaker cam and rotate cam until breaker contacts begin to separate. Tighten the screw. Make certain that the rotor is under the segment connected to the spark plug in cylinder No. 1. This system uses two sets of contacts with a four sided cam, contacts opening alternately at intervals of 45° (distributor) corresponding to 90° of crankshaft rotation. Contact opening must be accurately set. Check timing of second set of contacts by special synchronizing tool which is Delco-Remy Part No. 822572. Loosen screw in center of breaker cam and remove regular firing cam. Place synchronizing tool on shaft so that fiber bumper of contact arm mounted on stationary plate rests in notch in plate. Then loosen lockscrews and turn eccentric adjusting screw until fiber bumper of second contact arm rests in the other notch of the tool. Tighten the lockscrew and replace the firing cam.

Valve Timing:—INLET VALVES:—Head diameter, 1 9/32 inches; stem diameter, 11/32 inch; stem length, 5½ inches; valve lift, 5/16 inch; spring pressure, 62 pounds; tappet clearance, .006-.008 inch (hot). Inlet valves open at top dead center and close 35° after lower dead center.

EXHAUST VALVES:—Head diameter, 1 13/32 inches; stem diameter, 11/32 inch; stem length, 5½ inches; valve lift, 5/16 inch; spring pressure, 62 pounds; tappet clearance, .006-.008 inch (hot). Exhaust valves open 42° before lower dead center and close 5° after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

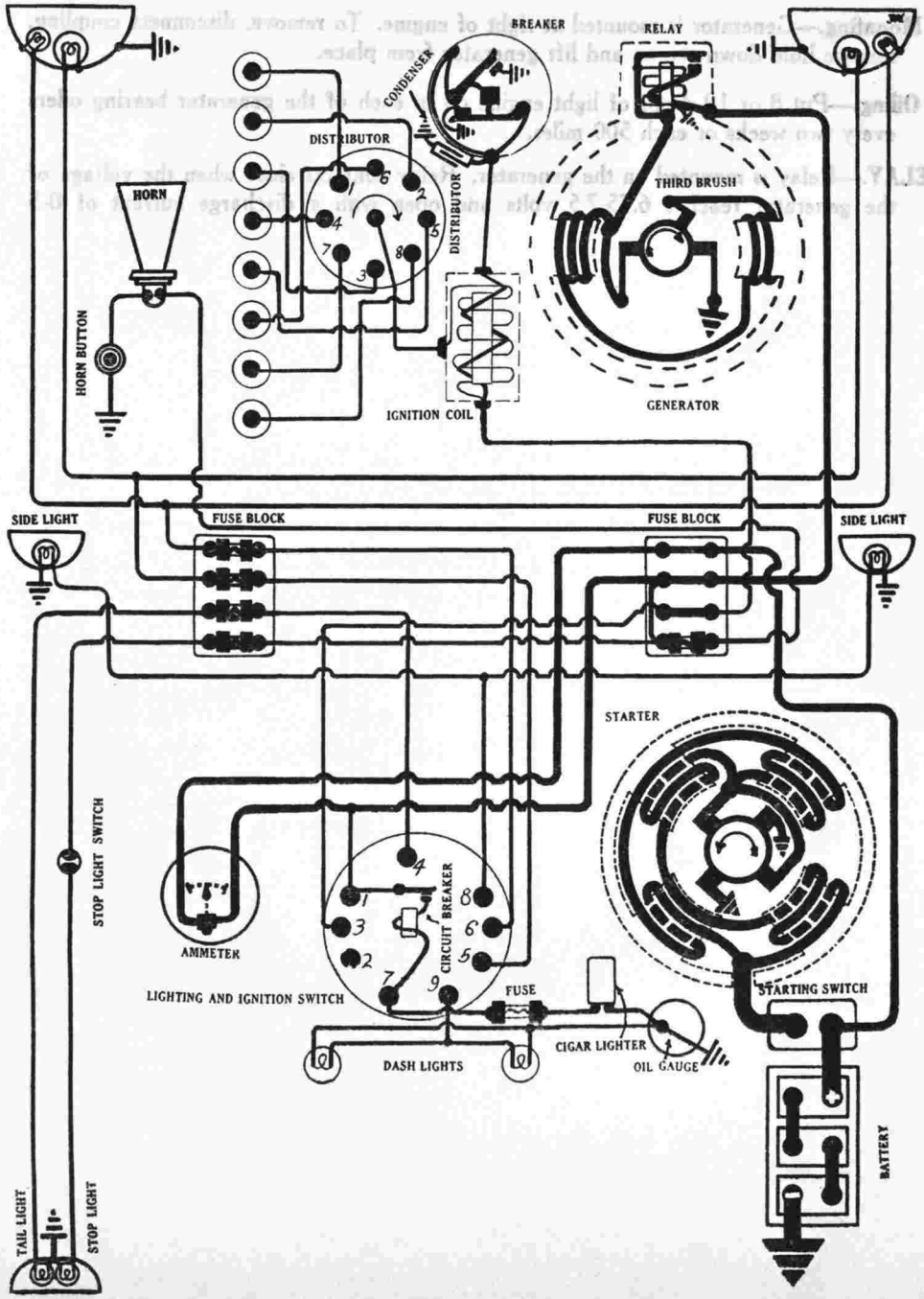
Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are .025 inch.

STARTER:—Model 313. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension is 2¼-2½ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	4.0	60
2 "	1750	5.5	175
13 "	Lock	3.0	450

Oiling:—Starter bearings are oilless. They require no attention.



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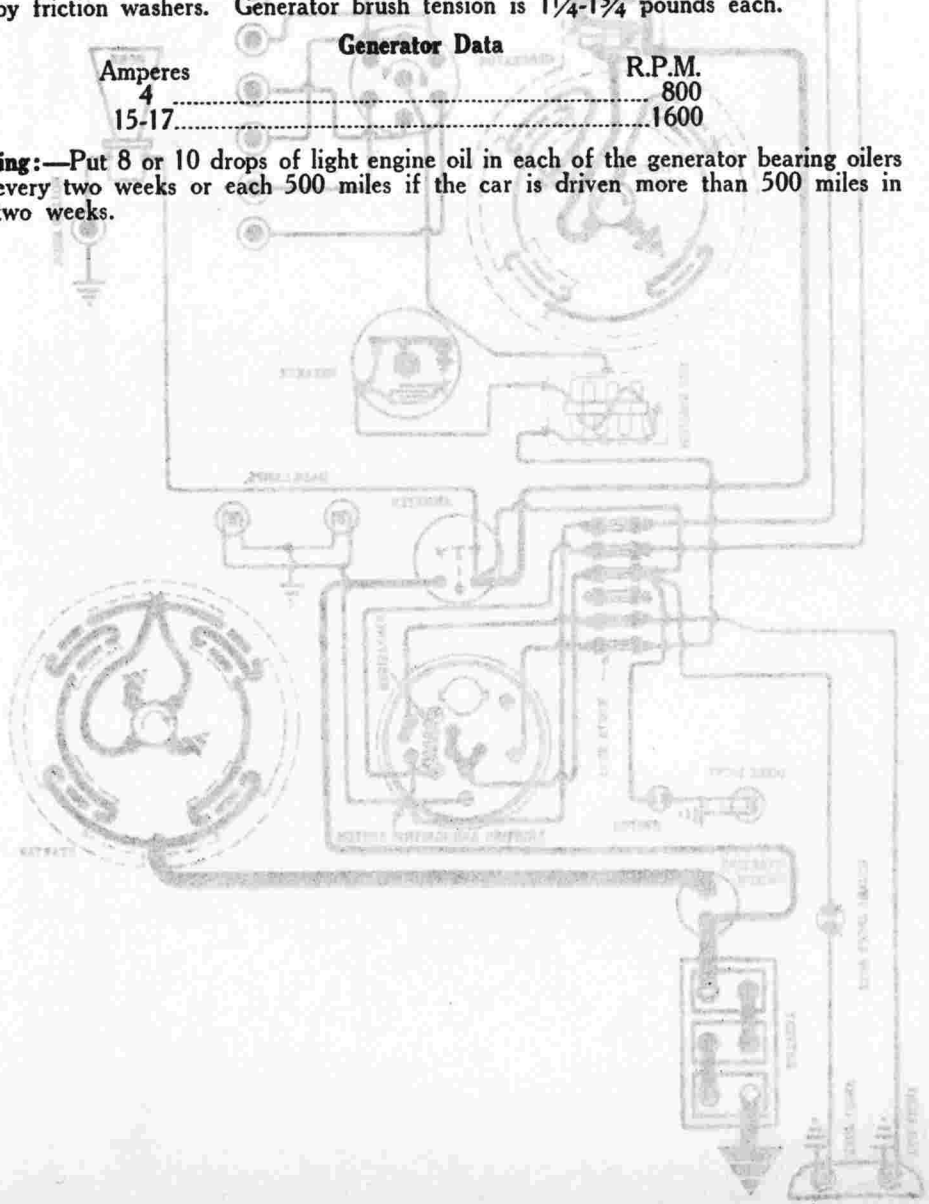
EIGHT IN LINE MODEL (1925-1926)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

GENERATOR:—Model 256. The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove commutator cover band and shift third brush mounting plate by means of the handle on the plate. Shift the third brush in a clockwise direction to increase charging rate and in the opposite direction to decrease the charging rate. The brush and mounting plate are held in any position by friction washers. Generator brush tension is 1¼-1¾ pounds each.

Generator Data

Amperes	R.P.M.
4	800
15-17	1600

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.



RELAY:—Relay is mounted on the generator. Relay closes when the voltage of the generator reaches 6.75-7.5 volts and opens with a discharge current of 0-3 amperes. Contacts separate .025-.035 inch. Air gap between relay armature and coil core is .015-.020 inch, contacts closed.

LIGHTING:—Switch Model 1246. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament for dimming. Stop lamp is 6-8 volt, 15 cp. S.C. Corner lamps and dome lamp are each 6-8 volt, 4 cp. D.C. Side lamps are each 6-8 volt, 4 cp. S.C. Dash and tail lamps are each 6-8 volt, 3 cp. S.C. Tonneau lamp is 6-8 volt, 3 cp. D.C.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the back of the switch. A current of 25-30 amperes causes this device to operate limiting the current to 10-15 amperes.

FUSES:—Fuses in body light circuits are 10 amperes.

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TWIN VALVE SIX MODEL (1925-26-27-28)
DE JON GENERATING, STARTING AND LIGHTING SYSTEM
DE JON IGNITION

BATTERY:—Willard, Type SJRR-6, 6 volt. Starting capacity is 166 amperes for 20 minutes. Lighting capacity is 5 amperes for 31 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model CA-4011. Distributor Model IA-4011. Breaker contacts separate .018-.022 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is of the manual type. Condenser is mounted in the distributor head and is of .20-.25 microfarads capacity. Ignition current is 6.3-6.5 amperes at 6 volts with resistance cold, decreasing to 3.5-3.6 amperes at 6 volts with ballast register hot. On bench test with De Jon distributor, maximum spark is .394 inch between needle points with breaker running at 1000 R.P.M. Distributor is of manual type. Maximum manual advance is 25°. Breaker arm spring tension is 20 ounces.

Note:—Distributor has been furnished with two types of breaker arms. First type breaker arm was not insulated at hinge stud and was grounded to breaker plate through copper pig tail. Later type distributor arm is insulated at hinge stud and is grounded through copper ground strip fastened by clamp and screw. The two types are not interchangeable.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor head every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 3-3.5° (on the flywheel) past top dead center with the spark control lever in the fully retarded position. To set timing, crank engine until piston No. 1 reaches this position. Fully retard spark control lever. Then loosen timing adjustment screw in center of breaker cam and rotate cam until breaker contacts begin to separate. Tighten the screw. Make certain that the rotor button is under the segment connected to the spark plug in cylinder No. 1.

Valve Timing:—The McFarlan engine has two inlet and two exhaust valves in each cylinder. INLET VALVES:—Head diameter, 1½ inches; stem diameter, .3715 inch; stem length, 8 13/64 inches; valve lift, 5/16 inch; spring pressure, 60 pounds; tappet clearance, .007 inch (hot). Inlet valves open 3° 35′ after top dead center and close 29° 40′ before lower dead center.

EXHAUST VALVES:—Head diameter, 1½ inches; stem diameter, .3715 inch; stem length, 8 13/64 inches; valve lift, 5/16 inch; spring pressure, 60 pounds; tappet clearance, .012 inch (hot). Exhaust valves open 48° 6′ after lower dead center and close 11° 41′ before top dead center. Valve stem guides are removable. Oversize valve stems are not made.

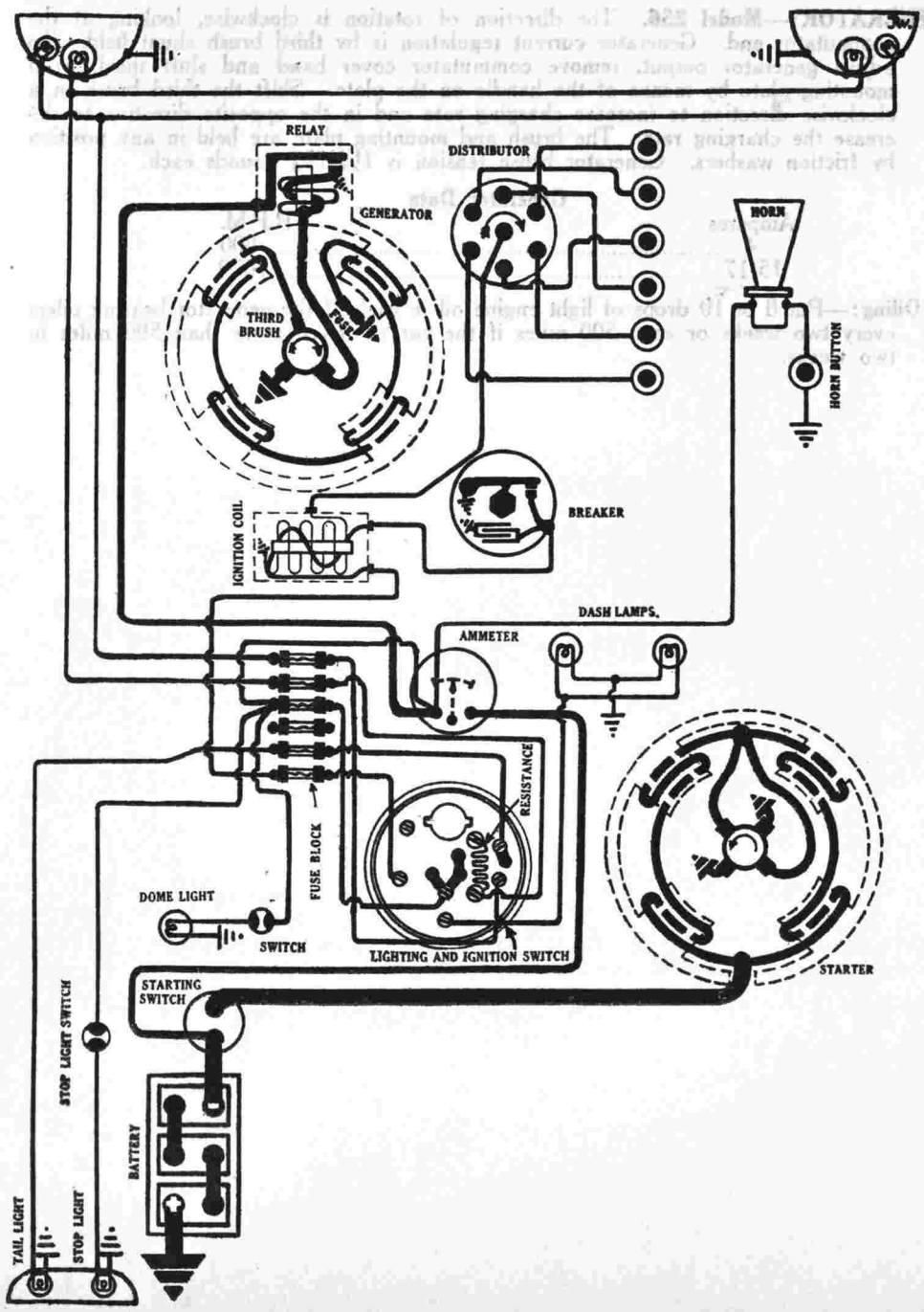
Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

STARTER:—Model SC-4001. Starter is connected to the engine through a Bendix drive, Type L-13-M-X. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	5.0	50
1.8 "	1275	5.5	100
5.5 "	850	5.0	200
9.9 "	590	4.5	300
15.0 "	450	4.0	1400
44.0 "	Lock	4.0	1000
31.25 "	Lock	3.0	700



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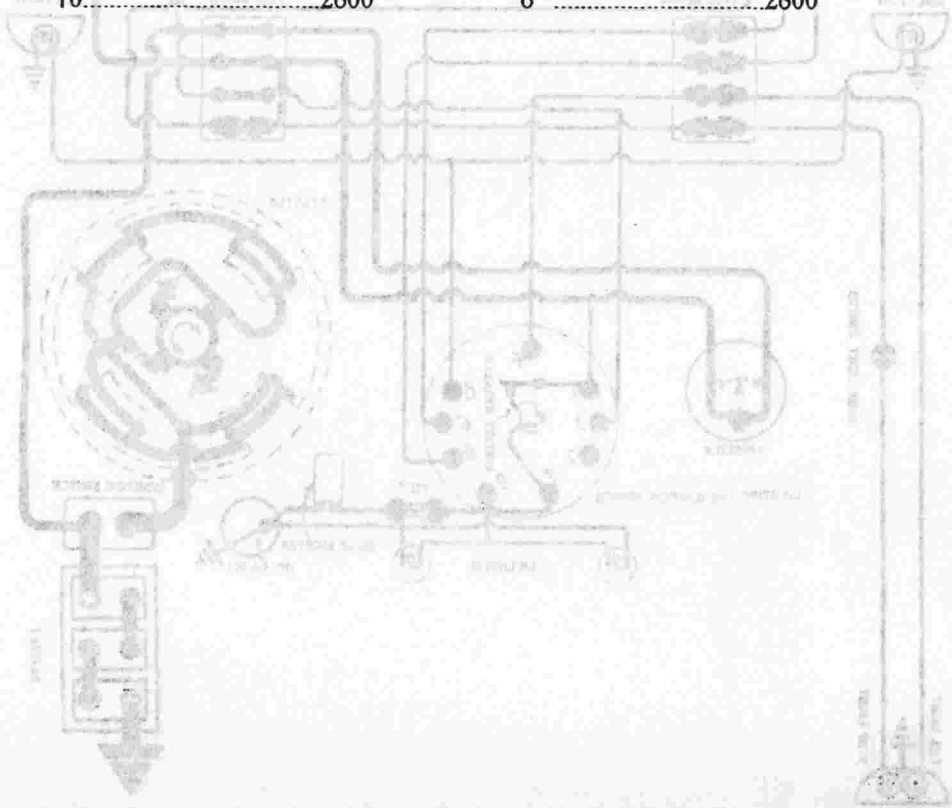
TWIN VALVE SIX MODEL (1925-26-27-28)
DE JON GENERATING, STARTING AND LIGHTING SYSTEM
DE JON IGNITION

Oiling:—Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR:—Model DE-4001. The direction of rotation is clockwise, looking at the commutator end. Generator current is by third brush shunt field. To adjust generator output, insert a screwdriver in the slotted third brush shifting shaft extending through to the outside of the generator endplate and shift the third brush by turning the shaft. Turning the shaft to the left or in a counter-clockwise direction increases the charging rate and in a clockwise direction decreases the charging rate. With maximum setting, generator output is 17-18 amperes at 8 volts reached at 1500-1600 R.P.M.

Generator Data

Colt Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
6	500	4	500
10	600	7	600
12	800	9	800
15	1000	12.5	1000
16	1200	12.5	1200
14	1600	11.	1600
10	2800	8	2800



Shunt field current is 2.5 amperes at 6 volts. Brush spring tension is 1½-2 pounds. A five ampere fuse mounted on the generator endplate protects the field circuit. No other size fuse should be used to replace it.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Model RA-4001-A. Relay is mounted on top of the generator. Relay contacts close when the voltage of the generator reaches 7-7.5 volts at 625 R.P.M. and open with a discharge current of .5-2.5 amperes. Maximum charging current at closing of contacts is 5 amperes. Contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING:—Clum Switch Model 10471. Head lamps are 6-8 volt, 21 cp. S.C. Dimmer lamps are 6-8 volt, 14 cp. S.C. Stop lamp is 6-8 volt, 15 cp. S.C. Corner lamps and dome lamp are each 6-8 volt, 4 cp. D.C. Step lamp is 6-8 volt, 4 cp. D.C. Side lamps are 6-8 volt, 4 cp. S.C. Dash, tonneau and tail lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuses are 30 amperes.

McFARLAN

EIGHT IN LINE MODEL (1927-28)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type SJRR-4, 6 volt. Starting capacity is 125 amperes for 20 minutes. Lighting capacity is 5 amperes for 22 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model 525-A. Distributor Model 658-A. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 15° (engine). Automatic advance begins at 300 R.P.M. of engine. Maximum automatic advance is 15° (engine) reached at 1800 R.P.M. Breaker arm spring tension is 15-20 ounces. Breaker has two sets of contacts on a four sided cam opening alternately at intervals of 45° corresponding to 90° of crankshaft rotation. This firing interval must be accurately set (see Timing).

Oiling:—Fill the grease cup on the side of the distributor housing with medium cup grease and turn down two turns every month or each 1000 miles. Remove the rotor and saturate the wick in the oiler in the shaft with light engine oil every 1000 miles. At the same time put a small bit of vaseline on the face of the breaker cam.

Timing:—Before setting timing, check timing for correct firing interval of contacts. Use special synchronizing tool which is Delco-Remy Part No. 820738. Set contact opening at .022 inch and place tool on shaft locking it in position by pushing the slide in until the arrow on the silde points in the direction of rotation. Then rotate the distributor shaft until contacts mounted on stationary plate begin to separate. Note scale reading on leading scale opposite edge of terminal block on housing and turn shaft until same reading on second scale is opposite the same point on the housing. If second set of contacts do not separate at this point loosen lockscrews and turn eccentric adjusting screw until contacts begin to separate. Tighten the lockscrews.

Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control lever in the fully retarded position. To set timing, crank engine until piston No. 1 reaches top dead center on compression stroke (the upstroke with all valves closed). Then fully retard spark control lever. If contacts are not separating, loosen advance arm clamp screw and rotate distributor until one set of contacts begin to open. Tighten the clamp screw and make certain that the segment opposite the rotor button is connected to the spark plug in cylinder No. 1.

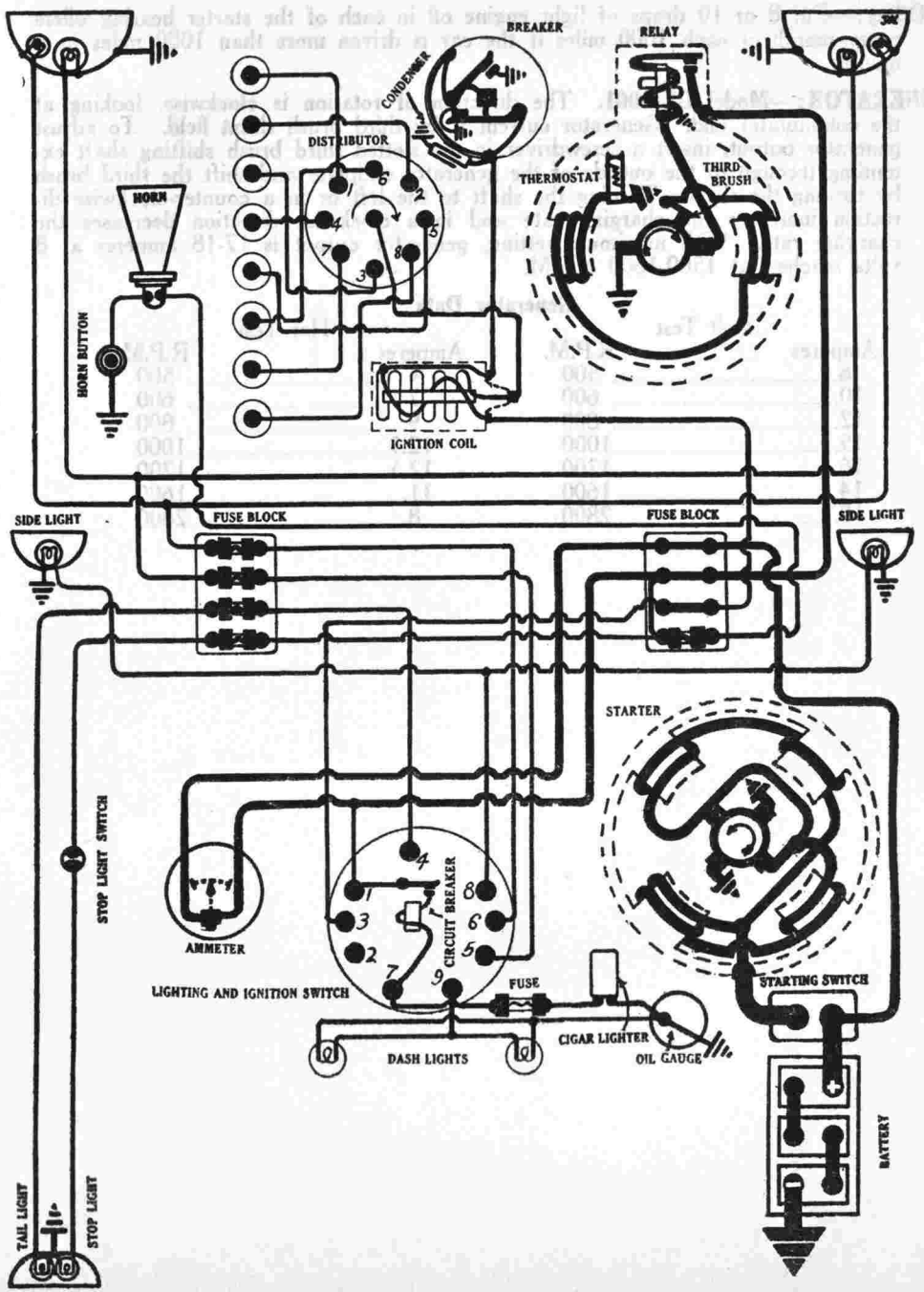
Valve Timing:—INLET VALVES:—Head diameter, 1 9/32 inches; stem diameter, 11/32 inch; stem length, 5½ inches; valve lift, 5/16 inch; spring pressure, 36 pounds; tappet clearance, .006-.008 inch (hot). Inlet valves open at top dead center and close 35° after lower dead center.

EXHAUST VALVES:—Head diameter, 1 13/32 inches; stem diameter, 11/32 inch; stem length, 5½ inches; valve lift, 5/16 inch; spring pressure, 36 pounds; tappet clearance, .006-.008 inch (hot). Exhaust valves open 42° before lower dead center and close 5° after top dead center.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are ⅞ S.A.E. Standard. Gaps are .025 inch.

STARTER:—Model 720-YX. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter switch is Model 406-A. Brush spring tension is 24-28 ounces.



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McFARLAN

EIGHT IN LINE MODEL (1927-28)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

Starter Data

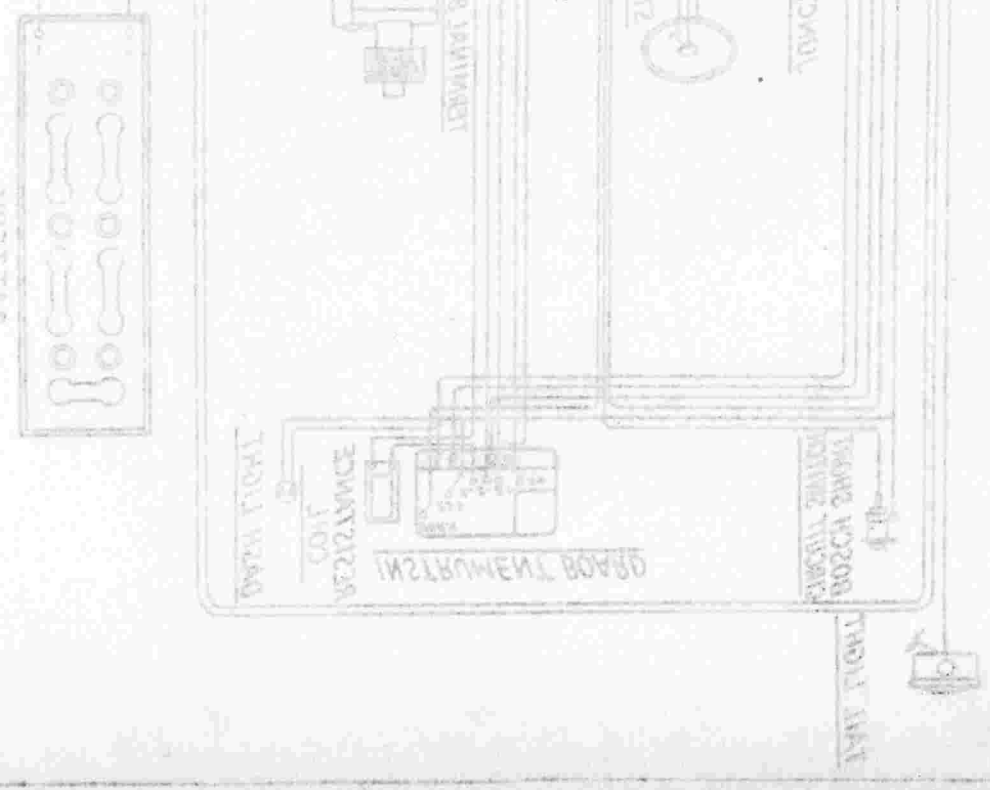
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Oiling:—Put 4 or 5 drops of light engine oil in the starter bearing oiler every month or each 1000 miles.

GENERATOR:—Model 941-S. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field combined with a thermostat. Thermostat contacts open at 160°F. cutting a resistance in the shunt field circuit and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the endplate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Maximum charging rate is 20 amperes at 8.3 volts reached at 1450 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	575			
2	7.25	675	12	7.5	2000
7	7-7.3	750			
21	8.3-8.5	1450			



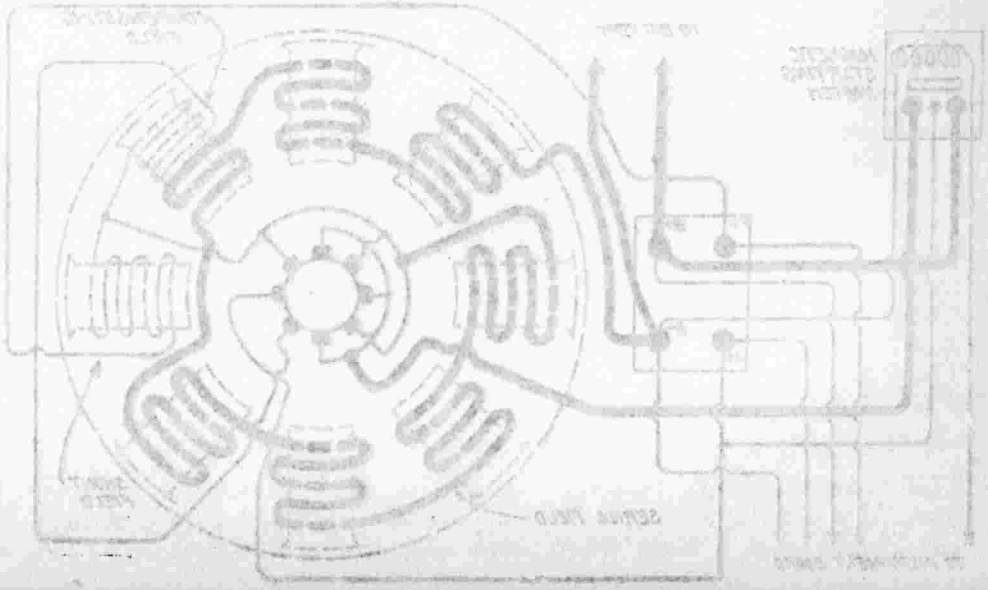
Motoring generator draws 5-5.5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 14-18 ounces each.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 675 R.P.M. when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is 2 amperes. Contacts separate .015-.025 inch. Air gap is .018-.022 inch, contacts closed.

LIGHTING:—Delco-Remy Switch Model 1246. Head lamps are 6-8 volt, 21 cp. S.C. Stop lamp is 6-8 volt, 21 cp. S.C. Dash, tail, corner and auxiliary head lamps are each 6-8 volt, 3 cp. S.C. Dome lamp is 6-8 volt, 3 cp. D.C.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the back of the switch to protect the lighting circuits. A current of 25-35 amperes will cause this device to operate. While vibrating the current is 10-15 amperes.



MERCER

SERIES 22-70 (1914-15) 22-72 (1916) 22-73 (1917)
U. S. L. GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH IGNITION

BATTERY.—Battery is 12 volt, 80 ampere-hour. The negative (—) terminal is grounded

IGNITION.—Bosch Type DU4. Breaker contacts separate .014 to .016 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 2 or 3 drops of light machine oil in each of magneto oilers every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fuly retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .018 to .023 inch.

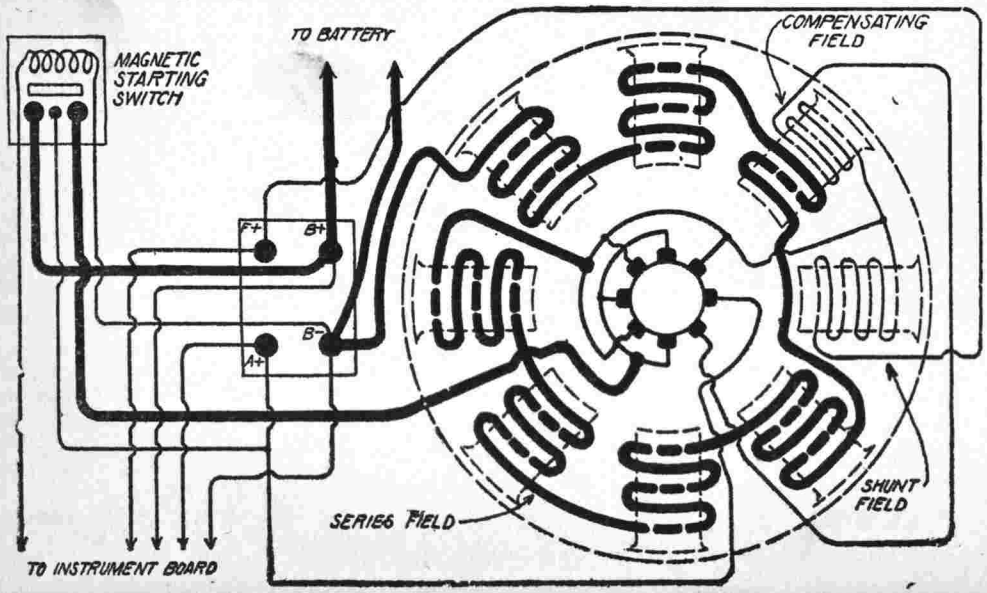
STARTER-GENERATOR.—Starter and generator are combined into one unit. The armature is fastened direct to the crank shaft, taking the place of the flywheel. An electromagnetic starting switch is provided. When the button, marked "Start," on the dash is pressed in, the circuit through a solenoid is closed. The solenoid draws in an iron core which closes a sliding switch, thus completing the main motor circuit. The core of the solenoid is forced out by a spring when the "Start" button is released. The touring button must be pulled out to start. The three lower brushes are used when the unit is operating as a generator. The other five are used for the starter. Spring tension on the generator brushes is 1¾ pounds. Spring tension on the starter brushesis 1¼ pounds.

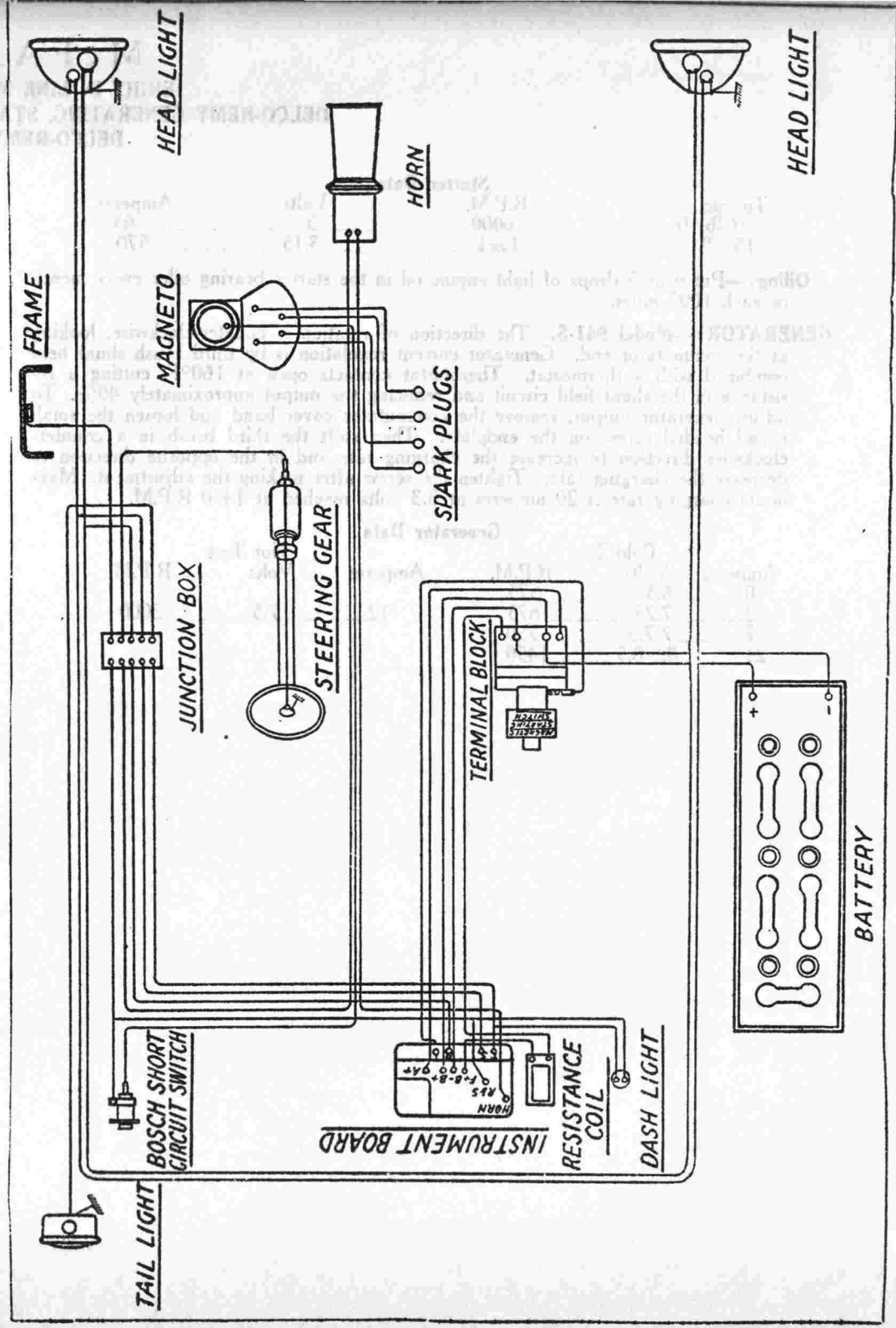
GENERATOR.—Generator current regulation is by reverse series field and a compensating field winding. Maximum current output is 18-20 amperes at 20-25 miles per hour. Charging rate may be varied by substituting a different resistance coil in the shunt field circuit. This resistance coil is mounted on the dash. The "Touring" button provides a means of cutting out the battery when it is fully charged. Pressing in the button opens the shunt field circuit and disconnects the battery from the generator.

RELAY.—Relay closes at 10 and opens at 8 miles per hour. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 12-16 volt, 24 cp. Dimmer lamps are 12-16 volt, 6 cp. Dash and tail lamps are each 12-16 volt, 6 cp.

FUSES.—There is a 30 ampere fuse in the charging circuit and a 5 ampere fuse in the field circuit. Lighting circuit fuses are 10 ampere.





MERCER

MODEL 22-74 SERIES 4 (1917-18)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
BERLING IGNITION

BATTERY.—Willard, Type SJR-6, 6 volt, 163 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Berling Magneto, Type F-41. Breaker contacts separate .016 to .020 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 10 drops of light engine oil in each oil cup every month. Put a small amount of vaseline on the cam and rubbing surface of the fiber lever, applying with a toothpick. If the car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

TIMING.—Magneto breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

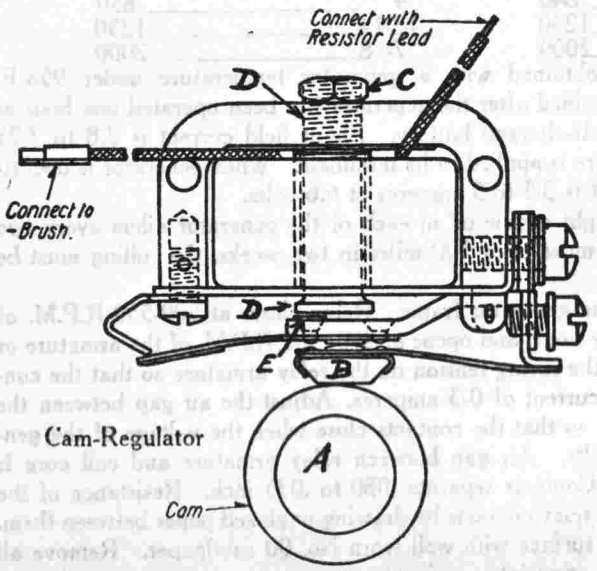
FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .016 to .020 inch.

STARTER:—Frame 775. Starter is connected to the engine through a magnetically shifted pinion. The starting switch is of the magnetic type, controlled by a push button on the dash. Lock torque developed by the starter is 12.5 pound-feet, current being 400 amperes. Torque at 1200 R.P.M. is 2.5 pound-feet.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

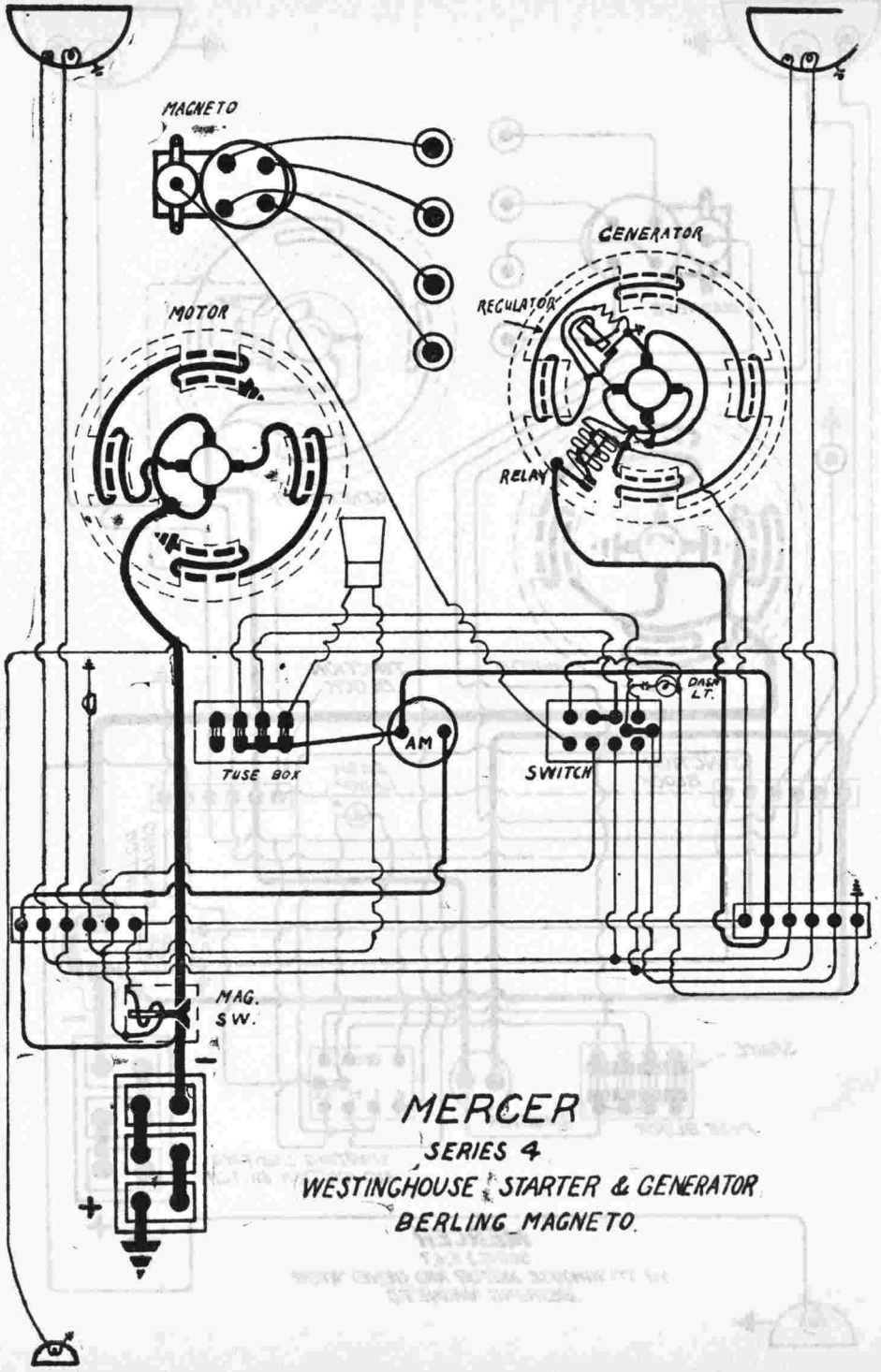
GENERATOR:—Frame 762-R, Style 287,842. Generator voltage regulation is by combined magnetic and mechanical cam regulator. Maximum output of generator is 12 amperes at 6.5-7 volts, reached at 1800 R.P.M. of the armature or 25 miles per hour. On open circuit, generator voltage is 8.0 at 1800 R.P.M. To adjust the cam regulator, loosen the nut C and turn the screw D until the air gap between D and E is .003 inch, when the rider B is on the highest point of the cam A. Further adjustment to obtain the specified action is made by bending the stop F. Resistance of regulator winding is 10 ohms. Resistance of the part of the resistor which is in series with the regulator coil is 10 ohms. Resistance of the part of the resistor connected across the contacts is the armature or 6-8 miles per hour, and opens at 425-475 R.P.M. of the armature or 5-7 miles per hour. Adjust the armature stop so that the relay contacts open when the discharge current is 0-3 amperes. Adjust the spring tension so that relay closes when the voltage of the generator reaches 5.8 to 6.1 volts, battery disconnected. Air gap between relay armature and coil core is .005 inch, contacts closed. Contacts separate .012 to .018 inch. Resistance of the shunt coil with resistor is 56.5 ohms. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.



Cam-Regulator

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 5 cp. Dome and pillar lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 3 cp. Tail lamp is 6-8 volt, 5 cp.

FUSES.—Fuses are 20 ampere.



MERCER

SERIES 5 (1918-19-20-21) SERIAL NOS. 4600 UP
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
EISEMANN MAGNETO IGNITION

BATTERY.—Willard, Type SJRN-6, 6 volt, 90 ampere-hour. The positive (+) terminal is grounded.

IGNITION:—(1920) Berling Type F-41 (1921) Eisemann Type G-4, 2nd Ed. Breaker contacts separate .016 to .020 inch on the Berling, and .010 to .012 inch on the Eisemann magneto. Resurface contacts with a fine flat jewelers file or worn No. 00 sandpaper.

OILING:—Berling:—Put 10 drops of light engine oil in each oiler, and put a small amount of vaseline on the surface of the cam every 1000 miles. **Eisemann:**—Put 1 or 2 drops of light oil in each oil well every 1000 miles.

Timing.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps are .022 inch.

STARTER:—Frame No. 771, 775, 776, 777, 778. Starter is connected to the engine through a Bendix drive. Starting switch is magnetic type controlled by a push button on the dash. Starter cranks the engine at 115 R.P.M., taking 250 amperes.

Starter Data

Torque	R.P.M.	Amperes
0 lb. ft	3500-6000	35-50
5 lb. ft	1400	235
31 lb. ft	Lock	750

Brush tension should be from 2½ to 3 pounds per brush.

Oiling.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR.—Frame No. 760. Style 287,842. Generator current regulation is by the third brush system. Maximum current output is 15-17 amperes, reached at 1250 R.P.M. of the armature or 16-20 miles per hour.

Generator Data

Amperes	Cold Test R.P.M.	Amperes	Hot Test R.P.M.
0	450	0	500
8	675	6	725
12	840	9	850
15-17	1250	12-14	1250
10	2000	7- 8	2000

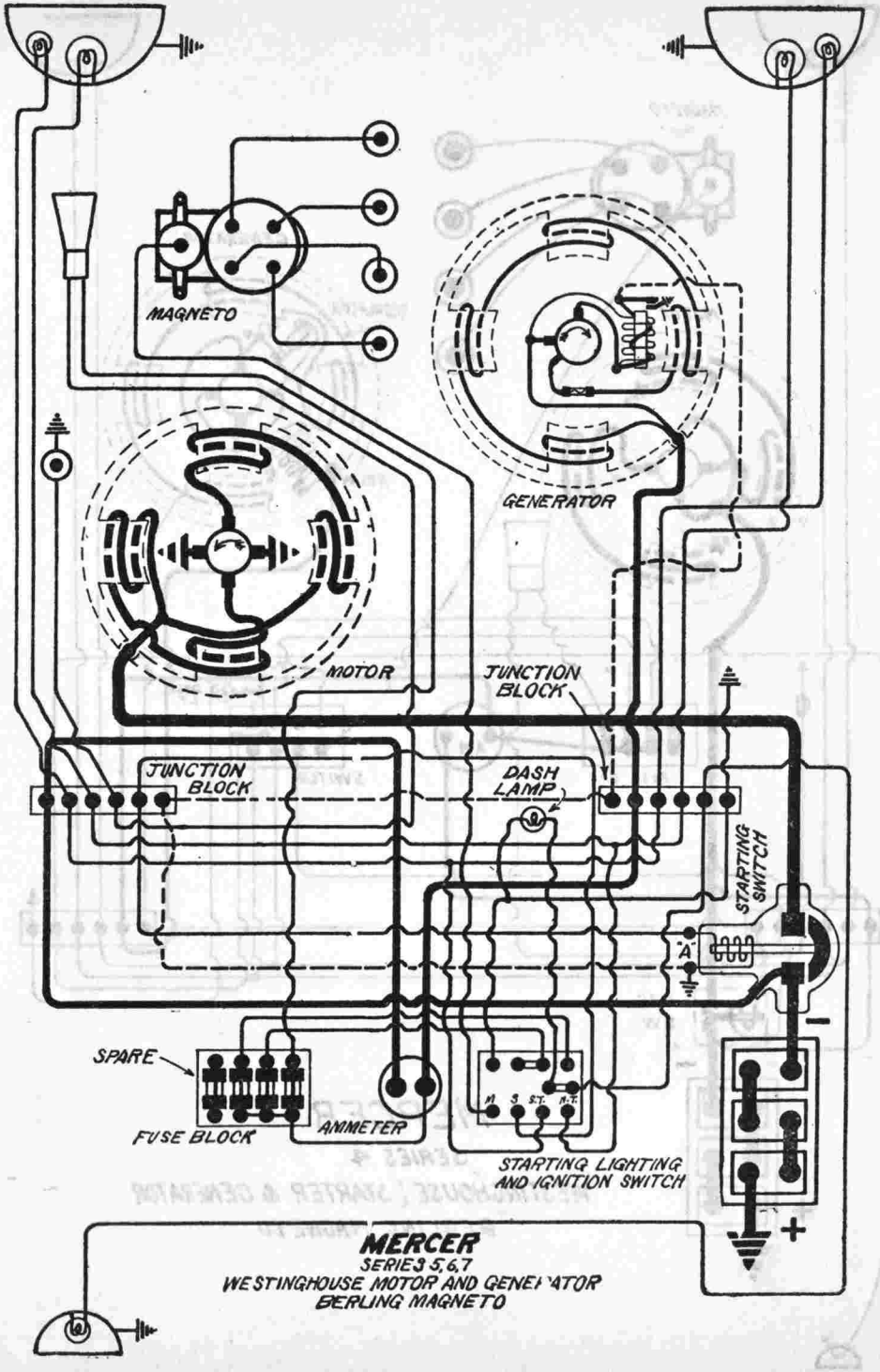
The cold test readings are obtained with a generator temperature under 95o F. The hot test readings are obtained after the generator has been operated one hour at 1800 R.P.M.. charging a half-charged battery. Shunt field current is 2.8 to 3,25 amperes, when 6 volts pressure is applied to its terminals. When generator is operating freely as a motor, current is 3.5 to 5 amperes at 6.6 volts.

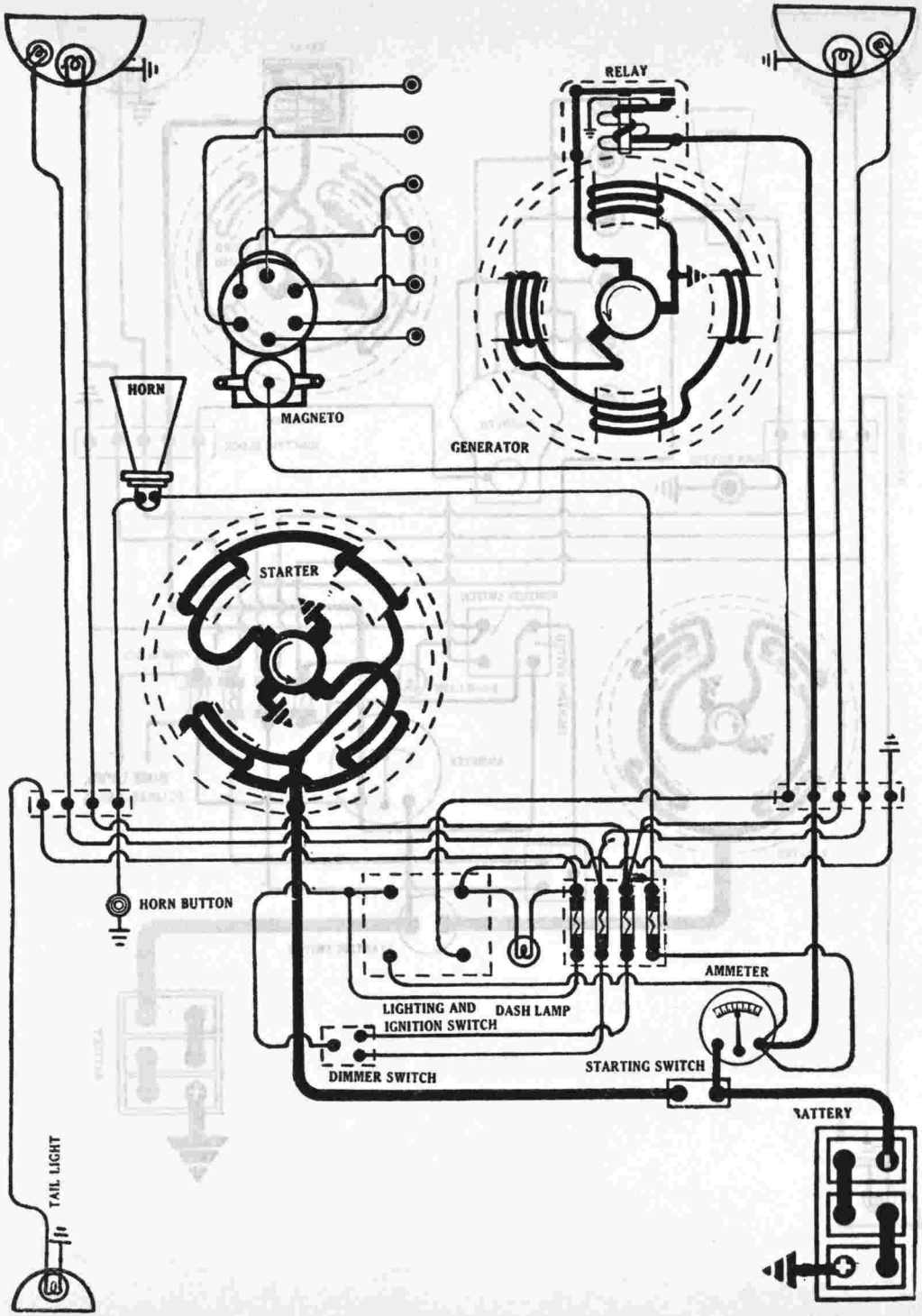
Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 50(miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in the generator frame. Relay closes at 500-550 R.P.M. of the armature or 7-9 miles per hour, and opens at 450- 500 R.P.M. of the armature or 5-7 miles per hour. Adjust the spring tension on the relay armature so that the contacts open with a discharge current of 0-3 amperes. Adjust the air gap between the relay armature and coil core so that the contacts close when the voltage of the generator reaches 6.2 to 6.5 volts. Air gap between relay armature and coil core is .005 inch, contacts closed. Contacts separate .030 to .035 inch. Resistance of the shunt coil is 68 ohms. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 5 cp. Tail lamp is 6-8 volt, 5 cp. Dash lamp is 6-8 volt, 2 cp.

FUSES.—Lighting fuses are 30 ampere. Genrator field fuse is 5 ampere.





MERCER

SERIES 6 (1922-23-24-25)

WESTINGHOUSE GENERATING, STARTING, AND LIGHTING SYSTEM
SPLITDORF MAGNETO IGNITION

BATTERY.—Willard, Type SJR-5, 6 volts, 132 ampere-hours capacity. The starting capacity is 135 amperes for 20 minutes. The lighting capacity is 5 amperes for 26 hours. The positive (+) terminal is grounded.

IGNITION.—Splitdorf, Type SS, 6 cylinder magneto is used. Breaker contact points separate .020 inch to .024 inch when the fibre bumper is on the highest point of cam.

Oiling.—Put a few drops of light engine oil into each magneto oiler once every 500 miles. NOTE.—Do not put more than 2 or 3 drops, rather a drop less than too many, as the oil will gum the mechanism and cause considerable magneto trouble.

Timing.—Breaker contacts begin to separate when piston No. 1 is at top dead center on compression stroke spark control lever and breaker assembly fully retarded. To time the ignition, retard spark control lever and breaker assembly fully with piston No. 1 on compression stroke, rotate magneto drive shaft until the breaker contact points just begin to separate. At this point, connect the magneto to the engine drive shaft.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plugs.—The spark plug gaps are .020 inch.

STARTER.—Frame No. 711. The starter is connected to the engine by a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter running free, at 3500-6000 R. P. M. of armature, takes a current of 35-45 amperes at 5.5. volts. The lock torque is 17 pound-feet taking a current of 525 amperes, at 4 volts.

Oiling.—Put 4 or 5 drops of light engine oil into each starter oiler every month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles.

GENERATOR.—Frame No. 56-AT. The direction of rotation is counter-clockwise looking at commutator end. The third brush system is used for current regulation. To adjust the charging rate of the generator remove the fibre plate on the front end of the generator housing, loosen the brass nut and move the brush in the direction of rotation (counter-clockwise) to increase the charging rate. To decrease the charging rate, move the third brush in the opposite direction to rotation (clockwise).

Generator Test Data

Amperes	R.P.M.	Volts
0	500	6.5
8	750	7.5
15-17 (Max)	1100-1600	8.0
7-12	2500	7.0

Generator motoring freely takes a current of 5 amperes at 6 volts. The field draws a current of 2.5 amperes at 6 volts.

Oiling.—Put 4 or 5 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Relay closes at 450-500 R.P.M. of armature or 8-10 M.P.H. at 6.5 volts, and opens at 400-450 R.P.M. of armature or 6-8 M.P.H. with a current discharge of 0-3 amperes. The contact gap is .030-.035 inch, contacts fully separated. The air gap between the relay armature and coil core is .015-.025 inch, contacts fully closed.

LIGHTING.—Head lights are each 6-8 volts, 21 cp. Dimmer lights are each 6-8 volts, 5 cp. Tail light is 6-8 volt, 4 cp. Dash light is 6-8 volts, 2 cp. All the above lights are of the single contact base type. Limousine dome and corner lights are each 6-8 volts, 2 cp. D. C. Coupe dome light is 6-8 volts, 4 cp. D. C.

MERCER

SERIES 6 (1925-26)

AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM SPLITDORF IGNITION

BATTERY.—Willard, Type SJR-5. 6 volt, 135 ampere hour. Starting capacity is 145 amperes for 20 minutes. Lighting capacity is 5 amperes for 26 hours. The positive (+) terminal is grounded.

IGNITION.—Splitdorf, Type SS. Breaker contacts separate .020-.024 inch with the fiber bumper on the highest point of the cam. They are made of platinum. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or with well worn No. 00 sandpaper.

Oiling.—Put 2 or 3 drops of light engine oil in the magneto oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Care must be exercised not to overoil the magneto as this causes much of magneto trouble.

Timing.—Breaker contacts begin to separate when piston No. 1 reaches top dead center on compression stroke with the spark control lever and breaker assembly in the fully retarded position. To time engine, rotate magneto drive shaft until breaker contacts just begin to separate. Then couple magneto to engine and connect spark plugs in correct order. Make certain that rotor is under segment connected to spark plug in cylinder No. 1.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER.—Model 1117. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 1¾-2 pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	6	60
12 "	Lock	4	450

Oiling.—Oilless bearings are used. They require no attention.

GENERATOR.—Model 1250. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the generator output loosen the hexagonal nut on the generator end plate and shift the third brush. Shifting the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. Tighten the nut after making the adjustment.

Generator Data

Amperes	R.P.M.
0	550
10	800
17	1200
15	1600

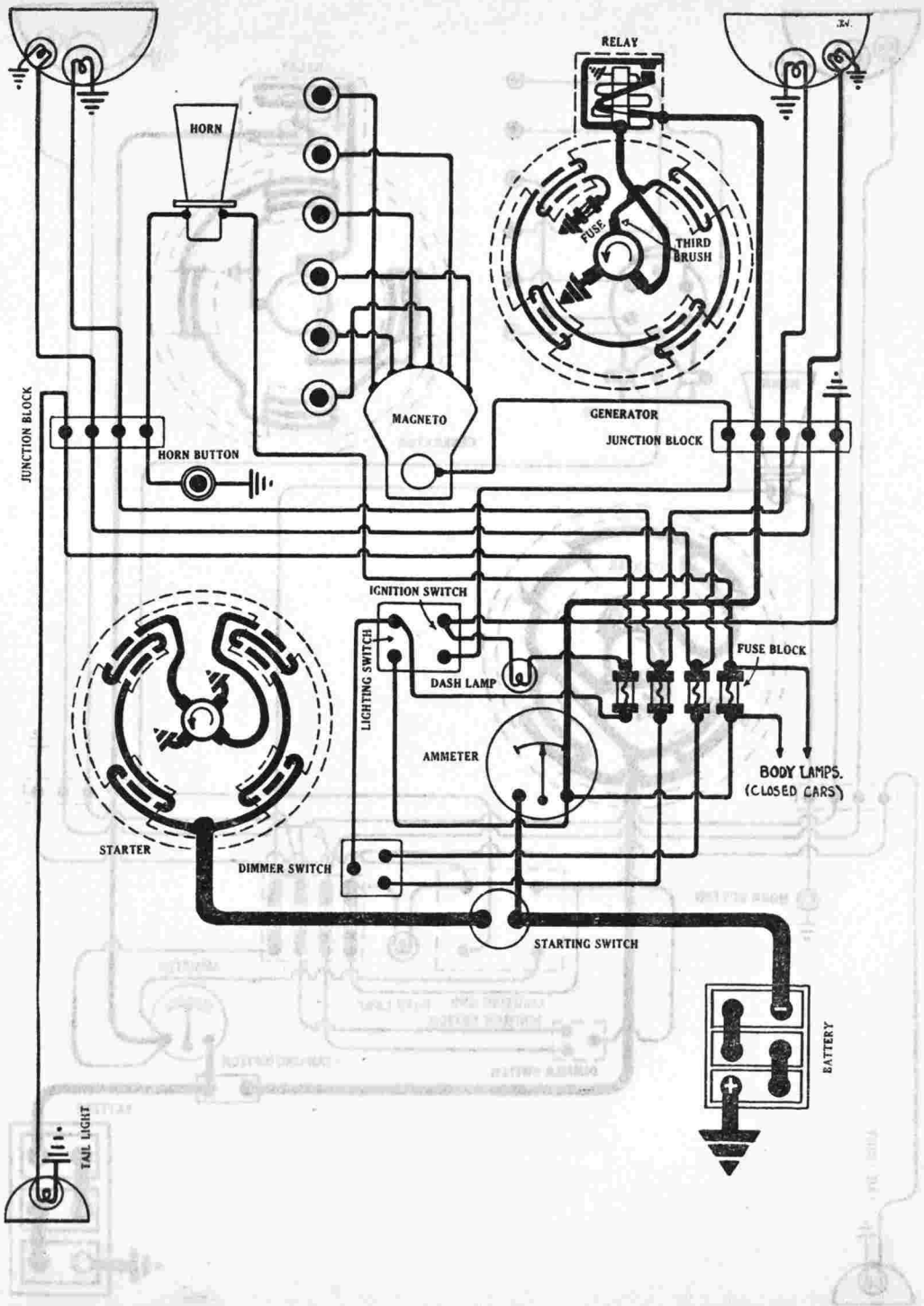
Motoring freely, generator draws 6 amperes at 6 volts. Shunt field current is 6.6 amperes at 6 volts.

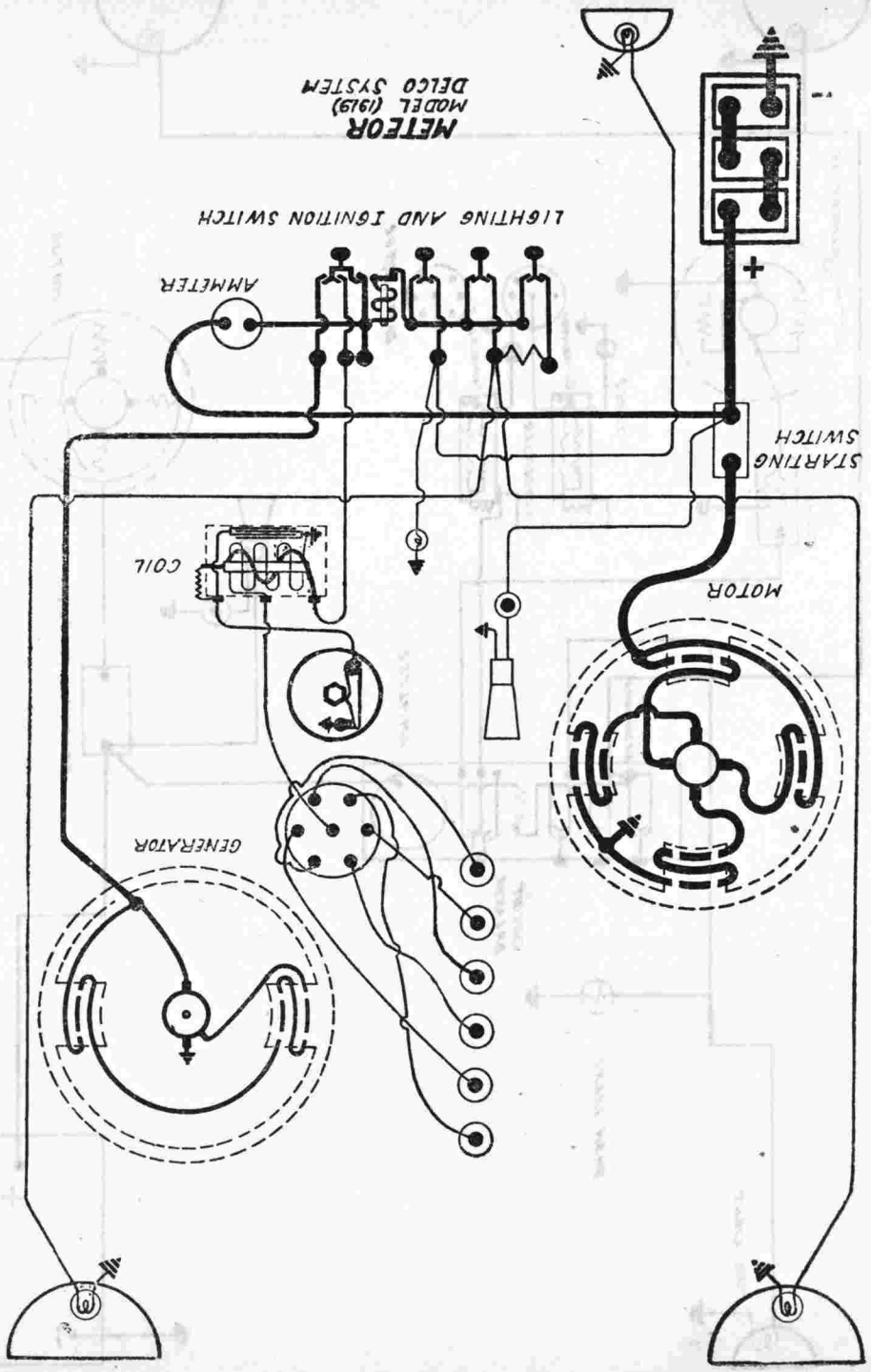
Oiling.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY.—Relay is mounted on top of the generator. Relay closes at 550-600 R.P.M. when the voltage of the generator reaches 6.5-7.0 volts and open at 400-500 R.P.M. with a discharge current of 0-3 amperes. Relay contacts separate .015 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING.—Head lamps are each 6-8 volt, 21 cp. S. C. Dimmer lamps are 6-8 volt, 4 cp. S. C. Dash and tail lamps are each 6-8 volt, 2 cp. S. C.

FUSES.—Generator field fuse is 7.5 amperes. Lighting fuses are 15 amperes.





METEOR

MODELS 75 AND 80 (1916-17-18-19)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Battery is 6 volt, 90 ampere-hour. The negative (—) terminal is grounded.

IGNITION—Coil Model No. 2158. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 4 or 5 drops of light engine oil in the ignition unit bearings every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly one-third advanced.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 5.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER:—Model No. 102. Starter is connected to the engine through a Bendix drive. Lock torque is 16 pound-feet at 3.5 to 3.8 volts. Running freely, starter takes 40 amperes.

OILING.—Starter bearings are of the oilless type.

GENERATOR.—Model No. 101. Generator current regulation is by the third brush system.

Generator begins to supply current at 500 R.P.M. of the armature or 7-8 miles per hour, and reaches the maximum current output of 14-16 amperes at 1400 R.P.M. of the armature or 18-22 miles per hour.

Generator Data

Amperes	Cold Test	R.P.M.	Amperes	Hot Test	R.P.M.
Neutral		500	Neutral		500
10.5-12.5		900	10-12		900
15.5-18.0		1400	14-16		1400
13.0-17.0		2000	11-13		2000

Charging rate is varied by adjusting the third brush setting. Loosen the two screws holding the third brush arm, and move in a counter-clockwise direction (looking at the commutator end) to increase the charging rate. Move the third brush in a clockwise direction to decrease the charging rate. Tighten the holding screws and reseat the brush after adjusting position.

OILING.—Put 5 or 6 drops of light engine oil in the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—There is no relay. The generator-battery circuit is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Dash and tail lamps are each 6-8 volt, 2cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start the vibrator. While vibrating, the current is 3.5 amperes.

METEOR

MODELS 75-A, 80-A, 82, 85 (1917-18)

Delco Starting and Lighting System

Delco Ignition

Battery.—Battery is 6 volt, 85 ampere-hour. The negative (—) terminal is grounded.

Ignition.—There are two separate ignition coils, timers and distributors, providing a complete and separate ignition system for each cylinder block. Breaker contacts should separate .018 inch to .020 inch. Should they become badly burned or pitted, resurface them with a fine, flat jeweler's file or a strip of worn No. 00 sand paper.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Spark Plug Gaps.—Spark plug gaps should be .028 inch to .030 inch.

Oiling.—Clean out the lower distributor bearing and repack with soft cup grease two or three times a season. Remove the cap on top of the distributor and put 4 or 5 drops of light engine oil in each of the oil holes exposed every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Starter.—Starter is connected to the engine through a Bendix drive. Motor should develop at least 16 pound-feet lock torque, terminal voltage measuring 3.5 to 3.8 volts. When running free, starter should not take more than 40 amperes.

Generator.—Generator current regulation is by third brush system. Although there is a relay, the circuit between generator and battery is broken when ignition switch is in "Off" position. Relay contacts should open about .030 inch. If badly burned or pitted, resurface them with a piece of worn No. 00 sand paper.

GENERATOR DATA, MODEL NO. 87.

Cold		Warm	
Amperes	R. P. M.	Amperes.	R. P. M.
Neutral	500 (or less)	Neutral	500
11.5-13.5	900	11-13	900
16.5-19.5	1400	16-18	1400
15.5-18.5	1800	15-17	1800
15 -18	2000	14-16	2000

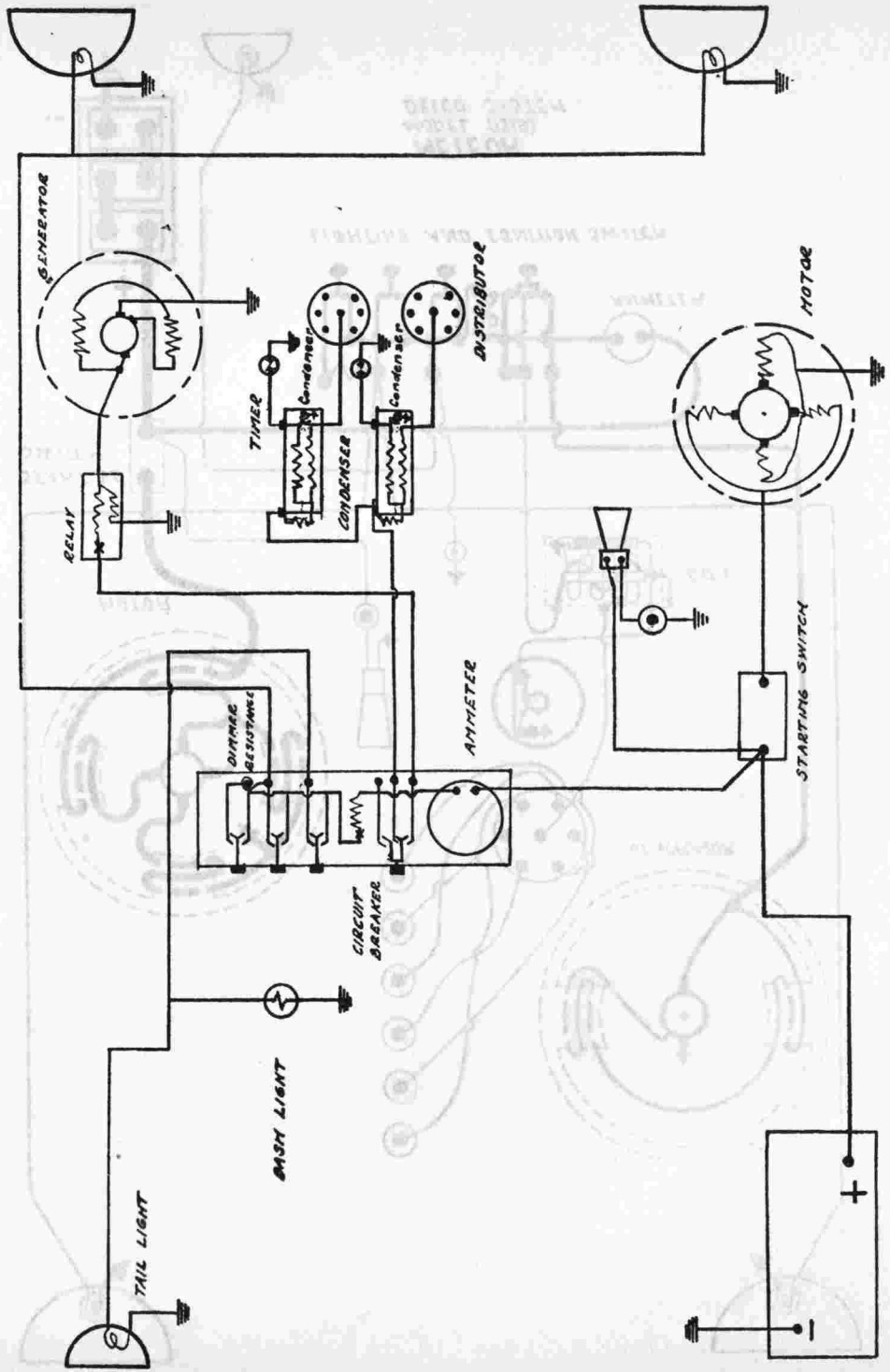
Although these outputs may be varied somewhat by adjustment of third brush should conditions require, the rates given here will give satisfaction in the average case. At no time should the maximum generator output exceed 20 amperes.

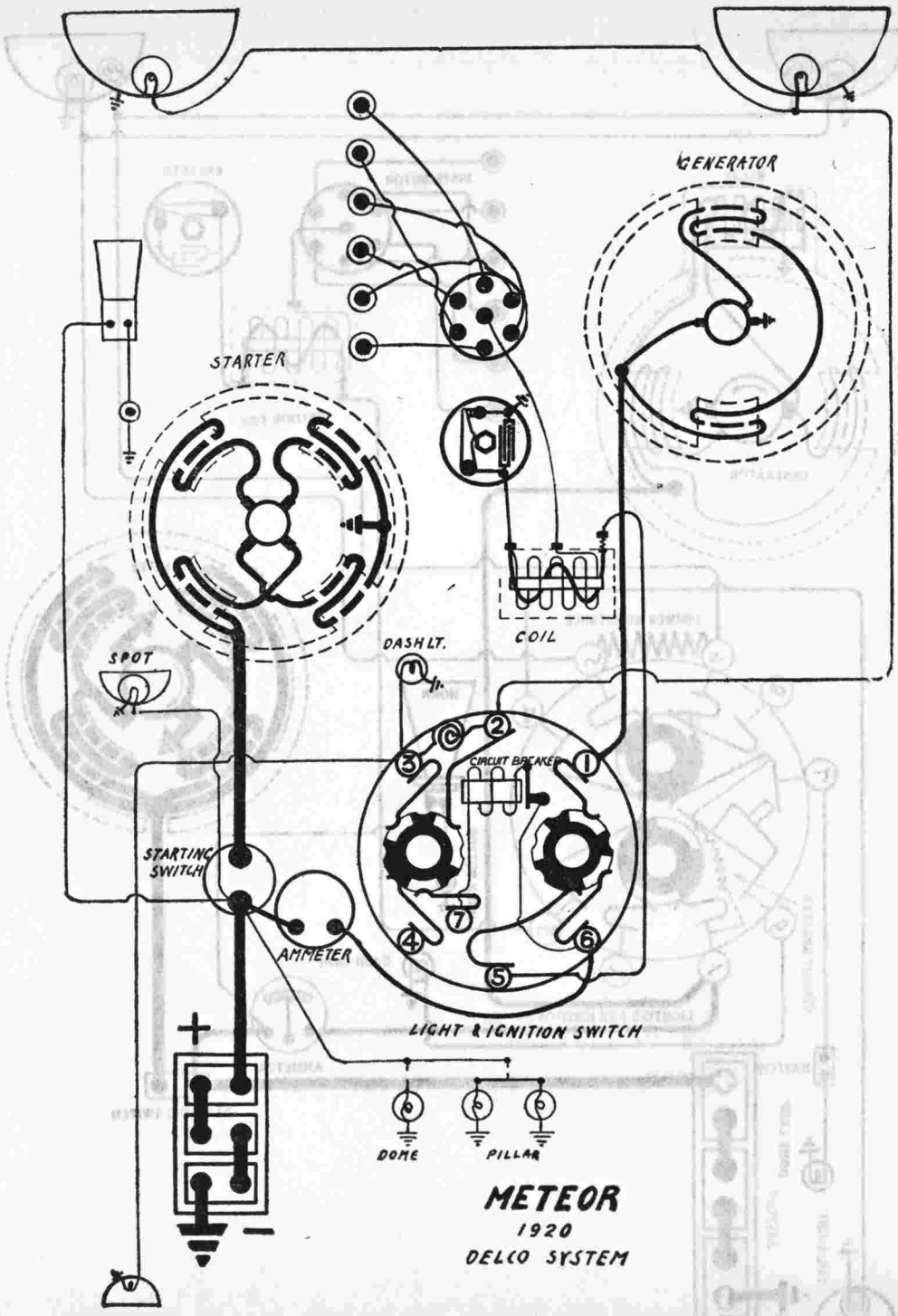
Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 17 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.

Circuit Breaker.—There is a vibrating type circuit breaker to take the place of fuses in the light circuits. It should take about 25 amperes to start this device vibrating, but once set vibrating, 3 to 5 amperes will cause it to continue operating.

Model Numbers.—Generator is No. 87. Starter is No. 86. Starting switch is No. 1965. Ignition coils are No. 2123. Distributor is No. 5156. Combination switch is No. 1105.





METEOR

1919-20. 9N ENGINE
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Battery is 6 volt, 90 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2159. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 4 or 5 drops of light engine oil in the ignition unit bearings every two weeks. If the track of the rotor button in the distributor head in not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks. these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly one-third advanced.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

STARTER.—Model No 136. Starter is connected to the engine through a Bendix drive. Running freely, starter takes 35 amperes, armature revolving at 4500 R.P.M.

GENERATOR.—Model No. 135. Generator current regulation is by the third brush system.

OILING.—Starter bearings are of the oilless type.

Generator begins to supply current at 500 R.P.M. of the armature or 7-8 miles per hour, and reaches the maximum current output of 14-16 amperes at 1400 R.P.M. of the armature or 18-22 miles per hour.

Generator Data.

Amperes	Cold Test	R.P.M.	Amperes	Hot Test	R.P.M.
Neutral		500	Neutral		500
10.5-12.5		900	10-12		900
15.5-18.0		1400	14-16		1400
13.0-17.0		2000	11-13		2000

Charging rate is varied by adjusting the third brush setting. Loosen the two screws holding the third brush arm, and move in a counter-clockwise direction (looking at the commutator end) to increase the charging rate. Move the third brush in a clockwise direction to decrease the charging rate. Tighten the holding screws and reseat the brush after adjusting position.

OILING.—Put 5 or 6 drops of light engine oil in the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—There is no relay. The generator-battery circuit is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Dash and tail lamps are each 6-8 volt, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start the vibrator. While vibrating, the current is 3.5 amperes.

METEOR

6-T CONTINENTAL ENGINE (1923)
DELCO GENERATING, STARTING, AND LIGHTING SYSTEM.
DELCO IGNITION.

BATTERY:—Exide, Type 3-XC-15-2, 6 volts, 105 ampere-hour capacity. The starting capacity is 114 amperes for 20 minutes. The lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. 2159. Distributor Model No. 5251. Breaker contacts separate .020-.0275 inch They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone. It is not necessary to grind the points if the same are pitted. Just brighten the surface of the point, and remove the raised surface of the opposite point.

Oiling.—Place 8 or 10 drops of light engine oil into each distributor oiler every two weeks. If the car is driven more than 500 miles in two weeks this care must be given every 500 miles. Repack the distributor housing with medium soft cup grease up to the advance ring and yoke once each season. Apply a little vaseline on to the rubber rotor track occasionally during the first 2000 miles. After the first 2000 miles, the track will become glazed, and it will only be necessary to keep the track wiped clean with a clean cloth. Apply a very small amount of vaseline about the size of a match head to the surface of the breaker cam every 2000 miles.

Timing.—Breaker or contact points begin to separate when piston No. 1 is on compression stroke, at top dead center, mark "UD" on flywheel is opposite the indicator on flywheel housing, breaker assembly and spark control lever in fully retarded position.

Spark Plugs.—Spark plug diameters are 7/8 inch, and gaps are .025 inch.

Firing Order:— The firing order is 1-5-3-6-2-4.

STARTER:—Model No. 208. The starter is connected to the engine by a Bendix drive. The direction of rotation is counter-clockwise, looking at commutator end. When the starter is running free it takes a current of 36 amperes, at 6 volts. The lock torque is 27 lb. ft.

Oiling:—Put 8 or 10 drops of light engine oil into each starter oiler every month. If car is driven more than 1000 miles in a month, this care must be given every 1000 miles. Keep oil off the commutator. Keep oil and dirt off of the spiral shaft of the Bendix mechanism to secure perfect operation.

GENERATOR:—Model No. 165, 256. Direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. To adjust the charging rate of the generator loosen three screws on the end plate of the generator, shift the third brush in the direction of the arrow on the bearing retainer plate to increase the charging rate, and in the opposite direction to decrease the same.

Generator Test Data

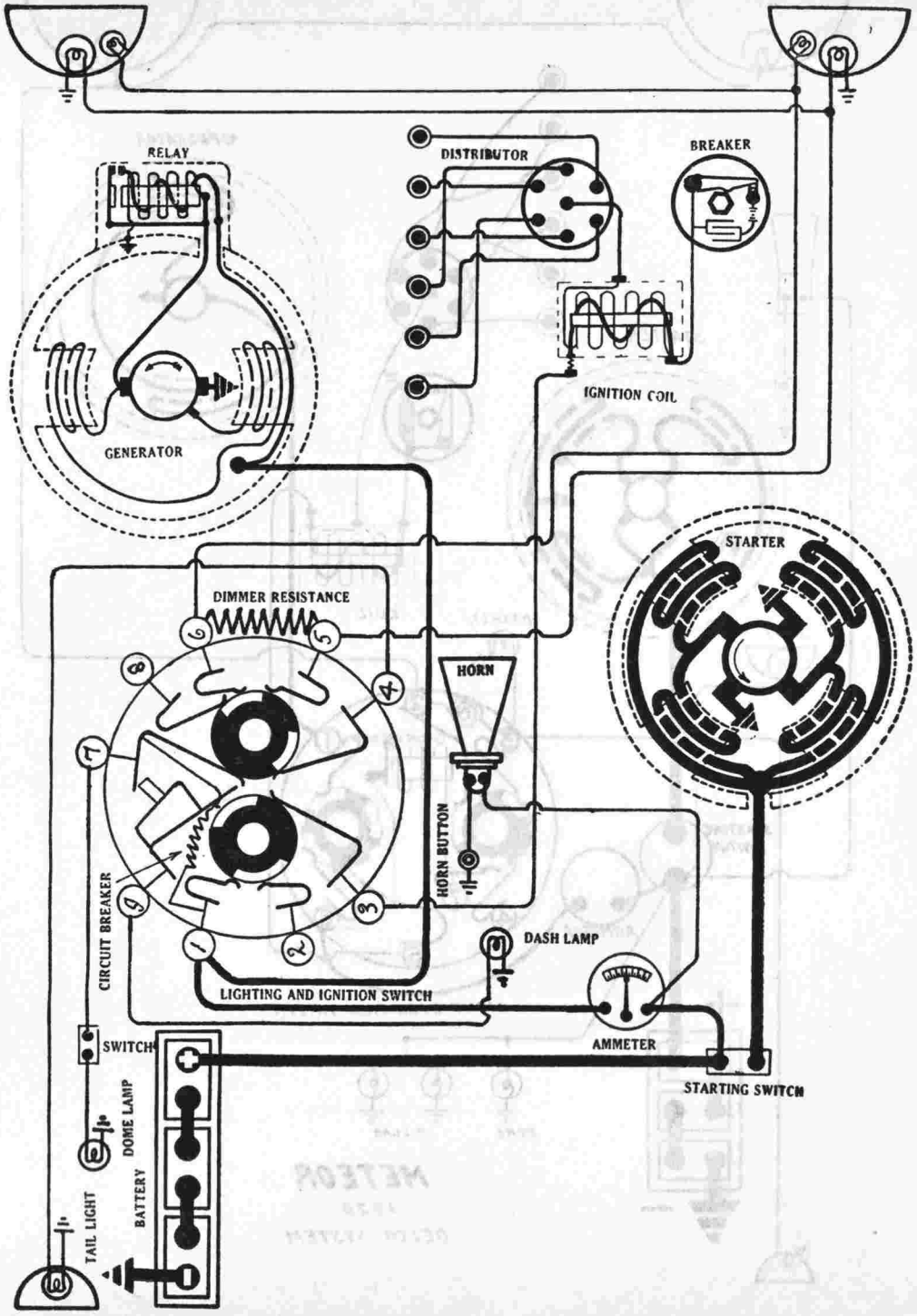
Amperes	R. P. M.
0	650
4	800
8	1000
12-16 (Max)	1600
8-12	2300

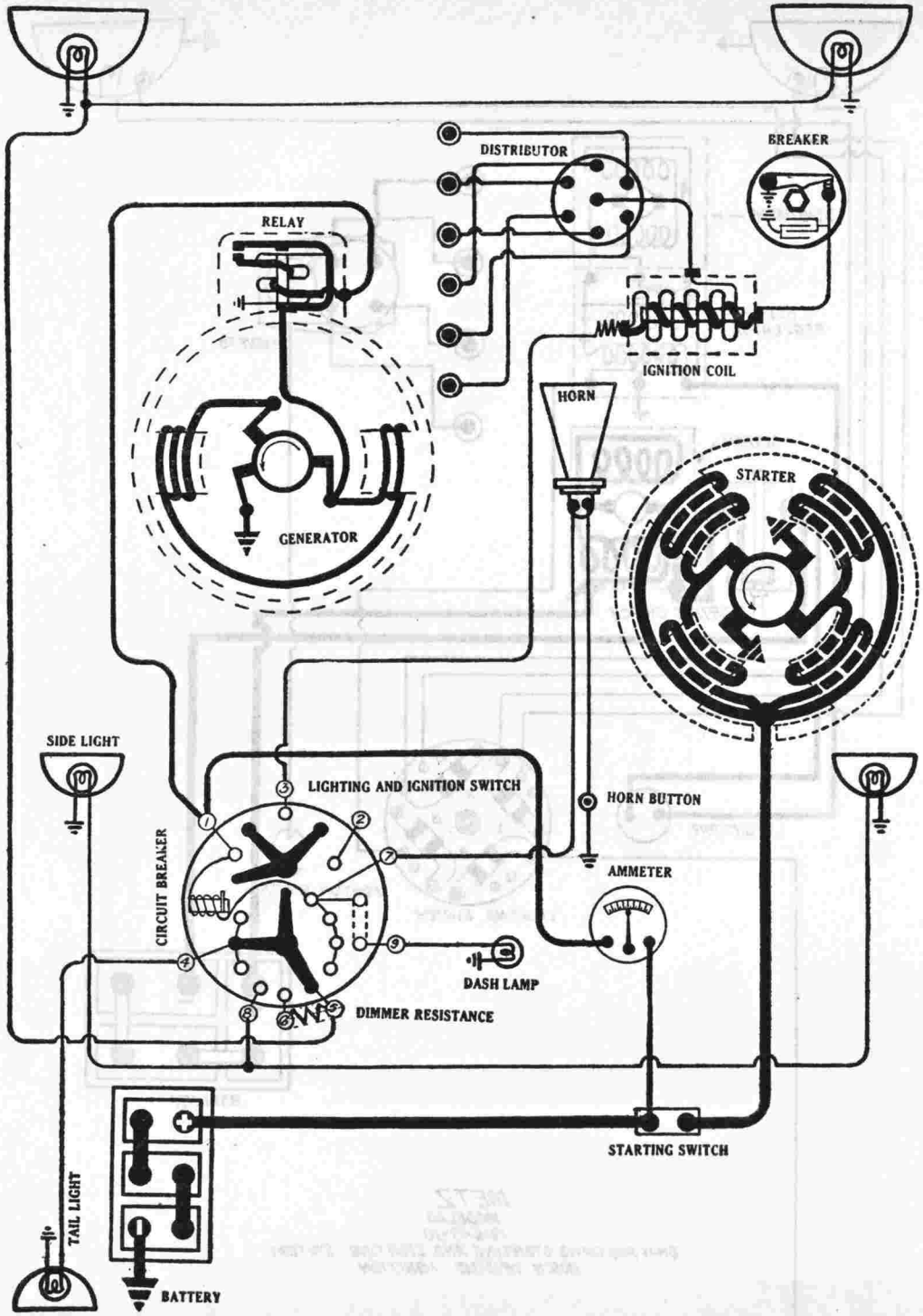
Oiling:— Put 8 or 10 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY:—Relay closes at 6-8 M. P. H. 7-8 volts, and opens at 5-6 M. P. H. with a current discharge of 0-3 amperes. The contact gap separates .025-.035 inch, contacts fully separated. The air gap between relay armature and coil core is .025-.035 inch, contacts fully closed.

LIGHTING:—Combination Switch, Model No. 1192 is used. The head lights are each 6-8 volts, 21 cp. Auxiliary lights are each 6-8 volts, 4 cp. Dash and tail lights are each 6-8 volts, 2 cp. All the above lights are of the single contact type.

CIRCUIT BREAKER:—A circuit breaker mounted on the back of the combination switch is used in the place of fuses. Circuit breaker will operate with a current flow of 25-30 amperes, and will continue to operate with a current flow not exceeding 15 amperes. Also not over 15 amperes must pass with dead short circuit across the circuit breaker terminals.





METEOR

MODELS R, S, T, U (1923-24-25-26)
DELCO GENERATING, STARTING, AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Exide, Type 3-XC-15-2, 6 volts, 105 ampere-hour capacity. The starting capacity is 114 amperes for 20 minutes. The lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2178. Distributor Model No. 5256 (8-R), No. 5251 (6-T). Breaker contacts separate .020-.0275 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone. It is not necessary to grind the points if they are pitted. Just brighten the surface of the point, and remove the raised surface of the opposite point.

Oiling.—Place 8 or 10 drops of light engine oil into each distributor oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles. Repack the distributor housing with medium soft cup grease up to the advance ring and yoke once each season. Apply a little vaseline to the rotor track occassionally during the first 2000 miles. After the first 2000 miles, the track will become glazed, and it will only be necessary to keep it wiped clean with a clean cloth. Apply a very small amount of vaseline about the size of a match head to the surface of the breaker cam every 2000 miles.

Timing.—Breaker contacts just begin to separate when piston No. 1 is at top dead center, on compression stroke, mark "UD" on flywheel opposite indicator on flywheel housing; spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plugs.—The spark plug diameters are 7/8 inch, and the gaps are .025-.030 inch.

STARTER.—Model No. 181 (8-R). No. 208 (6-T). The starter is connected to the engine by a Bendix drive. The direction of rotation is counter-clockwise, looking at commutator end. When the starter is running free, it takes a current of 36 amperes at 6 volts. The lock torque is 27 pound feet.

Oiling.—Put 8 or 10 drops of light engine oil into each starter oiler every two weeks. If the car is driven more than 1000 miles in two weeks, this care must be given every 1000 miles.

GENERATOR.—Model No. 256 (6-T). No. 258 (8-R). The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. To adjust the charging rate, remove the cover band and by means of an extension handle, shift the third brush mounting plate in a counter-clockwise direction (direction of rotation) to increase the charging, and in the opposite direction (clockwise) to decrease the charging rate.

Generator Test Data

No. 258(8-R)		No. 256(6-T)	
Amperes	R.P.M.	Amperes	R.P.M.
5	700	4	800
11	1000	8	1000
14-16 (Max.)	1600	14-16 (Max.)	1600
15	1800	15	2000

Oiling.—Put 8 or 10 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Relay closes at 8-10 M.P.H. or at 6.75-7.5 volts; and opens with a current discharge of 0-3 amperes. The contact gap is .025-.035 inch, contacts fully separated. The air gap between relay armature and coil core is .025-.035 inch, contacts fully closed.

LIGHTING.—Combination Switch Model No. 1244 is used. Head lights are each 6-8 volts, 21 cp. Dimmer lights are each 6-8 volts, 4 cp. Dash and tail lights are each 6-8 volts, 2 cp. All the above lights are of the single contact base type.

CIRCUIT BREAKER.—A circuit breaker is used in the place of fuses. It is mounted on the back of the combination switch. Circuit breaker will operate with a current flow of 25-30 amperes, and will continue to operate with a current flow not exceeding 15 amperes. Also not over 15 amperes must pass with dead short circuit across the circuit breaker terminals.

METZ

MODEL 25 (1915-16-17)

Gray and Davis Generating, Starting and Lighting System

Bosch or Dixie Magneto Ignition

Battery.—Battery is 6 volt, 70 ampere-hour. The positive (+) terminal is grounded at the starting motor.

Ignition.—Breaker contacts separate .014 to .016 inch on the Bosch Magneto or .018 to .020 inch on the Dixie Magneto. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper.

Timing—Breaker contacts separate when piston entering power stroke is on top dead center, spark control lever about one inch from the fully retarded position. (First see that the breaker assembly is fully retarded when the control lever is in the fully retarded position.

Firing Order.—The firing order is 1, 2, 4, 3.

Spark Plug Gaps.—Spark plug gaps are .024 to .026 inch on models using Bosch Magneto, and .030 to .034 inch on models using Dixie Magneto.

Oiling.—Put 2 or 3 drops of light machine oil in Bosch Magneto oilers every month. Fill oil wells on Dixie Magneto every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

Starter.—Starter is connected to the engine through a set of reduction gears and a pinion shifted by the operator. When operating without load starter draws 35 amperes at 3 volts pressure, and runs at 3500 R. P. M. With the same current at 5.5 volts, starter turns at 6600 R. P. M., and 7000 R. P. M. with 6 volts pressure. Starter torque is 1.5 pound-feet at 2400 R. P. M., taking 137 amperes, Pressure of starter brushes on commutator should be 3½ pounds.

Oiling.—Put 8 to 10 drops of light engine oil in starter oilers every two weeks. Oil the sliding surfaces and rods at the same time. Every three months remove the oil plug in reduction gear case and inject one tablespoonful of heavy motor oil.

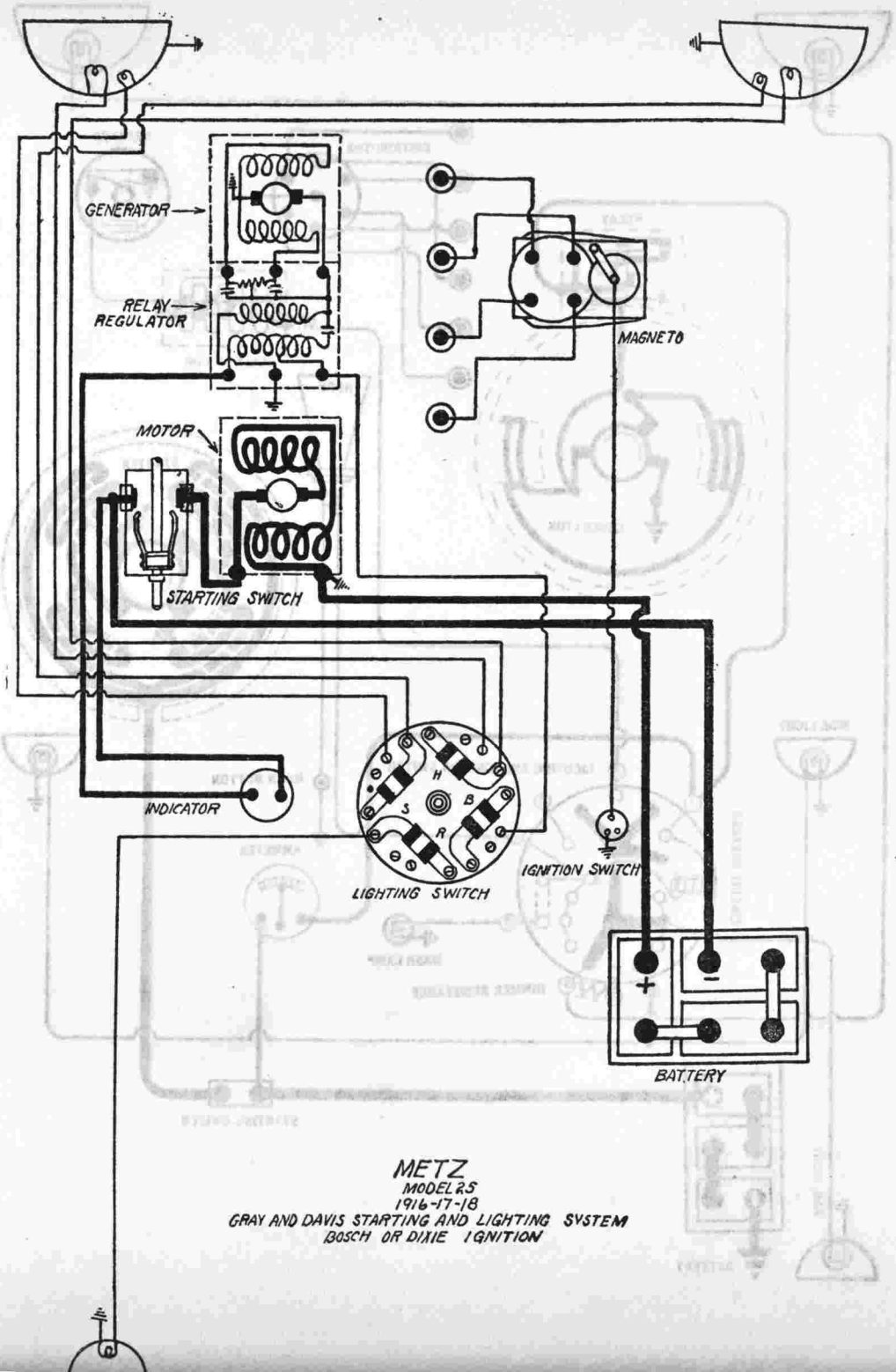
Generator.—Generator output regulation is by vibrating regulator. Generator current is 10 amperes at 1300 R. P. M. Charging rate will vary with condition of battery, being highest when battery is discharged and decreasing as the battery charges. With a 7½ ampere lamp load, the charging rate is 1 to 4.5 amperes. Running freely as a motor, generator takes 3 amperes at 6 volts pressure, and armature revolves at 650 R. P. M. Shunt field takes 1.04 to 1.30 amperes.

Oiling.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

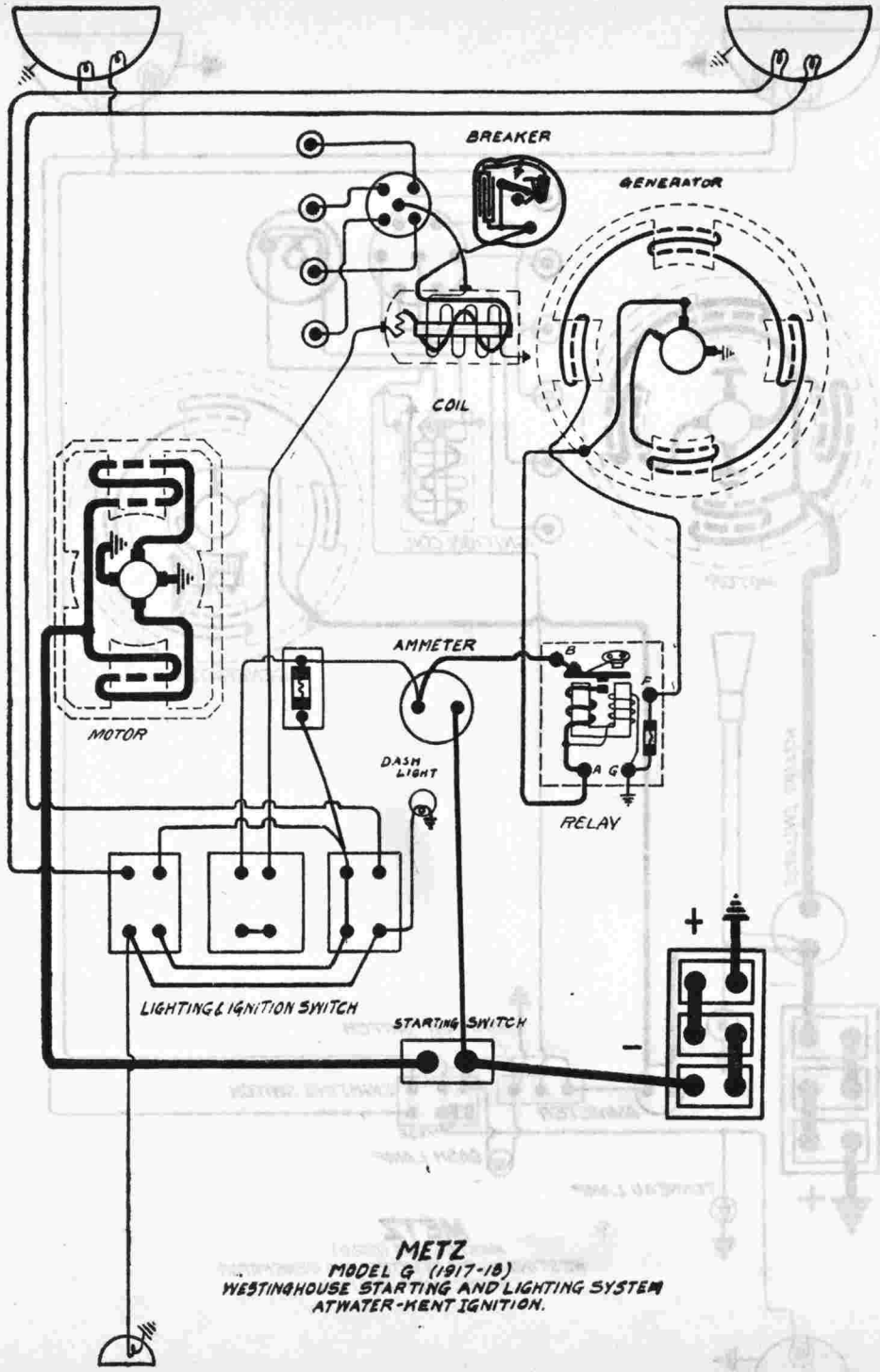
Relay-Regulator.—Relay and regulator are combined into one unit. Relay closes at 10 miles per hour. The terminal marked "B" is the negative (—) generator terminal and is connected to the battery. Terminal "L" is also negative, but supplies current to lights only. It is a tap taken off the series winding some distance from the end. "B" is the end of series regulator winding. When the lamps are turned on the frequency at which armature (moving member) operates is reduced, increasing the output in proportion to lamp load. Clean relay and regulator contacts by drawing unglazed paper between them. When badly burned or pitted, resurface with a fine, flat jeweler's file or worn No. 00 sand paper. To adjust contacts, hold one set apart and adjust the other set until the desired output is attained. Then hold the first set apart and adjust the other set until the desired output is attained. Then allow both sets to operate together. Increasing spring tension will increase the output. Decreasing the spring tension will decrease the output. Generator armature should be driven at 1750 R. P. M. while adjusting regulator.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Tail lamp is 6-8 volt, 2 cp.

Fuses.—Four fuses mounted on rear of lighting switch are 5 ampere.



METZ
MODEL 25
1916-17-18
GRAY AND DAVIS STARTING AND LIGHTING SYSTEM
BOSCH OR DIXIE IGNITION



METZ
MODEL G (1917-18)
WESTINGHOUSE STARTING AND LIGHTING SYSTEM
ATWATER-KENT IGNITION.

Metz

Model G (1917-18)
Westinghouse Starting and Lighting System
Atwater-Kent Ignition

Battery.—Battery is 6 volt, 70 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate .006 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become burned or corroded, affecting the ignition, remove and resurface them by drawing across a piece of fine emery cloth laid on a flat surface, as on the bed of a drill press, finishing on a hard oil stone.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever within one inch of the fully retarded position. See that breaker assembly is fully retarded when control lever is in the fully retarded position. Spark advance is controlled both automatically and by hand.

Firing Order.—The firing order is 1, 2, 4, 3.

Spark Plug Gaps.—Spark plug gaps should be about .023 inch.

Oiling.—Put 5 or 6 drops of light engine oil in oil hole at side of breaker (exposed when cover is removed). If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Starter.—Starter is connected to engine through a Bendix drive. It should develop 2 pound-feet torque when running at 1500 R. P. M. It should develop 11½ pound-feet lock torque, taking about 400 amperes.

Oiling.—Refill the oil wells under starter bearings every month.

Generator.—Generator current regulation is by third brush system. Relay should close at 8-10 and open at 6-8 M. P. H. The charging current immediately after relay closes should be 1 to 1.5 amperes. Relay should open when the discharge current reaches .75 to 1.25 amperes. Contacts should separate .013 inch to .018 inch. The air gap between relay armature (moving member) and coil core should be about 1/32 inch. Clean contacts by drawing a piece of unglazed paper between them. Should they become badly burned or pitted, resurface with a piece of well worn No. 00 sand paper, drawing a piece of soft paper between them to remove any grit, before again putting into service Adjust by bending the brass prongs. The maximum generator output should be 14-17 amperes, reached at 1100 to 1500 R. P. M., of generator armature. This rate reduces to 7-11 amperes at 2300 to 2600 R. P. M. Shunt field should take 1.5 to 2.2 amperes. There is a 5 ampere fuse in the shunt field circuit.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts. 15 cp. Dimmer lamps are 6-8 volts, 4 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.

Fuses.—Fuse is 50 ampere.

Model Numbers.—Generator is Frame Number 760. Starter is Frame Number 318 Atwater-Kent breaker is type CA, standard coupling being used.

METZ

MASTER SIX (1919-20)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM

CONNECTICUT IGNITION

BATTERY.—Willard, 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .018 to .024 inch. They are made of tungsten. When the condition of the contacts affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put oil or grease in the cup.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUGS.—Diameter, 7/8 inch. Spark gaps are .025 inch.

STARTER:—Frame No. 100, 700, 710. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 125 R.P.M., taking 250 amperes. Lock torque is 12 pound-feet, current being 475 amperes at 4 volts. Running freely, starter takes 35-45 amperes, armature revolving 4000 R.P.M. or more.

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR.—Frame No. 760. Generator current regulation is by the third brush system. Maximum current output is 15-17 amperes at 7.5 volts, reached at 1100-1500 R.P.M. of the armature or 25 miles per hour.

Generator Data

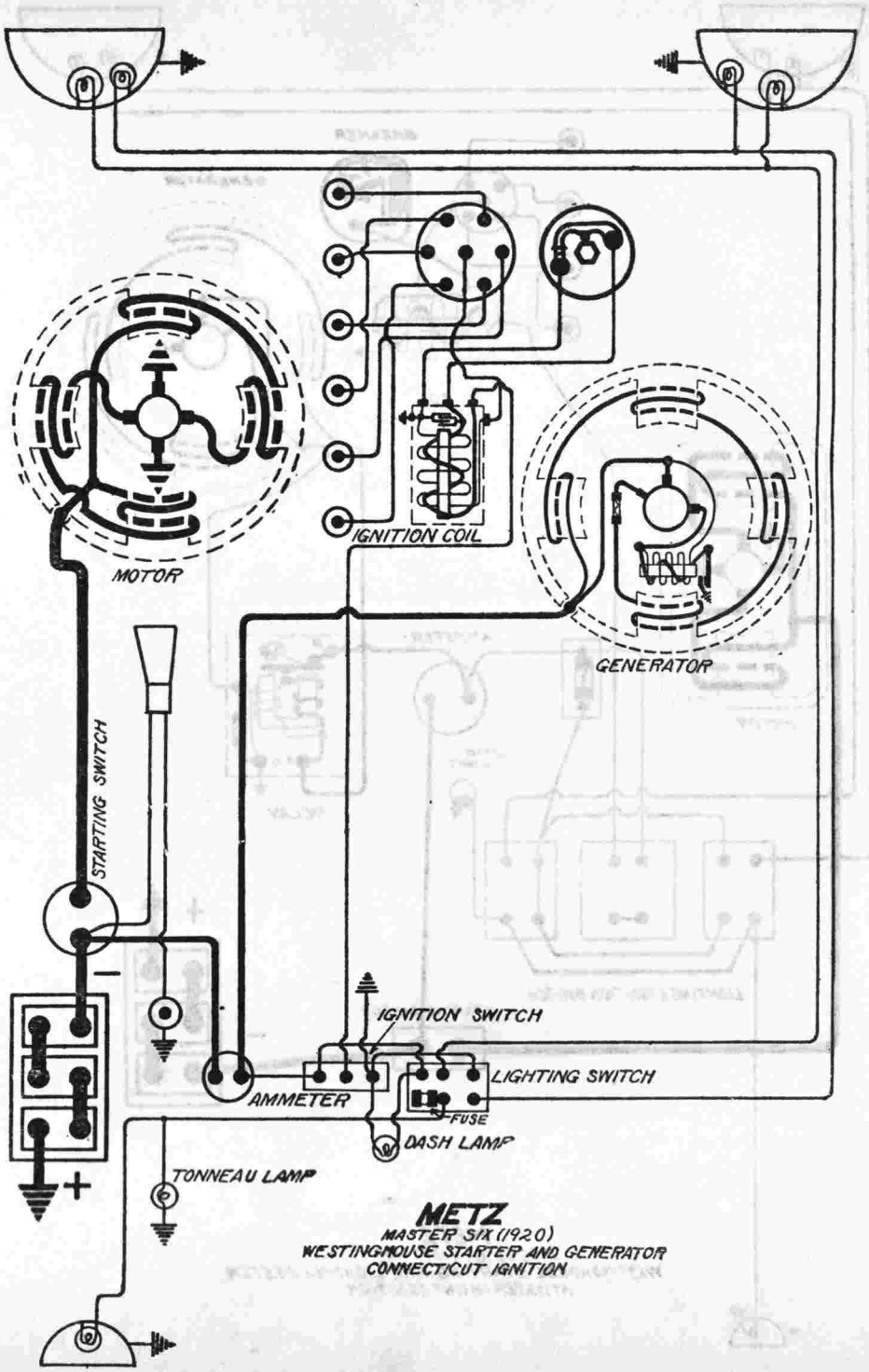
Amperes	R.P.M.	Volts
0	500	6.5
8.0	750	7.0
15-17	1100-1500	7.5

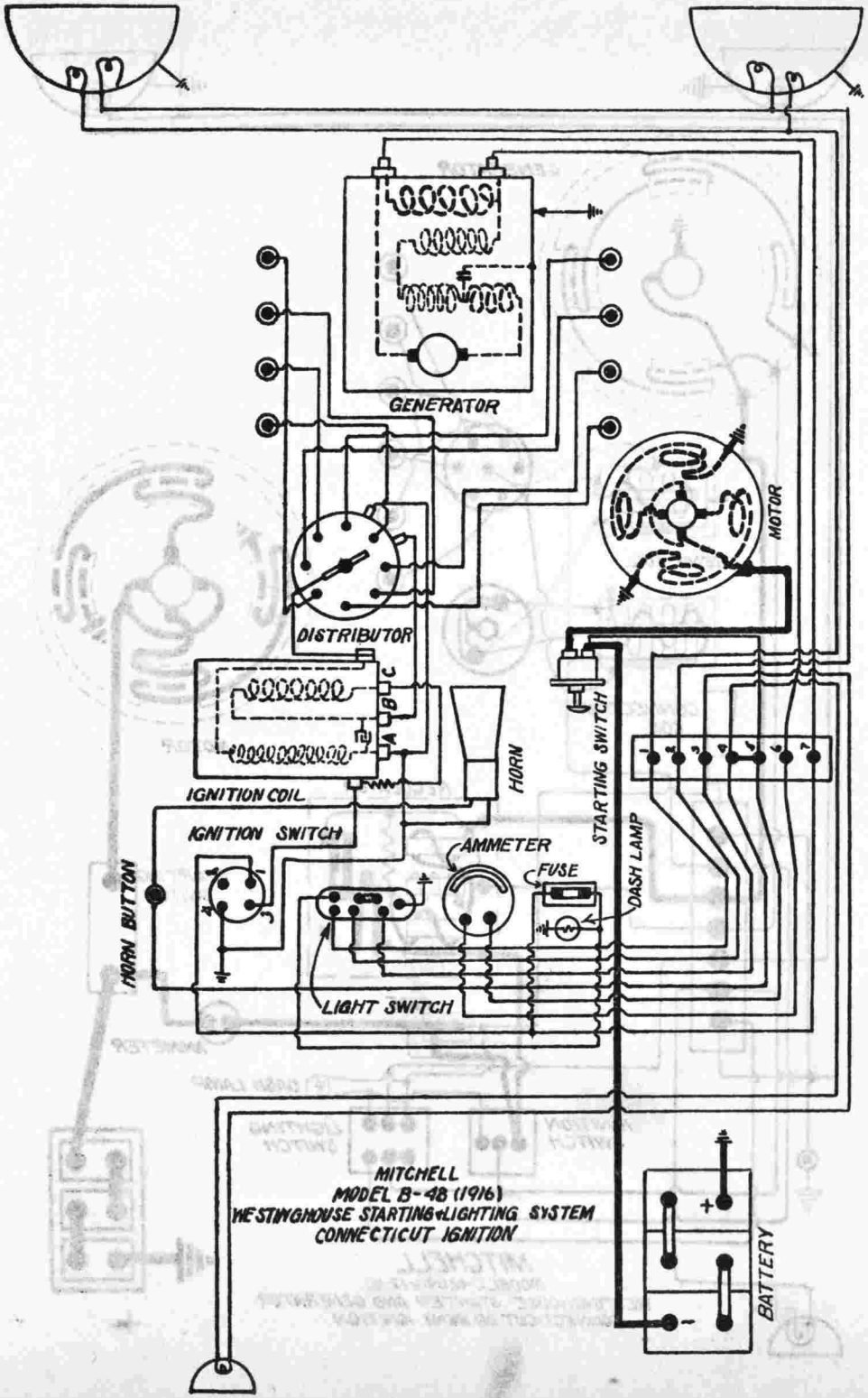
Shunt field winding takes 2.5 amperes at 6 to 6.3 volts. Move the third brush in the direction of armature rotation to increase the charging rate, and in the opposite direction to decrease the charging rate.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes at 575-625 R.P.M. of the armature or 7-9 miles per hour and opens at 525-575 R.P.M. of the armature or 5-7 miles per hour. Adjust the spring tension on relay armature so that the contacts open with a discharge current of 0-3 amperes. Adjust the air gap between the relay armature and coil core so that the contacts close when the voltage of the generator reaches 6.2-6.5 volts. Air gap beween relay armature and coil core is .005 inch, contacts closed. Contacts separate .030 to .035 inch. Resistance of the shunt coil is 68 ohms. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 16 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.





Mitchell

Model B-48 Eight Cylinder (1916)
Westinghouse Starting and Lighting System
Connecticut Ignition

Battery.—Battery is 6 volt, 142 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate .023 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Breaker contacts should just begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly being in the fully retarded position.

Firing Order.—The firing order is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

Spark Plug Gaps.—Spark plug gaps should be .027 inch.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Starter.—Starter is connected to the engine by a Bendix drive. It should deliver 2.5 pound-feet torque when running at 1200 R. P. M. It should deliver 12.5 pound-feet lock torque, taking about 400 amperes. Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current.

Oiling.—Put several drops of light engine oil in each of the starter oilers every month.

Generator.—Generator charging current regulation is by reverse series field. Current taken by the lamps does not pass through the series winding, hence has but little effect on the charging rate. Generator should deliver 14 amperes at 7.4 volts.

Relay.—Relay should close at about 8 miles per hour car speed. Charging current should be 1 to 1.5 amperes at closing and discharge current .75 to 1.25 amperes at opening of contacts. Air gap between relay armature (moving member) and coil core should be .027 inch to .030 inch. Contacts should separate .013 inch to .017 inch. Adjust by bending the brass prongs. Clean contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a piece of well worn No. 00 sand paper, drawing a piece of unglazed paper between them, to remove all grit, before again putting into service.

Oiling.—Put several drops of light engine or machine oil in each of the generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling should be done every 500 miles.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp. Double contact base is used on all lamps.

Fuses.—Fuses are 20 amperes.

Model Numbers.—Starter is No. 700. Generator is No. 208. Storage battery is Willard, type SM7.

Mitchell

Model C-42 (1916-17-18)
Westinghouse Starting and Lighting System
Connecticut or Remy Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Conneticut ignition was used on the 1916-17 cars and Remy on the 1918. On cars using the Connecticut system, contacts should separate .018 inch to .022 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them. On cars equipped with Remy ignition, contacts should separate .018 inch to .023 inch. Should they be burned or pitted, affecting the ignition, resurface them with a fine, flat jeweler's file or a strip of worn No. 00 sand paper.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever about 1½ inches from the fully retarded position. (First see that breaker assembly is fully retarded when lever is in the fully retarded position).

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be .020 inch to .025 inch with Connecticut ignition and .025 inch to .030 inch with Remy ignition.

Oiling.—On cars using Connecticut ignition, refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup. On cars using Remy ignition, refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions should be given every 500 miles.

Starter.—Starter is connected to the engine through a Bendix drive. Cold engine, heavy oil, tight bearings or other obstructions will cause abnormally high current and reduce the speed during the cranking operation. Starter should run at 1200 R. P. M., when delivering 2.5 pound-feet torque. It should develop 12.5 pound-feet lock torque, taking 400 amperes.

Oiling.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month. Do not oil the Bendix drive. Should the pinion stick, clean shaft with gasoline.

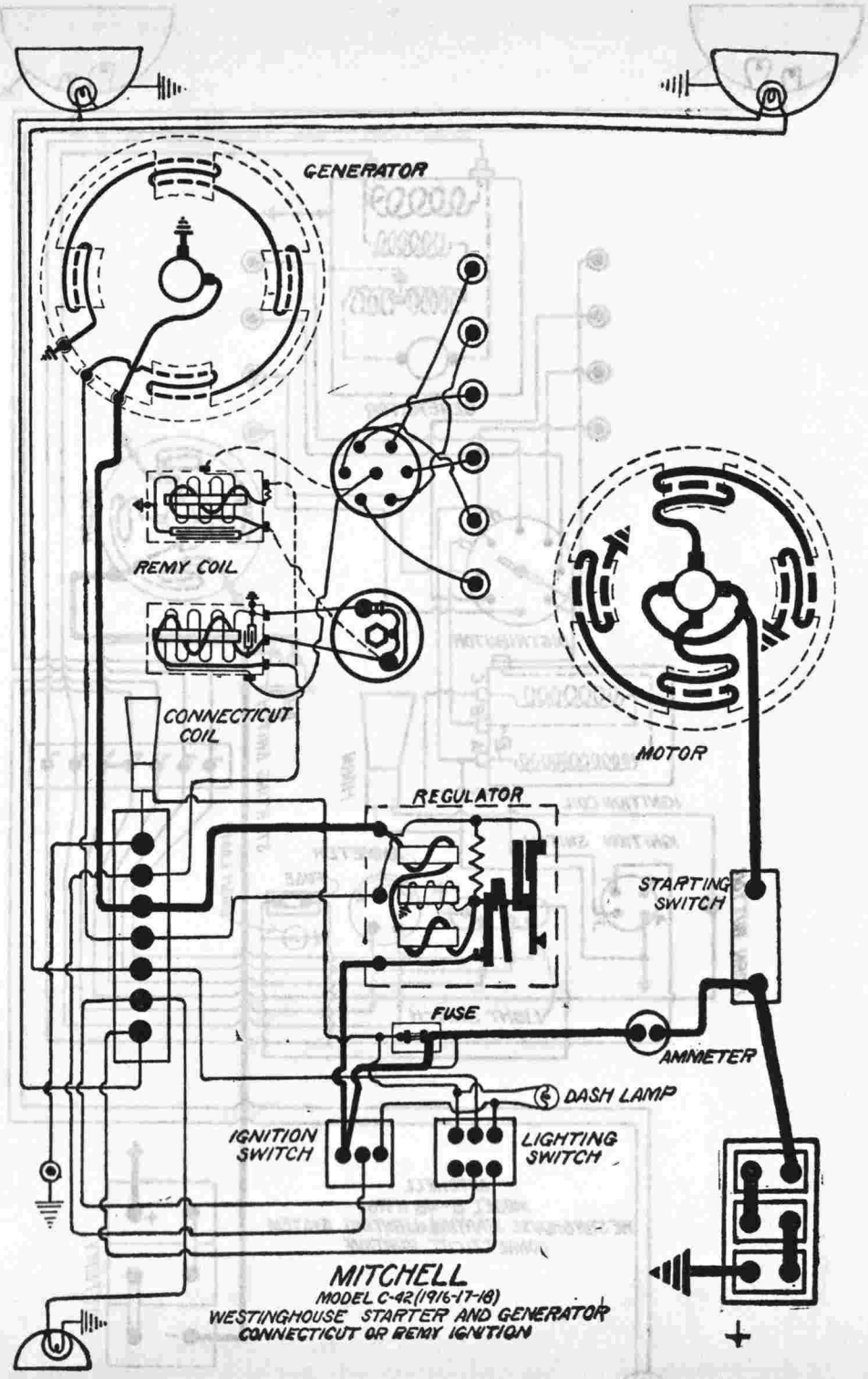
Generator.—Generator voltage regulation is by a vibrating regulator. Relay is combined with the regulator. The charging current should be about 1.5 amperes at closing and the discharge current 1.25 amperes at opening of relay contacts. The air gap between relay armature (moving member) and coil core should be .027 inch to .030 inch. Contacts should separate .013 inch to .017 inch. Adjust by bending the brass prongs. Clean relay and regulator contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface them with a piece of well worn No. 00 sand paper, drawing a piece of unglazed paper between them, to remove all grit, before again putting into service. Generator output should be 14 amperes at 7.5 volts.

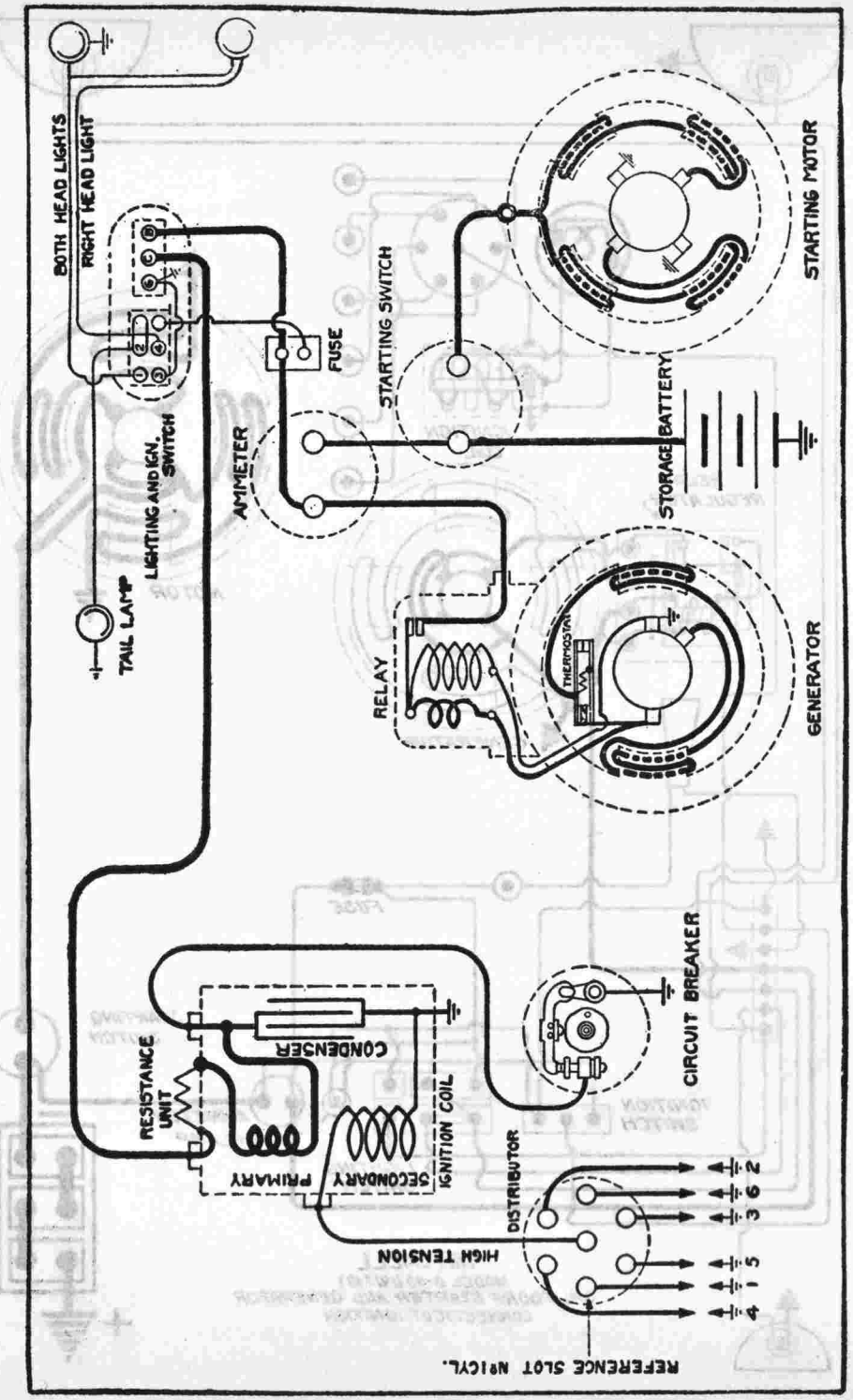
Oiling.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 15 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.

Fuses.—Lighting fuses are 20 ampere.

Model Numbers.—Generator is Frame No. 400. Starter is Frame No. 700.





MITCHELL

MODELS C-42, E-40 (1916-17-18) E-40, E-42 (1918-19)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Battery is 6 volt, 110 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .018 to .020 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions should be given every 500 miles.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER.—Starter is connected to the engine through a Bendix drive.

Starter Data. Model No. 304-A

Torque, lb. ft.	R.P.M.	Amperes	Volts
1	2000	110-130	5.4-5.6
2	1500	165-175	5.1-5.4
4	1000	215-225	4.8-5.2
5	850	265-275	4.6-4.9
6	600	325-335	4.3-4.5
15	Lock	540-560	3.5-3.65

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Generator current regulation is by third brush system. A thermostat, located in the brush rigging of the generator, cuts in a resistance at a temperature of 175°F., reducing the maximum charging rate 6 amperes. Resistance also acts as a shunt field fuse. The thermostat is intended to change the charging rate as demand of seasons or car operation requires. Never touch the thermostat points.

Generator Data. Model 232-A

Amperes	R.P.M.	Volts
0	515	6.4
7	745	7.1
14	1000	7.9
22	1800	8.6
17	2500	8.2
10	3500	7.4

Above tests made with relay in circuit and thermostat points closed. Position of third brush is adjustable by means of a rack and pinion movement operated by turning a screw exposed at commutator end of generator. Turn screw in a clockwise direction (looking at commutator end), to increase the charging rate, and in a counter-clockwise direction to decrease the charging rate. Brush tension on main brushes is 17 to 20 ounces. Brush tension on third brush is 13 to 17 ounces. Field winding takes 5 amperes at 6.4 volts.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 7-9 miles per hour and opens at 5-7 miles per hour. Gap between relay contacts is .012 inch to .015 inch. Air gap between armature (moving member) and coil core is .012 inch to .015 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Tail lamp is 6-8 volt, 2 cp.

MODEL NUMBERS.—Starter is No. 304-A. Generator is No. 232-A. Ignition Coil is No. 284-B. Relay is No. 264-A. Combination Switch is No. 403-A.

Mitchell

Model D-40 (1917-18)
Splitdorf Starting and Lighting System
Connecticut Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate about .020 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 to 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should begin to separate when piston entering power stroke is on top dead center, spark control lever about 1 inch from the fully retarded position. (First see that breaker assembly is fully retarded when the lever is in the fully retarded position).

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be about .027 inch.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Starter.—Starter is connected to engine through a Bendix drive. Cold engine, tight bearings, heavy oil or other obstructions or grounded, damp or short circuited field coils, armature windings or commutator bars will cause abnormally high current and low speed during the cranking operation.

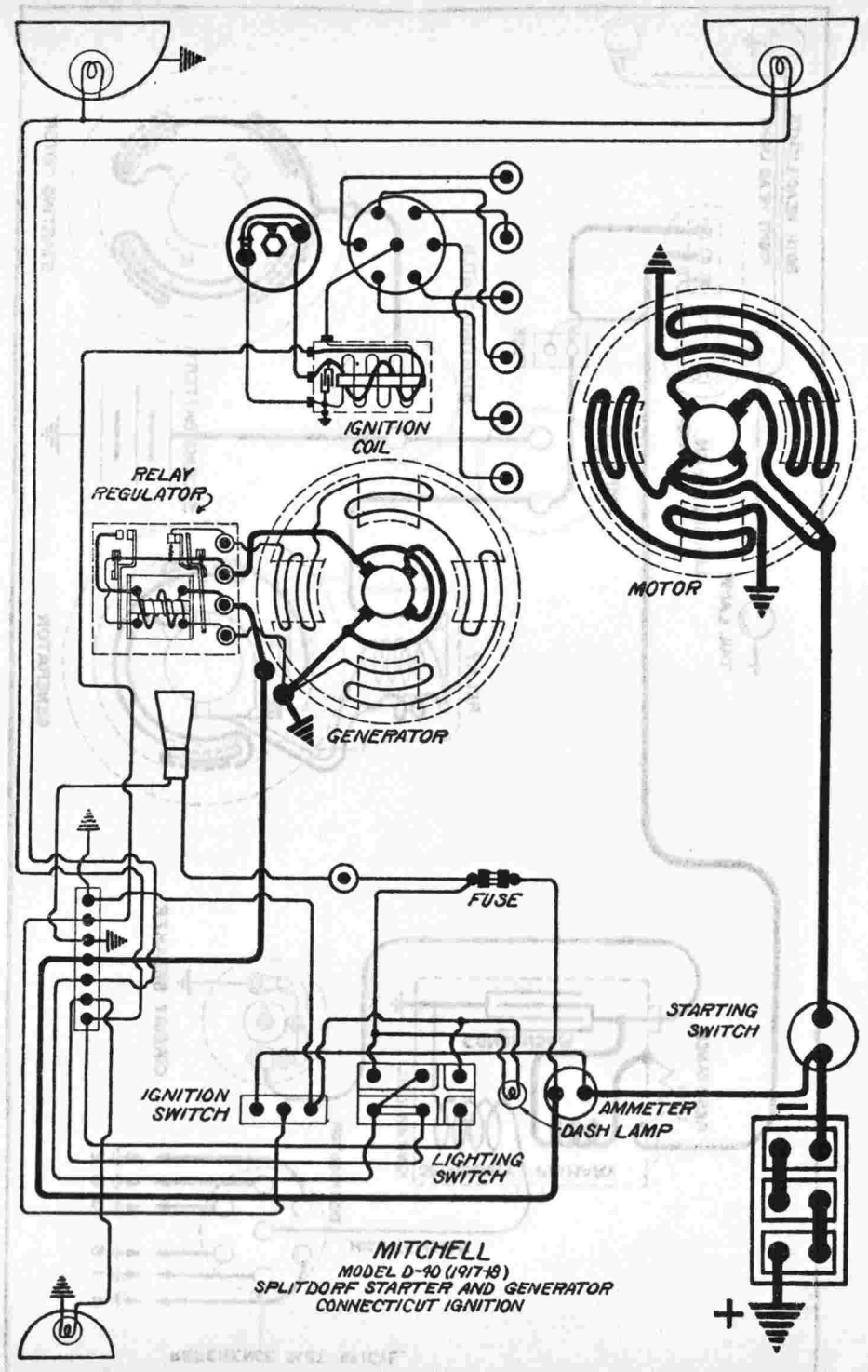
Oiling.—Put several drops of light engine oil in each of the starter oilers every month.

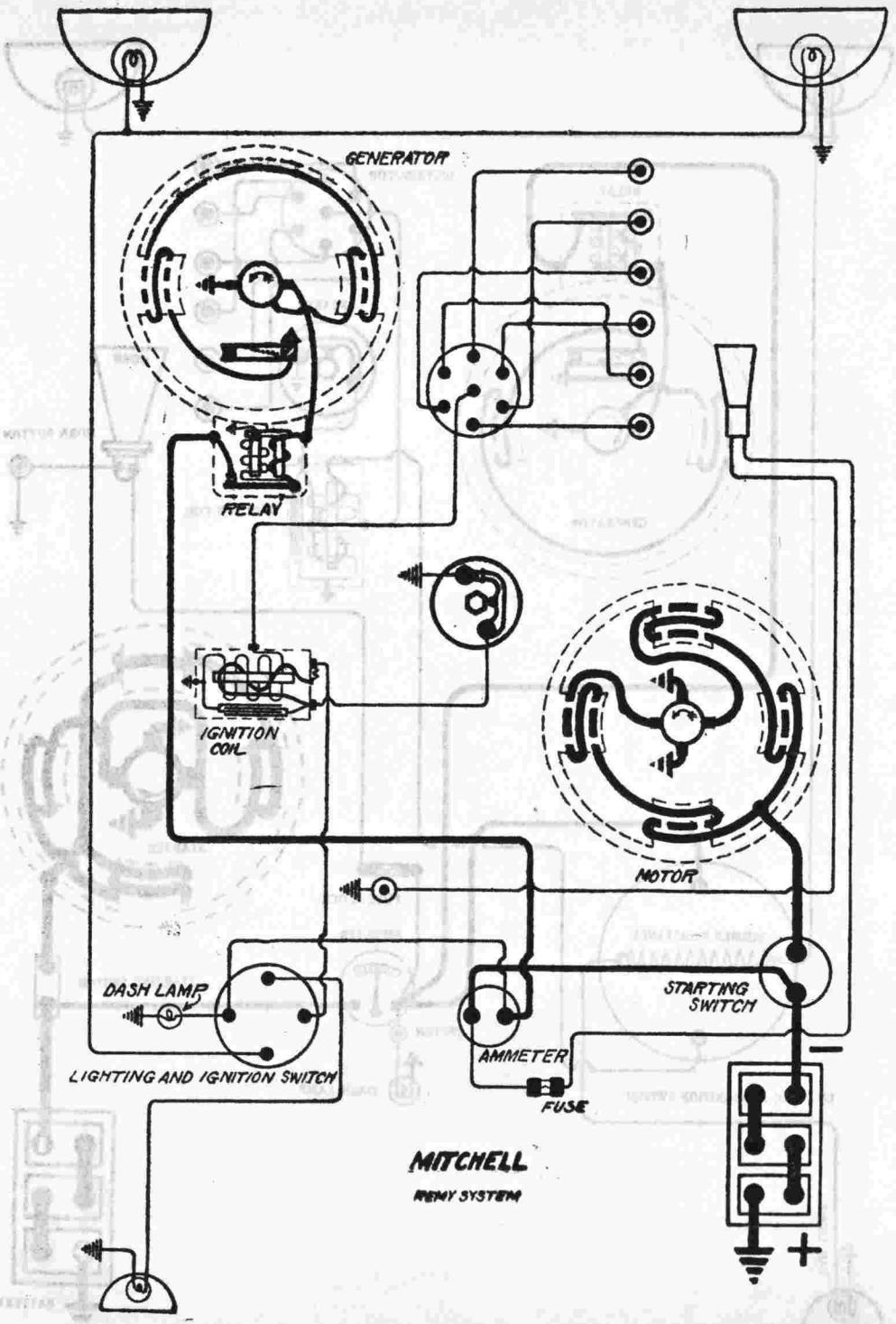
Generator.—Generator voltage regulation is by a vibrating regulator. Relay is combined with the regulator. Clean relay and regulator contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a piece of well worn No. 00 sand paper, drawing a piece of unglazed paper between them, to remove all grit, before again putting into service. Should the charging rate continue to increase with the speed, regulator contacts are dirty or sticking. Generator output may be increased by increasing the spring tension on the armature (moving member). Be sure to tighten lock nuts after adjusting regulator or relay.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 15 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.

Fuse.—Fuse is 20 ampere.





MITCHELL

MODEL F-40 (1920-21)

REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY:—Willard (1920-21) 6 volt, 90 ampere hour. **(1922) Type SJRN-4,** 6 volt, 120 ampere hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model No. 284-B. Distributor Model 366-A. Breaker contacts separate .022 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the grease cup under the distributor head with soft cup grease and turn down two turns every two weeks Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model No. 700-C. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes	Volts
0 lb. ft.	10,000	65	5.7
2 lb. ft.	2250	175	5.1
6 lb. ft.	750	365	4.2
10 lb. ft.	225	500	3.5
12 lb. ft.	Lock	575	3.2

Above tests are made without gear reduction. Pressure of brushes on the commutator is 20-24 ounces.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Model 910-A. Generator current regulation is by the third brush system. A thermostat, located in the brush rigging of the generator, cuts a resistance into the shunt field circuit of the generator at a temperature of 175°F., reducing the maximum charging rate 8 amperes. Never touch the thermostat points. Maximum charging rate is 20 amperes with the thermostat closed, reached at 1800 R.P.M. of the armature or 25 miles per hour.

Generator Data

Cold Test. Thermostat Closed		Hot Test. Thermostat Open	
Amperes	R.P.M.	Amperes	R.P.M.
0	600	0	800
5	750	4	1100
10	950	6	1250
15	1200	8	1450
20	1800	11	2000
14	3200	9	3200

Charging rate is varied by adjustment of the third brush settng. Third brush assembly is moved by turning a screw exposed in the commutator end plate. Pressure of main brushes on the commutator is 17-20 ounces. Pressure of the third brush is 13-17 ounces.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 600-650 R.P.M. of the armature and arate .020 inch. Air gap between relay armature and coil core is .020 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly opens at 6-8 miles per hour or 550-600 R.P.M. of the armature. Relay contacts sepburned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dash and tail lamps are 6-8 volt, 2 cp. On 1920-21 cars head lamps are 6-8 volt 15 cp.

MITCHELL

MODEL F-50 (1922-23), SERIAL NO. 15001 AND UP AND 33001 AND UP
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Willard, Type SJRN-4, 6 volts 113 ampere-hours capacity. The starting capacity is 120 amperes for 20 minutes. The lighting capacity is 5 amperes for 23.5 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model No. 284-B. Distributor Model No. 366-A. Breaker contacts separate .022 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone or with a fine flat jeweller's file. It is unnecessary to grind the contacts if they are burned or pitted, just brighten the point and remove the raised portion of the opposite point.

Oiling.—Refill the grease cup under the distributor head with medium soft cup grease and turn down two or three turns every two weeks. Put a very small amount of vaseline, about the size of a matchhead on the fibre bumper of the contact arm, applying with a toothpick. These instructions should be followed every two weeks. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts just begin to separate when piston No. 1 on compression stroke is 12 degrees or 1 11/16 inches before reaching top dead center, measured on flywheel, spark control lever and breaker assembly fully advanced.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plugs.—Spark plug diameters are 7/8 inch, and the gaps are .025-.030 inch.

STARTER.—Model No. 721-B. The starter is connected to the engine by a Bendix drive. The direction of rotation is counter-clockwise, looking at commutator end. The starter cranks the engine at 100-150 R.P.M. taking a current of 150-200 amperes, at 5-5.5 volts. The brush tension is 20-28 ounces.

Starter Test Data

Amperes	Volts	Torque	R.P.M.
60 (Running Free)	5.7	0	4600
575	3.2	16 lb.-ft.	Lock

Oiling.—Fill oil cup on each end of starter with light engine oil every month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles. Keep oil off of the commutator. Keep grit and dirt off of Bendix drive to insure perfect operation.

GENERATOR.—Model No. 910-B. The direction of rotation is counter-clockwise, looking at commutator end. The ignition apparatus is attached to the generator. The third brush system is used for current regulation. To adjust the charging rate, loosen the screw exposed at the generator end plate and move the brush with the finger. Move the third brush in the direction of rotation (counter-clockwise) to increase the charging rate. To decrease the charging rate, shift the third brush in the opposite (clockwise) direction. The thermostat is automatic and requires no attention. The maximum charging rate is 20 amperes, reached at 1800 R.P.M., when the generator is cold, or 22-25 M.P.H. carspeed in high gear.

Hot Test			Cold Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
9-12 (Max.)	8.0-8.5	1800-2000	0	(Relay Cut in)	675
			17-20	8.0-8.5	1500
			19-21 (Max.)	8.3-8.8	1800
			18.5		2500

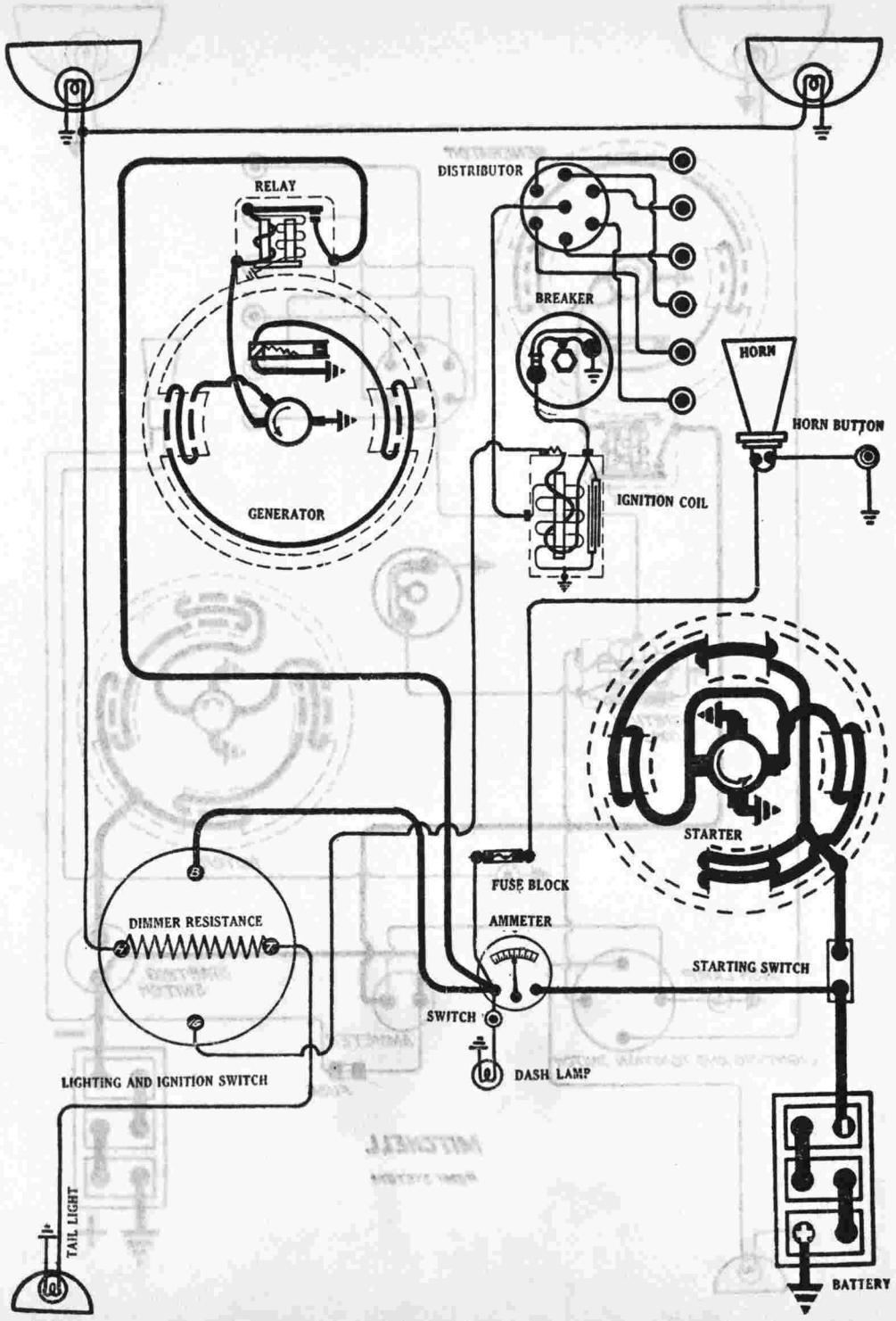
The field draws a current of 5 amperes at 6 volts.
The brush tension is 14-18 ounces.

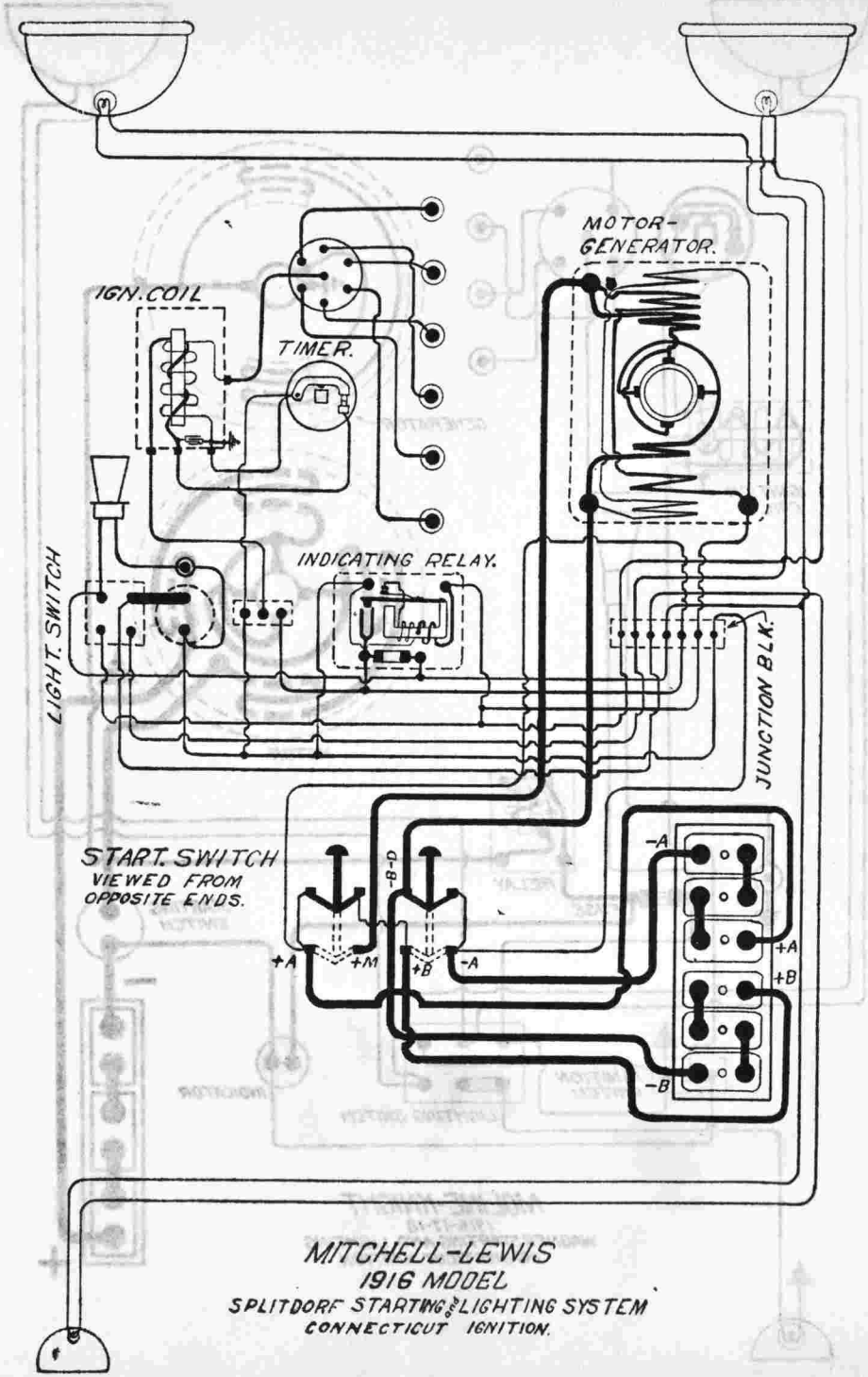
Oiling.—Fill grease cups at rear end of generator with cup grease every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Relay closes at 600-625 R.P.M. of armature, or 8-10 M.P.H. at 6.5 volts, and opens at 500-525 R.P.M. of armature or 6-8 M.P.H. with a current discharge of 0-1 amperes. The contact gap is .017-.020 inch, contacts fully separated. The air gap between relay armature and coil core is .012-.015 inch, contacts fully closed.

LIGHTING.—Briggs & Stratton Combination Switch No. 1804 is used. Head lights are each 6-8 volts, 21 cp. S. C. Tail light and dash light are each 6-8 volts, 2 cp. S. C. and D. C. respectively. Stop light is 6-8 volts, 21 cp.

FUSES.—10 amperes.





MITCHELL-LEWIS

1916 MODEL

SPLITDORF-APELCO GENERATING, STARTING AND LIGHTING SYSTEM

CONNECTICUT IGNITION

BATTERY.—Battery is 12 volt, 65 ampere-hour. The two-wire system is used.

IGNITION.—Breaker contacts separate .023 inch. They are made of tungsten. When the condition of the points affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, oiling must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER-GENERATOR.—Starter and generator are combined into one unit. Armature is permanently chain connected to engine crank shaft.

GENERATOR.—Generator current regulation is by reverse series field. Maximum charging current of 15 amperes is reached at 1500 R.P.M. of armature, or 20-25 miles per hour.

OILING.—Put several drops of light engine oil in each of starter-generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Cutout relay closes at 7-9 miles per hour and opens at 5-7 miles per hour. Charging current is 1-3 amperes at closing and the discharge current 0 to 1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

FUSE.—Fuse on back of indicating relay is 15 ampere.

Moline-Knight

Models MK-40 (1914-15) MK-40, 50 (1916-17-18) C & G (1917-18)
Wagner Starting and Lighting System
Connecticut Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The positive (+) terminal is grounded at the starting motor.

Ignition.—Breaker contacts should separate .018 inch to .020 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps should be about .027 inch.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles.

Starter.—Starter is connected to the engine through a Bendix drive. It should crank the engine at about 125 R. P. M., taking 150 to 230 amperes. Cold engine, tight bearings, heavy oil or other obstructions or damp, grounded or short circuited motor windings or commutator bars will cause low speed and high current during the cranking operation When free to operate, motor should take 85 to 90 amperes, armature turning at about 1200 R. P. M. Much greater speed indicates damp, grounded or short circuited field coils. Low speed and high current or moving of ammeter needle at low speeds indicate damp, grounded or short circuited armature coils or commutator bars.

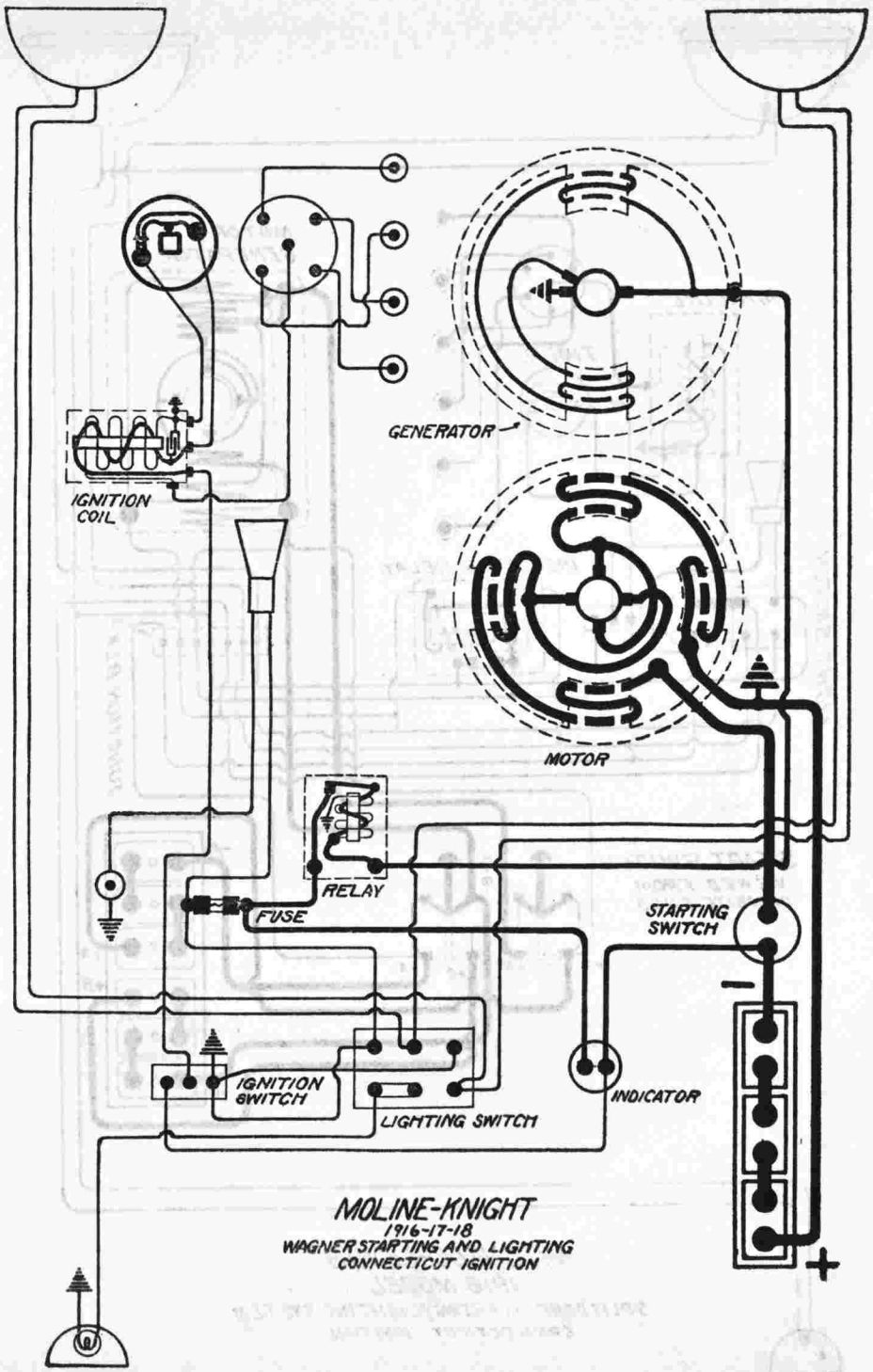
Oiling.—Put 5 or 6 drops of light engine oil in each of the starter bearing oilers every month. At the same time inject a quantity of grease in the plugged hole provided. Gredag is recommended tor this purpose by the Wagner Electric Company.

Generator.—Generator current regulation is by third brush system. Relay should close at 8-10 and open at 6-8 miles per hour. The maximum generator output should be about 18 amperes at 8.6 volts, reached at 18-20 miles per hour. This rate reduces to about 9 amperes at about 35 miles per hour. If it is necessary to operate car with battery disconnected, ground the ungrounded generator terminal, to prevent burning out generator windings or lamps.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 17 cp. Dimmer lamps (when used) are 6-8 volts, 5 cp. Dash lamp is 6-8 volts, 4 cp. Tail lamp is 6-8 volts, 2 cp. Tonneau lamp is 6-8 volts, 4 cp.

Fuse.—Fuse is 20 ampere.



MOLINE-KNIGHT

MODEL G (1919)

WAGNER GENERATOR. AUTO-LITE STARTER
CONNECTICUT IGNITION

BATTERY.—Willard, Type SJW-4, 6 volt, 120 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, renew the inner breaker mechanism. For temporary service, resurface the contacts with fine emery cloth.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .027 inch.

STARTER.—Auto-Lite, Type MC. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R. P. M.	Amperes
1 lb. ft.	2650	100
4 lb. ft	1400	225
6 lb. ft.	1000	300
16 lb. ft.	Lock	450

OILING.—Clean out starter bearings and repack with soft cup grease every six months. Add 2 or 3 drops of light engine oil to keep the grease soft, every month.

GENERATOR.—Wagner, E.M.-202, Type 45-W. Rotation is counter-clockwise, looking at commutator end. Generator current regulation is by third brush system. Maximum current output is 17 amperes, reached at 20 miles per hour.

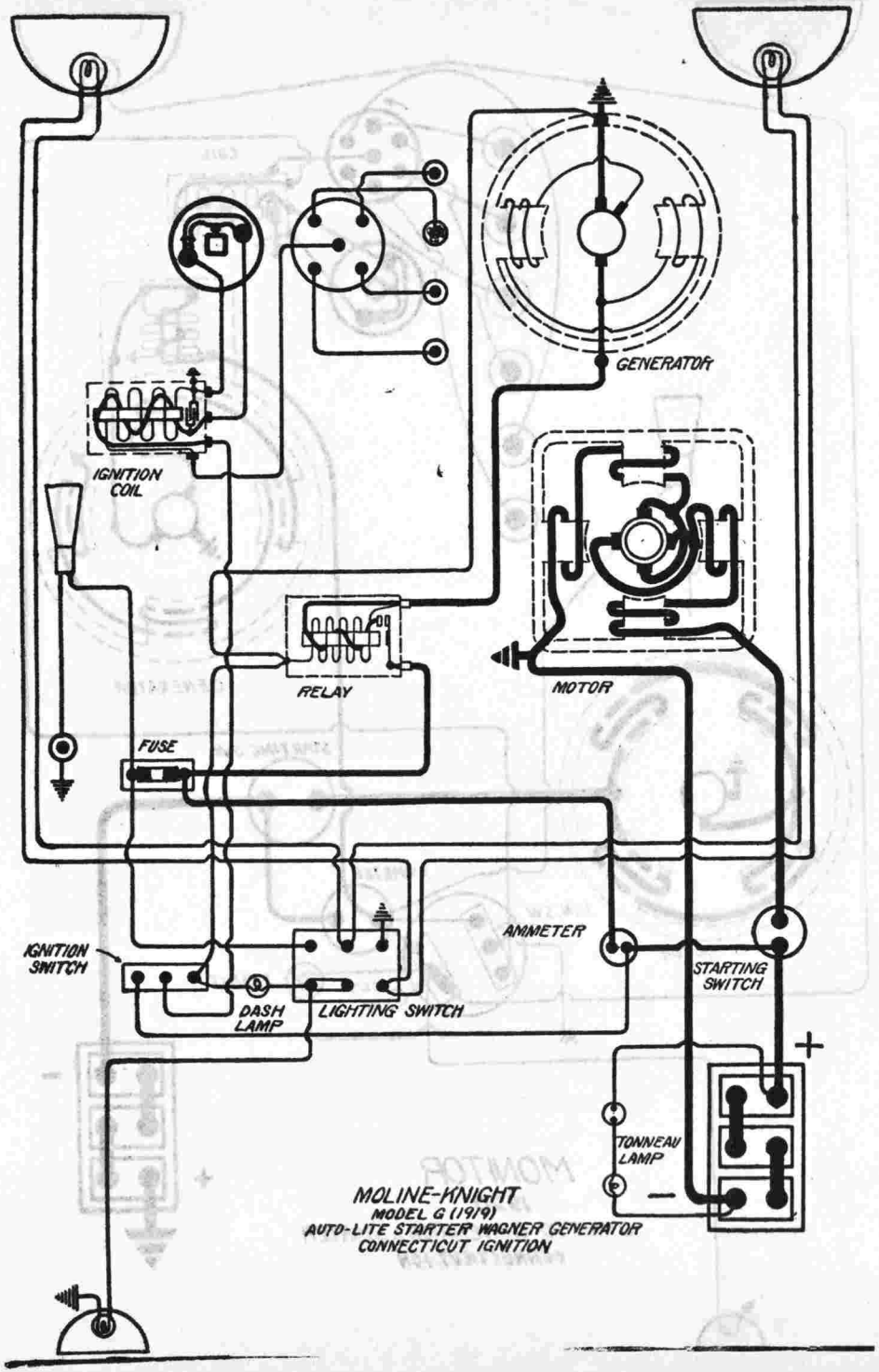
Amperes	Generator Data	R.P.M.
7.0		700
13.0		1000
16.0		1300
17.0		1500
14.0		2000
10.5		2500

To increase the charging rate, move the third brush in a counter-clockwise direction (looking at the commutator end). Move the third brush in a clockwise direction to decrease the charging rate.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 and opens at 6-8 miles per hour. Charging current at closing is 2 amperes, and the discharge current is 0-4 amperes at opening of relay contacts. Relay contacts separate .035 to .065 inch. Air gap between relay armature and coil core is .025 inch, contacts closed. Clean relay contacts by drawing unglazed paped between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are 6-8 volt, 2 cp.



MONITOR

MODEL M AND O (1917-18-19-20-21)
DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—Prest-O-Lite, 6 volt, 110 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .020 inch. When the condition of the points affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly one-third advanced.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model D-288. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 125 R.P.M., taking 130 amperes.

Starter Data

Torque	R.P.M.	Amperes	Volts
0.0 lb. ft	5600	25	6.4
2.5 lb. ft	1400	150	5.8
5.0 lb. ft	850	250	5.3
7.5 lb. ft	550	330	5.0
10.0 lb. ft	250	420	4.6
14.0 lb. ft	Lock	530	4.0

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Model C-288. Generator current regulation is by third brush system. Maximum current output is 12-15 amperes, reached at 1200 R.P.M of the armature or 24 miles per hour.

Generator Data

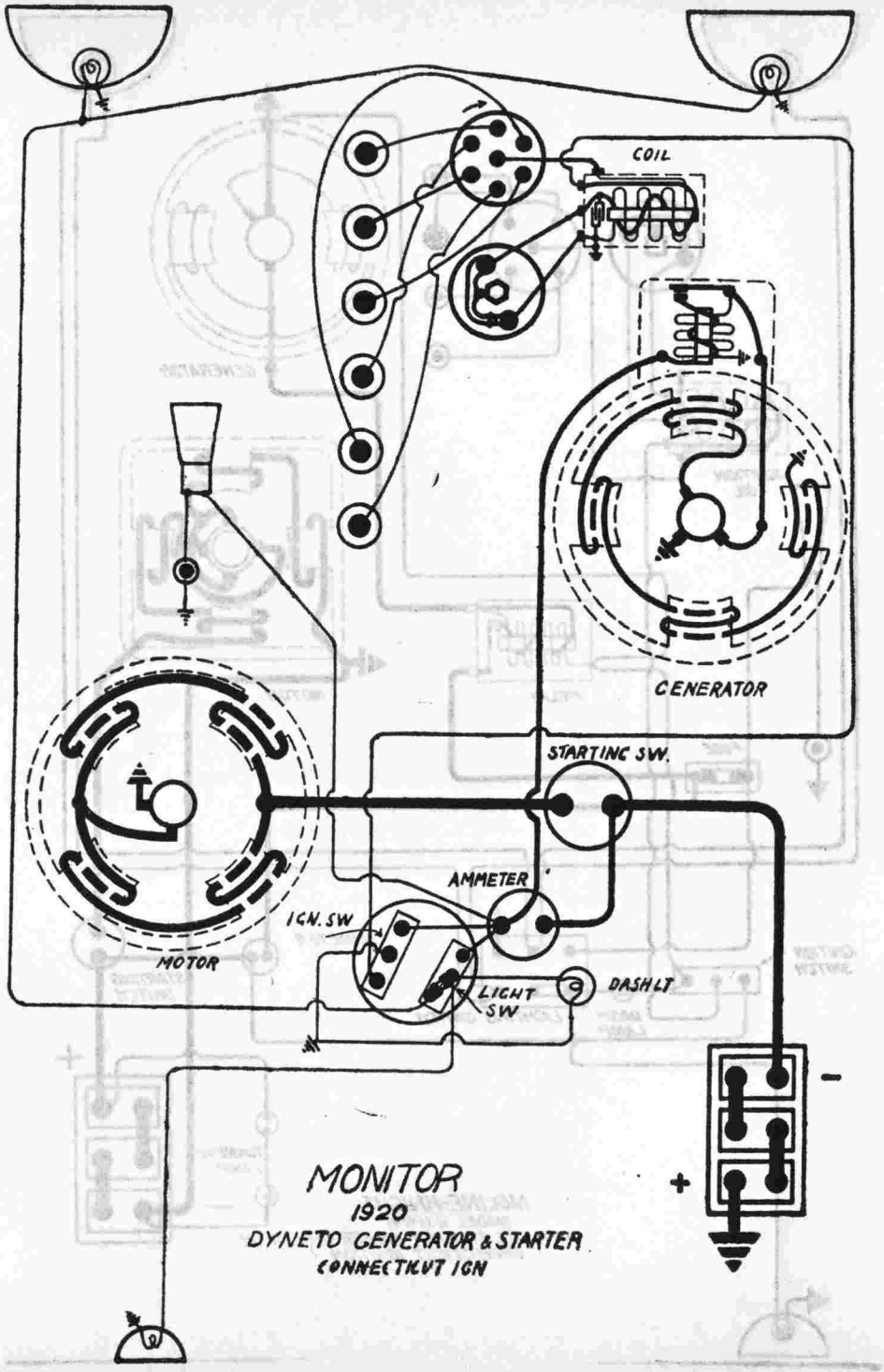
Amperes	Hot Test	R.P.M.	Amperes	Cold Test	R.P.M.
5.0		600	6.0		600
10.0		900	13.0		900
12.0		1200	15.0		1200
11.5		1600	13.5		1600
10.0		2000	11.5		2000

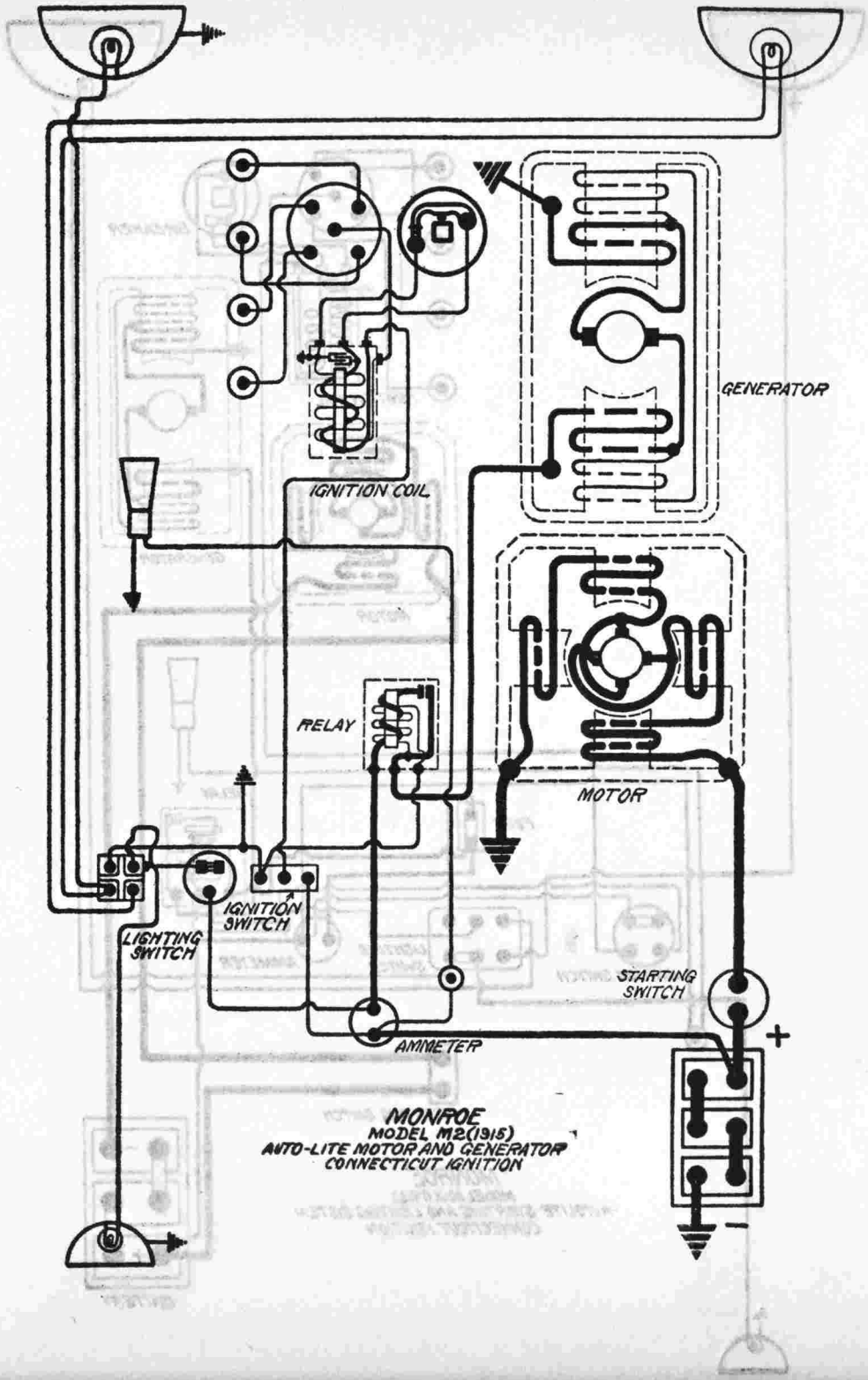
Shunt field current is 3.5 amperes at 6 volts. Charging rate is varied by adjusting the third brush setting. Remove the leather plug in the commutator end plate and loosen the screw exposed. Move in the direction of armature rotation to increase the charging rate, and in the opposite direction to decrease the charging rate. Replace the leather plug after the adjustment is made.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes at 8-10 miles per hour or 500-550 R.P.M. of the armature, and opens at 6-8 miles per hour or 450-500 R.P.M. of the armature. Relay contacts separate 3/32 inch. Air gap between relay armature and coil core is 1/8 inch, contacts open. Clean contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are 6-8 volt, 2 cp.





Monroe

Model M-2 (1915)

Auto-Lite Starting and Lighting System

Connecticut Ignition

Battery.—Battery is 6 volt, 85 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts should open .018 inch to .020 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—Firing order is 1, 2, 4, 3.

Spark Plug Gaps.—Spark plug gaps should be about .027 inch.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than a 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Starter.—Starter is connected to engine through a Bendix drive. It should crank the engine at about 150 R. P. M., taking about 150 amperes. Cold engine, tight bearings, heavy oil or other obstructions will cause a greater current flow and reduce the speed.

Brushes.—Use only the special copper-carbon composition type brushes as furnished by the manufacturer, as ordinary carbon brushes will cause trouble and their use in either the motor or generator forfeits the guarantee.

Oiling.—Clean and repack starter bearings with soft cup grease every six months. Put in one or two drops of oil every month to keep grease soft. Do not oil the Bendix drive. Should pinion stick, clean shaft with gasoline.

Generator.—Generator current regulation is by reverse series field. Relay should close at 8-10 miles per hour, or 550-650 R. P. M., of generator armature, the charging current being .6 to 1 ampere at closing. Relay contacts should separate when the reverse current reaches 0 to 1 ampere.

Amperes	Generator Data, Model GB	R. P. M.
5		495- 575
10		850-1035
12.5		1120-1370
15		1475-1810
17-19		2400-2800

If operated freely as a motor, generator armature should revolve at 200 R. P. M., taking 1.8-2 amperes. Much higher speed indicates damp, grounded or short circuited field coils. Greater current or lower speed indicates tight bearings or damp, grounded or short circuited armature windings or commutator. Periodic swinging of ammeter needle indicates grounded or short circuited armature coils or commutator bars. Shunt field should take about 1.2 amperes.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 15 cp. Tail lamp is 6-8 volts, 2 cp.

Fuses.—Lighting fuses are 20 ampere.

Model Numbers.—Generator is Model GB. Starter is Model MF.

Monroe

MODEL M-2 (1916)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—Battery is 6 volt, 70 ampere-hour. The negative (—) terminal is grounded through the motor frame.

IGNITION.—Breaker contacts separate .023 inch. When the condition of the points affects the ignition, renew the inner breaker mechanism. For temporary service resurface contacts with fine emery cloth.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker asembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 2, 4, 3.

SPARK PLUG GAPS.—Spark plug gaps are .027 inch.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

STARTER.—Starter is Model MF. Starter is connected to the engine through a Bendix drive. It takes 130-150 amperes when cranking the engine.

OILING.—Thoroughly clean out and repack starter bearings with soft cup or ball-bearing grease every six months. No oil is required.

GENERATOR.—Generator current regulation is by reverse series field.

Generator Data. Model GB

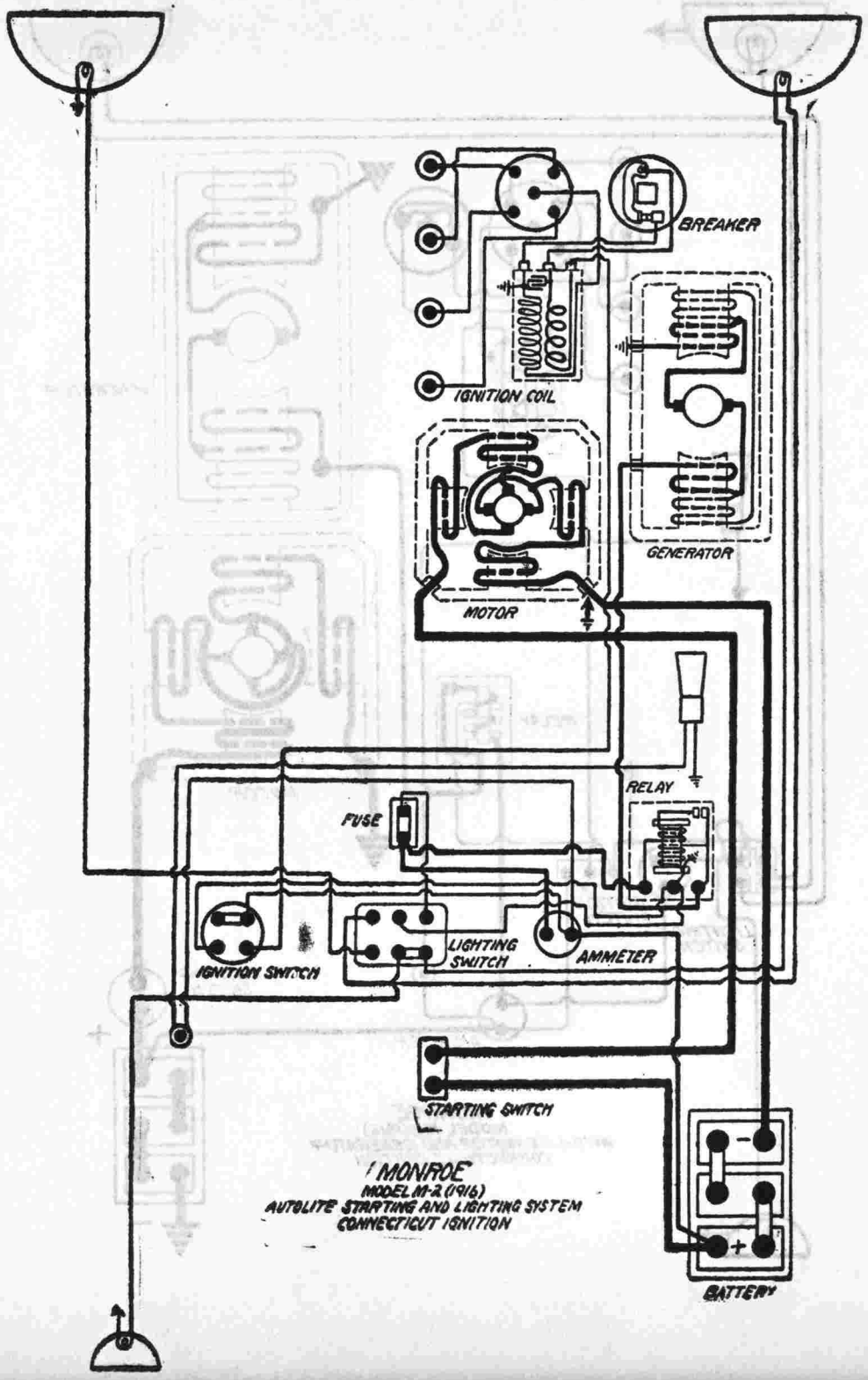
2 Inch Diameter Armature		2½ Inch Diameter Armature	
Amperes	R. P. M.	Amperes	R. P. M.
5	1000-1250	5.0	985-1140
10	1950-2300	10.0	1625-1875
12	2500-3500	12.5	2125-2545
14-15	3500-4500	15.0	2725-3500

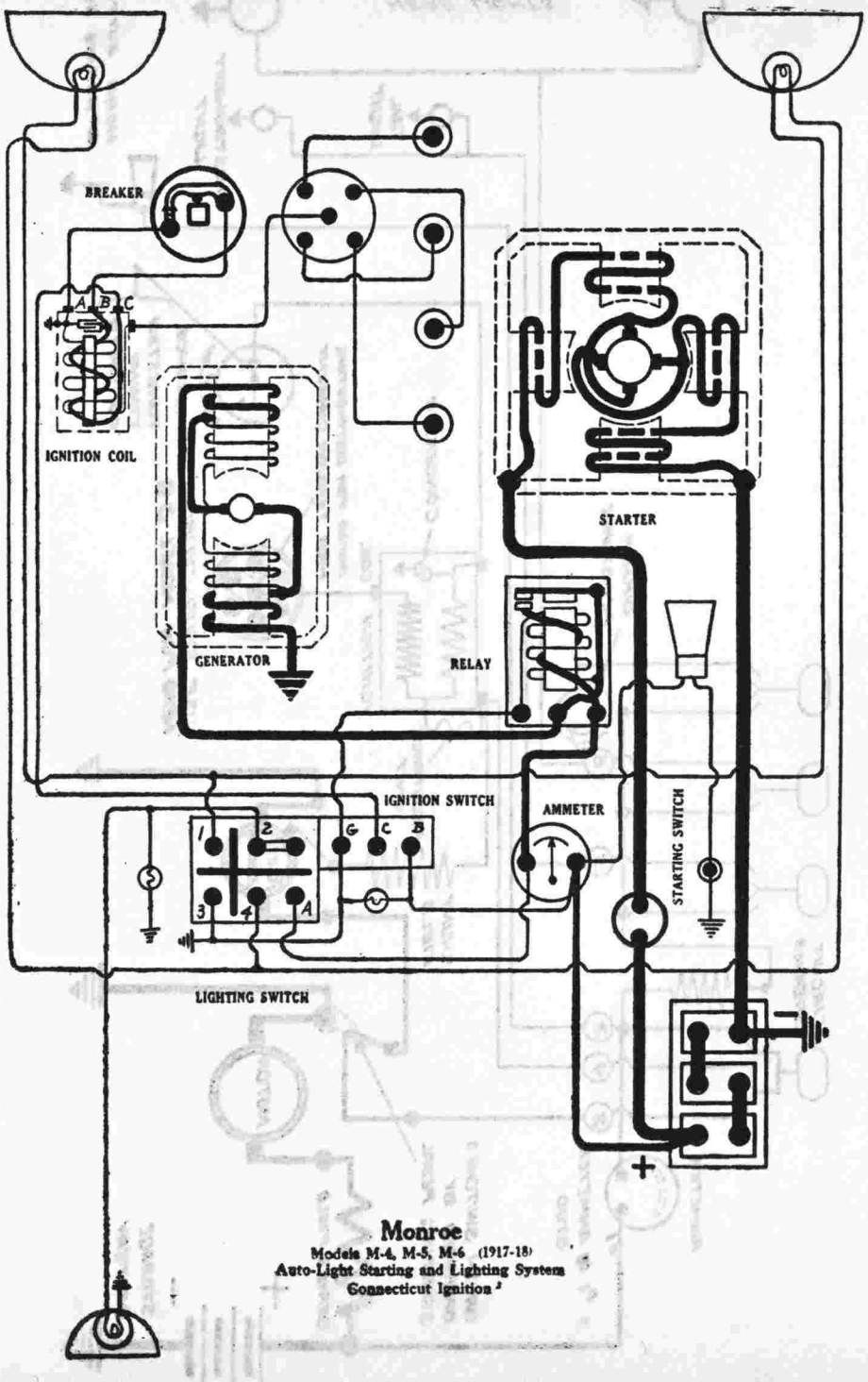
A variation of 1.5 amperes from these amounts is allowable. Output may be varied slightly by adjusting brush pressure. Brush pressure on commutator is 1 to 1¼ pounds. When operating freely as a motor, the generator with 2 inch armature takes 1.9 amperes, armature revolving at 450 R.P.M. The generator with 2½ inch armature, takes 1.7 amperes, armature revolving at 435 R. P. M. Shunt field of either machine should take 1 ampere.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done 500 miles.

RELAY.—Relay closes at 7 and opens at 5 miles per hour. Relay closes at 550-650 R.P.M., of 2 inch armature, or 525-625 R. P. M., of 2½ inch diameter armature. Charging current is .5 to 1.5 amperes at closing, and the discharge current 0 to 1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

FUSE.—Fuse, on dash under cowl, is 20 amperes.





Monroe
Models M-4, M-5, M-6 (1917-18)
Auto-Light Starting and Lighting System
Connecticut Ignition

MONROE

MODELS M-3, M-4, M-5, M-6 (1917-18)
MODELS S-7, S-8, S-9, S-10 (1919-20-21-22)

Auto-Lite Starting and Lighting System
Connecticut Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The negatve (—) terminal is grounded.

Ignition.—Contacts should separate .018 inch to .020 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should begin so separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps should be .027 inch to .030 inch.

Oiling.—Refill cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in this cup.

Starter.—Starter is connected to engine through a Bendix drive. It should crank the engine at about 150 R. P. M., taking 100-150 amperes.

Oiling.—Clean and repack starter bearings with soft cup grease every six months. Do not oil the Bendix drive. Should pinion stick, clean shaft with gasoline.

Generator.—Generator current regulation is by reverse series field. Relay should close at 500-575 R. P. M., of generator armature. Charging current should be .5 to 1.5 ampere at closing, and 0 to 1 amperes at opening.

Amperes	Generator Data, Model GG	R. P. M.
5		750- 860
10		1225-1400
12.5		1600-1825
15		2125-2450
17-19		3200-3700

A variation of 1.5 amperes from these amounts is allowable. Output may be varied slightly by adjusting brush pressure. The pressure should be 1 to 1¼ pounds. If operated freely as a motor, armature should revolve at 350 R. P. M., taking 2.8 amperes. Greater speed indicates damp, grounded or short circuited field coils. Greater current or lower speed indicates tight bearings or damp, grounded or short circuited armature windings or commutator. Periodic swinging of ammeter needle indicates grounded or short circuited armature coils or commutator bars. Shunt field should take approximately 1.1 amperes.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 15 cp. Dimmer lamps are 6-8 volts, 5 cp. Dash lamp is 6-8 volts, 2 cp, Tail lamp is 6-8 volts. 2 cp.

Fuses.—Fuses are 20 ampere.

Moon

Models 6-30 and 6-40 (1916)
Delco Generating, Starting and Lighting System
Delco Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Timing.—Contacts begin to separate when the piston entering power stroke is on top dead center, spark control midway between the fully retarded and fully advanced positions. Spark control is both automatic and manual.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .027 to .030 inch.

Oiling.—Put 3 or 4 drops of light engine oil in the oiler in side of breaker assembly every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Starter-Generator.—Model No. 73 or 83. Starter and generator are combined into one frame, but are electrically separate. Starter is connected to engine through a set of reduction gears meshed by the operator. Two overrunning clutches are provided. In connection with the ignition switch, a circuit ts closed allowing current to flow through the generator windings causing the armature to revolve slowly, aiding the meshing of the reduction gears. One clutch permits this rotation, and also permits a relatively high speed of the armature, necessary when operating as a starter. The second overrunning clutch prevents the engine from driving the armature through the reduction gears. Depressing the starting pedal meshes the reduction gears, opens the generator circuit and allows the motor brush to come into contact with the commutator, closing the starter circuit and cranking the engine. When the pedal is released, a spring reverses these operations.

Generator.—Generator current regulation is by third brush system. Generator begins to supply current at 8 miles per hour, or 400 R. P. M. of armature.

GENERATOR DATA, MODELS 73 AND 83

Amperes	R. P. M.
Neutral	400
6-10	600
16-20	1000
10-15	1500
9-13	1800

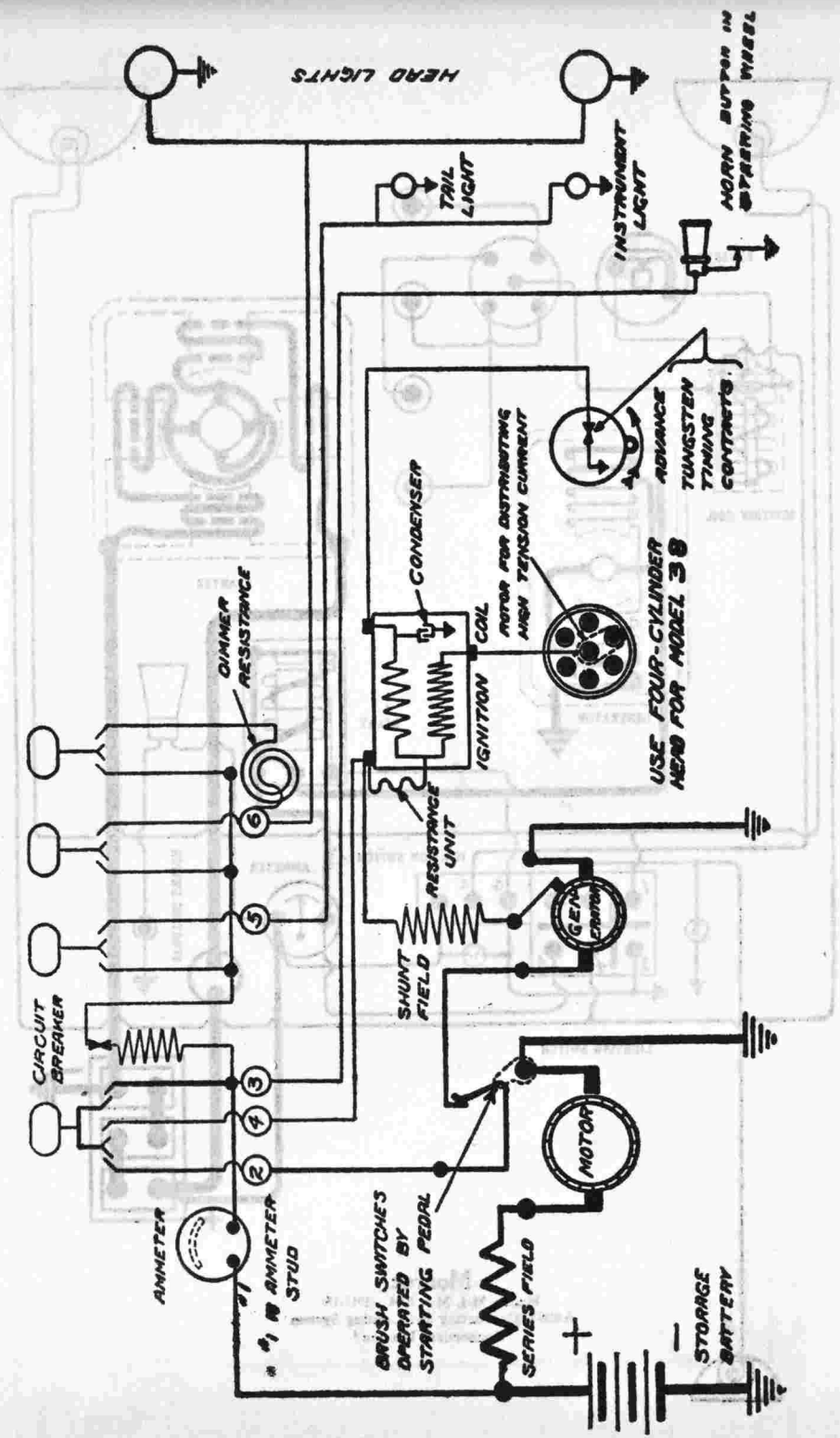
Output is varied by adjusting third brush setting. Moving third brush in direction of armature rotation increases the output. Moving brush in the opposite direction decreases the output. When running freely as a motor, clutch at driving end the only retarding force, current is 4.5 amperes.

Oiling.—Put 4 or 5 drops of light engine oil in rear starter-generator oiler and fill the front oiler every two weeks. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles. Refill and turn down the grease cup for lubricating motor clutch once a month.

Relay.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch. The overrunning clutch at driving end allows generator to operate as a motor when battery's pressure is above that of generator. If engine is killed when stopping, the noise made by the clutch serves to attract the operator's attention, to open the ignition switch. The opening and closing of the generator-battery circuit by the operator takes the place of the relay.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

Circuit Breaker.—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start this device vibrating. While vibrating the current flow is 3-5 amperes.

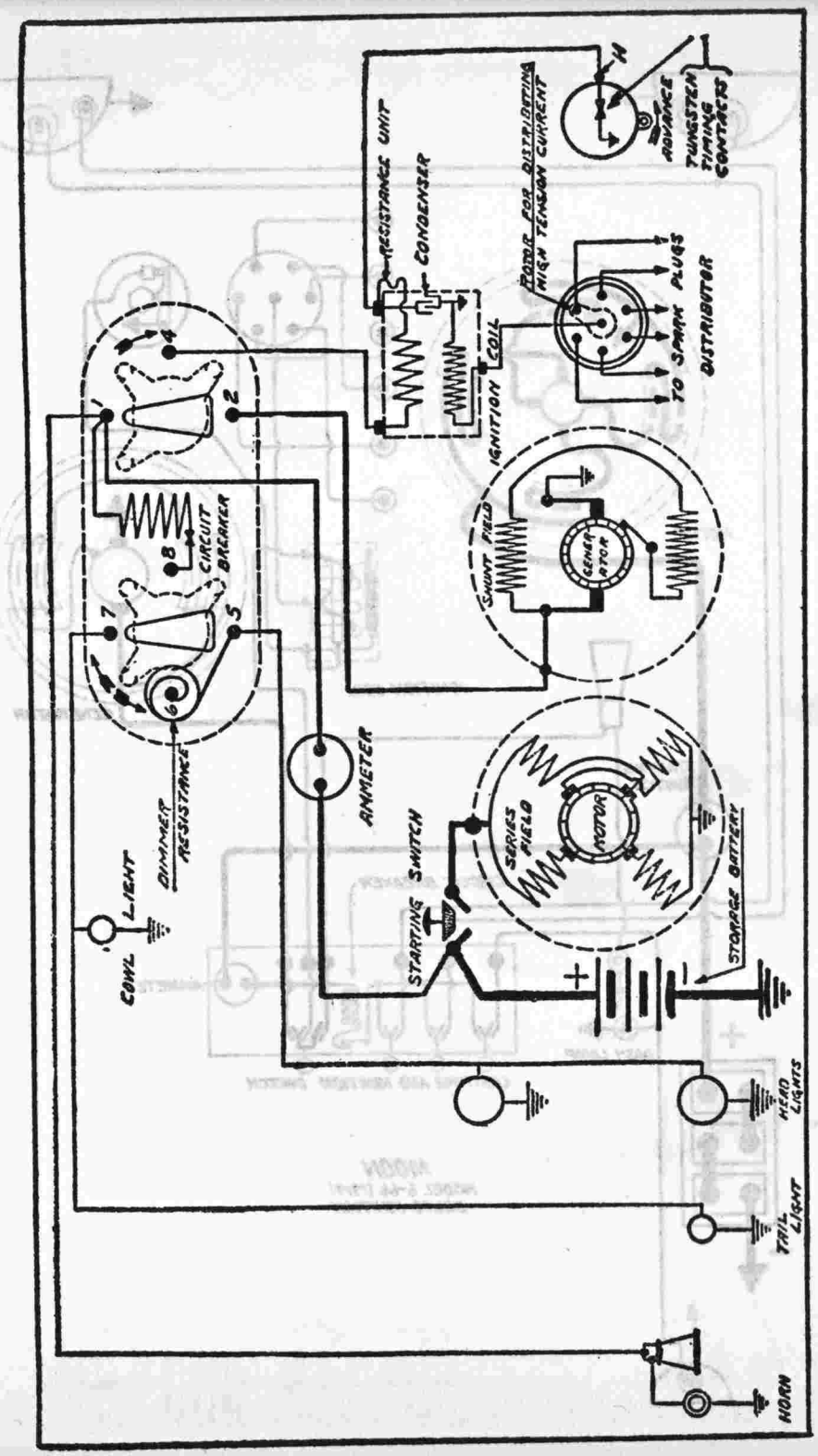


MOON

MODEL 6-43 (1917) 6-45 (1918-19)

Delco Generating, Starting and Lighting System

Delco Ignition



Battery.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Timing.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .027 to 030 inch.

Oiling.—Put 4 or 5 drops of light engine oil in timer bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Starter.—Starter is Model No. 106. Starter is connected to the engine through a Bendix drive. Lock torque is 10 pound-feet. Running freely, starter takes 40 amperes.

Oiling.—Put several drops of light engine oil in starter bearings every month.

Generator.—Generator current regulation is by third brush system. Generator begins to supply current at 8-10 miles per hour, or 500-550 R. P. M. of armature. Maximum charging rate is 15-18 amperes, reached at 22 miles per hour.

GENERATOR DATA, MODEL NO. 105

Hot Test		Cold Test	
Amperes	R. P. M.	Amperes	R. P. M
Neutral	500	Neutral	500
10-12	900	10.5-12.5	900
14-16	1400	15.5-18	1400
11-13	2000	13.0-17	2000

Charging rate is varied by adjusting third brush. Moving brush in a counter-clockwise direction (looking at commutator end) increases the output. Moving it in the opposite direction decreases output.

Oiling.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch. The overrunning clutch at driving end allows generator to operate as a motor when battery's pressure is above that of generator. If engine is killed when stopping the noise made by the clutch serves at attract the operators's attention to open the ignition switch. The opening and closing of the generator-battery circuit by the operator, takes the place of the relay.

Lamps.—Head lamps are 6-8 volt, 16 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

Circuit-Breaker.—A vibrating type circuit breaker takes the place of fuses in lighting circuit. It takes 25 amperes to start this device vibrating, but 3 to 5 amperes will cause it to continue.

Model Numbers.—Starter is No. 106. Generator is Model No. 105. Starting switch is Model No. 1964. Combination switch is Model No. 1078. Ignition coil is Model No. 2139. Ammeter is Model No. 6059.

MOON

MODEL 6-66 (1917-18-19)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2158. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth, or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Distributor shaft bearings are of the oilless type. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER:—Models 102 & 106. Starter is connected to engine through a Bendix drive Lock torque is 16 pound-feet, at 3.5 to 3.8 volts. Running freely, starter takes 40 amperes.

OILING.—Starter bearings are of the oilless type.

GENERATOR:—Models 101 & 105. Current regulation is by the third brush system Generator begins to supply current at 500 R.P.M. of the armature or 6-8 miles per hour, and reaches its maximum current output of 16-18 amperes at 20 miles per hour, or 1400 R.P.M. of the armature.

Generator Data

Cold Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
Neutral	500	Neutral	500
10.5-12.5	900	10-12	900
15.5-18.0	1400	14-16	1400
13.0-17.0	2000	11-13	2000

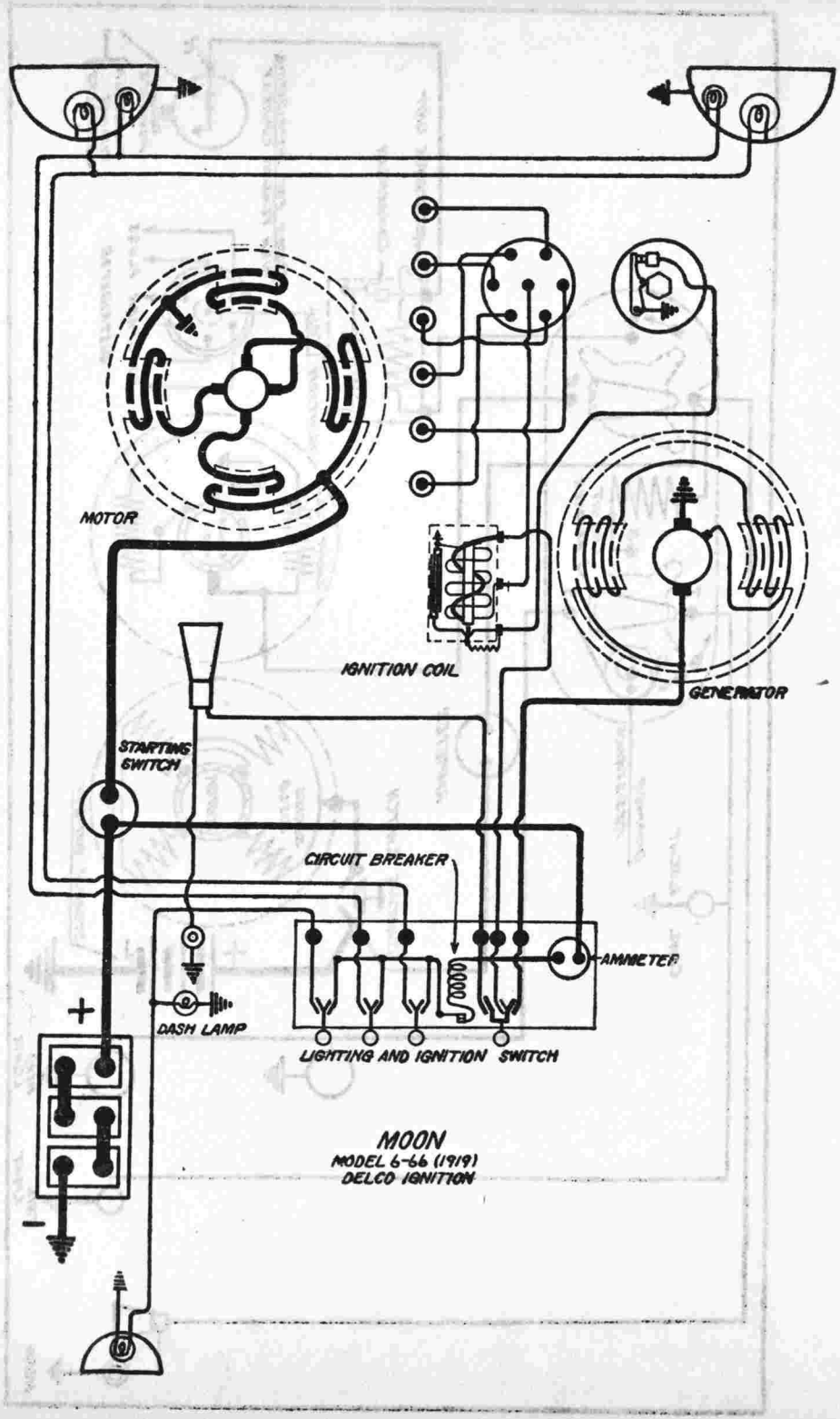
Charging rate is varied by adjusting third brush setting. Loosen the two screws holding the third brush arm and move brush in a counter-clockwise direction (looking at commutator end) to increase the charging rate. Move the third brush in a clockwise direction to decrease the charging rate. Tighten the holding screws and reseat brush after adjusting position.

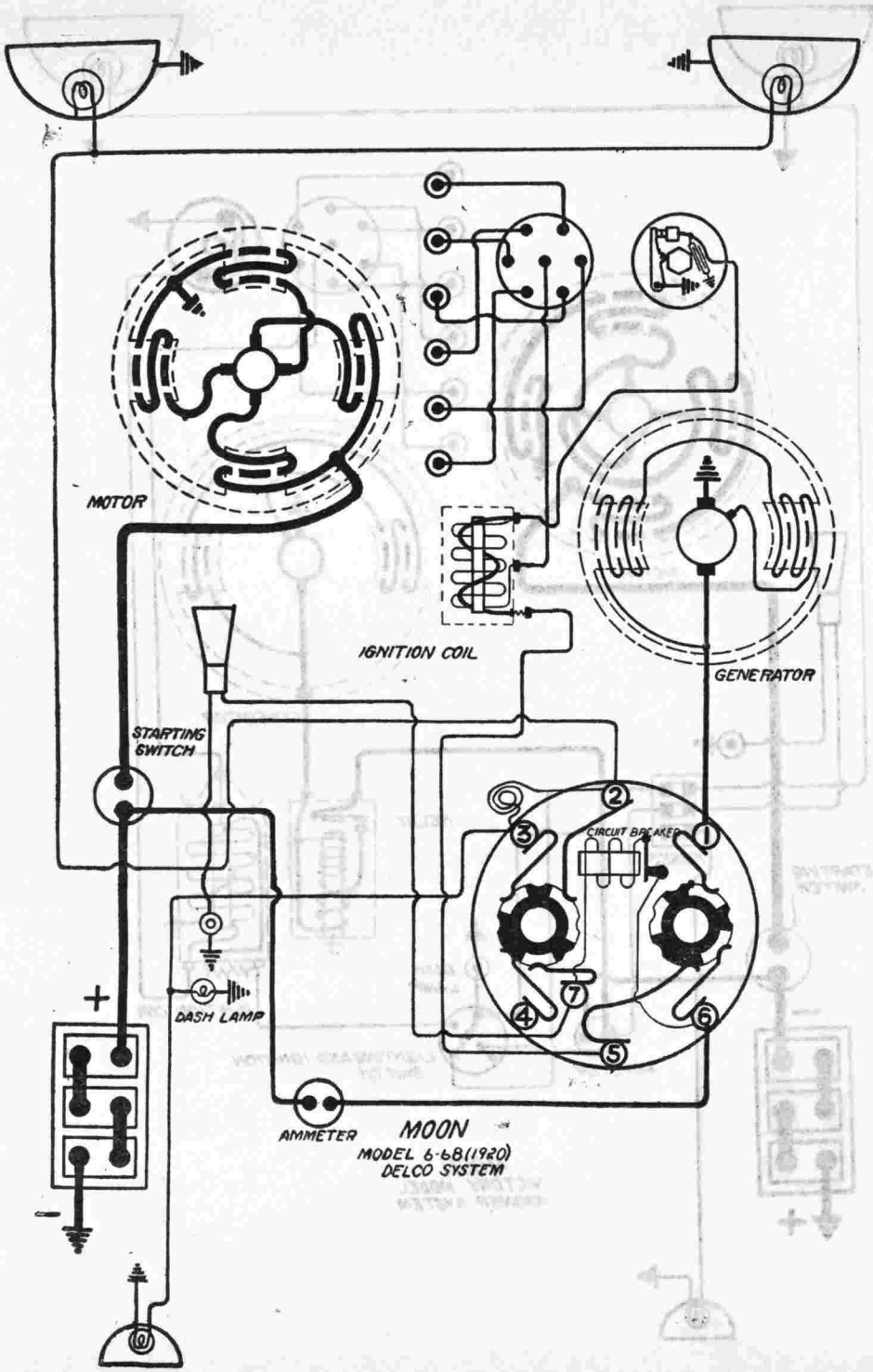
OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volt, 20 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are 6-8 volt, 2 cp. On 1917-18 cars, head lamps are 6-8 volt, 17 cp.

CIRCUIT BREAKER:—A vibrating circuit breaker takes the place of fuses. A current of 25-30 amperes is required to start the vibrator but 3-5 amperes will cause it to continue.





MOON

MODEL 6-68 (1920)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Exide, Type 3X-15-1, 6 volt, 120 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2159. Distributor Model No. 5157. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 3 or 4 drops of light engine oil in the distributor shaft bearing every two weeks. If the track of the rotor button is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model No. 136. Starter is connected to the engine through a Bendix drive. Running freely, starter current is 35 amperes at 3.5 volts, armature revolving at 4500 R.P.M.

OILING.—Starter bearings are of the oilless type.

GENERATOR.—Model No. 135. Generator current regulation is by the third brush system. Generator begins to supply current at 7-9 miles per hour or 500-550 R.P.M. of the armature and reaches the maximum current output of 16 amperes at 1400 R.P.M. of the armature or 18-24 miles per hour.

Generator Data

Cold Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
Neutral	500	Neutral	500
10.5-12.5	900	10-12	900
15.5-18.0	1400	14-16	1400
13.0-17.0	2000	11-13	2000

Charging rate is varied by adjusting the third brush setting. Loosen the two screws holding the third brush arm, and move the arm in a counter-clockwise direction (looking at the commutator end) to increase the charging rate. Move the arm in the opposite direction to decrease the charging rate. Tighten the two screws and reseat the brush after adjusting position.

RELAY.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volt, 20 cp. Dash and tail lamps are 6-8 volt, 2 cp.

CIRCUIT-BREAKER.—A vibrating circuit-breaker takes the place of fuses. It requires a current of 25 amperes to start the vibrator, but 3-5 amperes will cause it to continue.

MOON

MODEL 6-36 (1918) 6-46 (1920)
VICTORY MODEL (1919)
WAGNER GENERATING, STARTING AND LIGHTING SYSTEM
DELCO OR WAGNER IGNITION

BATTERY.—Exide, Type 3-X-15-1, 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model K-32.....Distributor Model KC-335. Breaker contacts separate .024 to .029 inch. When the condition of the contacts affects the ignition, renew the lever arm and contact screw.

OILING.—Screw the grease cup under the breaker head one-half turn every two weeks. If the car is driven more than 500 miles in two weeks, this must be done every 500 miles. Put 3 or 4 drops of light engine oil on the wick in the breaker lever spindle every 6 months.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .028 inch.

STARTER.—Model E.M.-272, Type 36-T. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 110 R.P.M., current 160 amperes. Lock torque is 11.5 pound-feet, current 475 amperes. Running freely, starter current is 60-90 amperes, armature revolving at 8000 R.P.M.

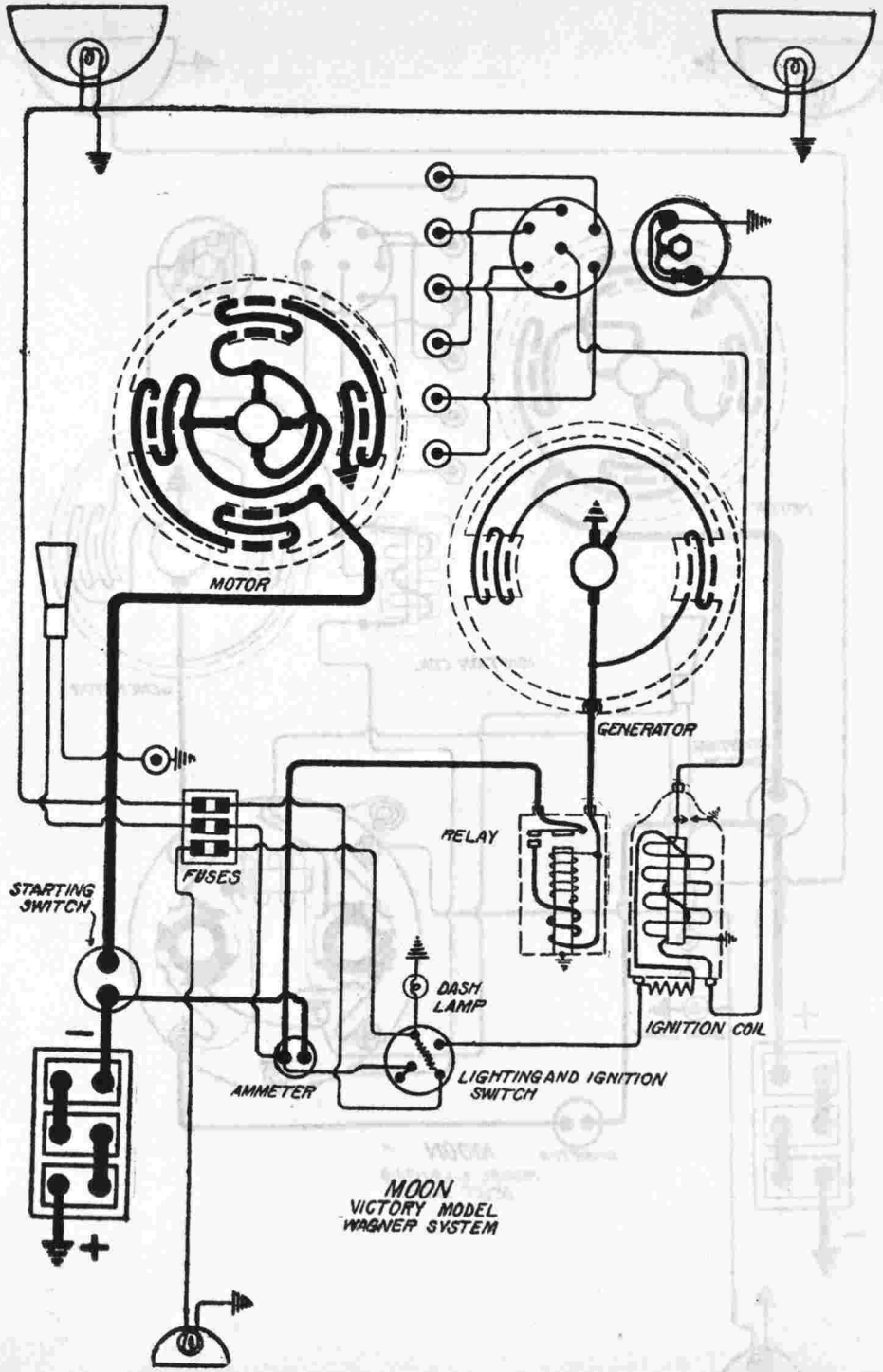
OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

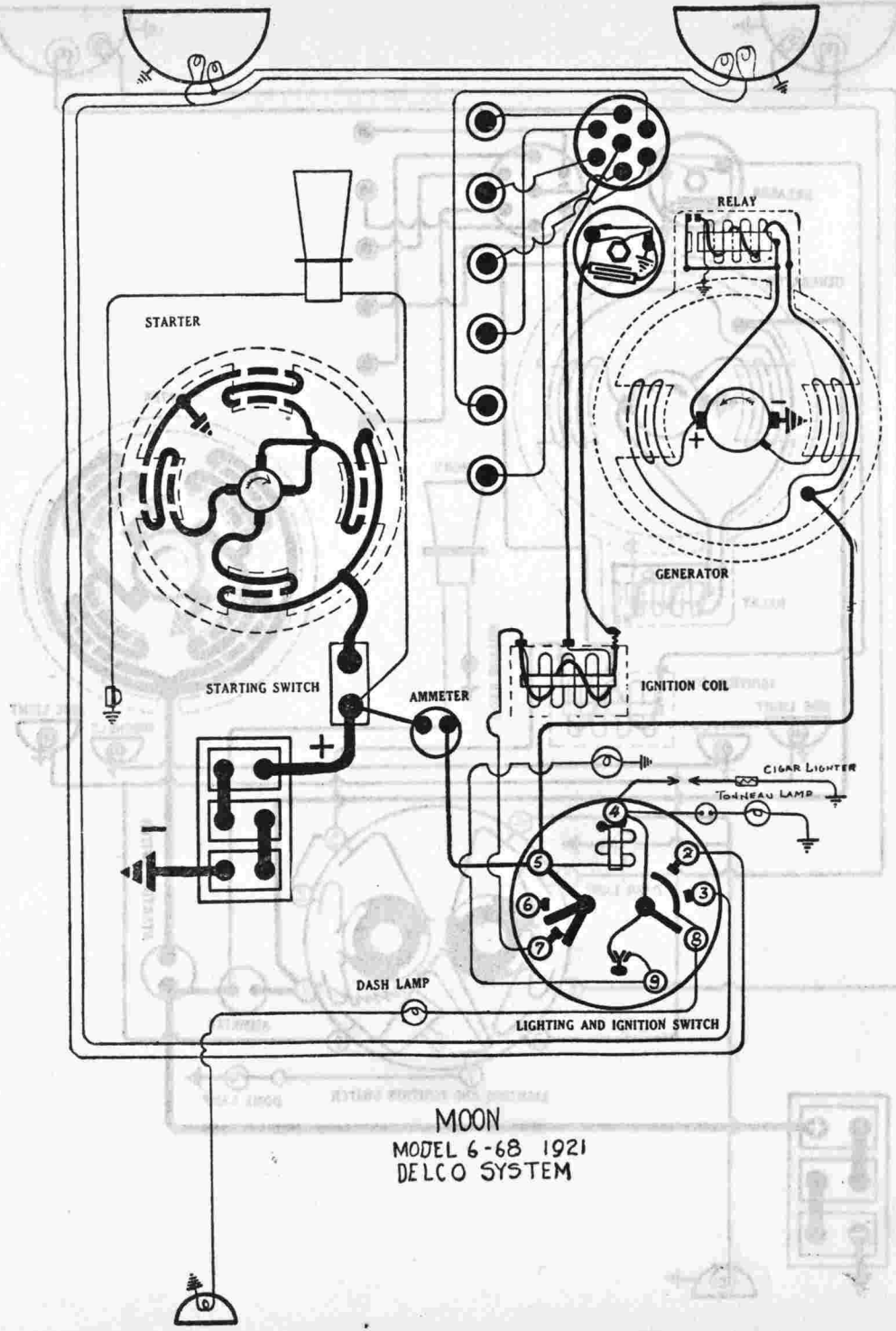
GENERATOR.—Model E.M.-303, Type 45-W. Generator current regulation is by third brush system. Maximum current output is 16 amperes, reached at 20-24 miles per hour, or 1500 R.P.M. of the armature.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 587-735 R.P.M. of the armature, and opens at 6-8 miles per hour or 440-587 R.P.M. of the armature. Charging current is 2 amperes at closing, and the discharge current 0-4 amperes at opening of relay contacts. Contacts separate .035 to .065 inch. Air gap between relay armature (moving member) and coil core is .025 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 20 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.





MOON

MODEL 6-68 (1920-21)
DELCO GENERATING, STARTING, AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Exide, Type 3-XC-15-1, 6 volt 100 ampere hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. 2159, Distributor Model No. 5215. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 4 or 5 drops of light engine oil in each of the ignition unit oilers every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 2¼ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER.—Model No. 179. Starter is connected to the engine through a Bendix drive Starter cranks the engine at 125 R.P.M., taking 180 amperes. Lock torque is 7 pound-feet.

OILING.—Put 4 or 5 drops of light engine oil in the starter oilers every month.

GENERATOR.—Model No. 180. Rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Maximum charging rate is 11-15 amperes, reached at 1200 R.P.M. of the armature or 16-20 miles per hour.

Amperes	Generator Data	R.P.M.
Neutral		550
4		800
8		1000
11-15		1200
11-14		2000

Charging rate is varied by the adjustment of the third brush setting. To move the third brush, loosen the three screws holding the bearing retainer plate on the commutator end and shift the plate. Move in a counter-clockwise direction to increase the charging rate, or in the opposite direction to decrease the charging rate. Tighten the adjusting screws and reseat the brush after making the adjustment. Maximum charging rate must not exceed 16 amperes.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes at 550-600 R.P.M. of the armature or 7-8 miles per hour, and opens at 500-550 R.P.M. of the armature or 5-6 miles per hour. Relay contacts separate .046 to .062 inch. Air gap between the relay armature and coil core is .020 to .035 inch, contacts closed. To adjust relay connect a voltmeter between the positive (+) generator brush and ground. Then slowly speed up the generator and adjust the relay spring tension by turning the thumb nut until the contacts close when the voltmeter indicates 7.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 3 cp.

CIRCUIT BREAKER.—A vibrating circuit takes the place of fuses. It requires 25 amperes to start the vibrator. While vibrating, the current is 3-5 amperes.

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION — 7-R CONTINENTAL ENGINE

BATTERY.—Exide, Type 364, 6 volt, 110 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2159. Distributor Model No. 5208. Breaker contacts separate .020 to .0275 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Put 3 or 4 drops of light engine oil in each of the distributor oilers every two weeks. Fill the distributor housing, to a level above the advance ring and yoke, with light cup grease once each season. If the track of the rotor button is not well polished, apply a very small amount of vaseline.

Timing.—Breaker contacts begin to separate when the piston of the first cylinder is on top dead center of power stroke, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—The spark plug gaps are .025 inch.

STARTER.—Model No. 181. Starter is connected to the engine through a Bendix drive. Lock torque is 28 pound-feet, the current being 525 amperes at 4 volts.

Oiling.—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month. Remove the grease plug in the reduction gear housing and inject soft cup grease every six months.

GENERATOR.—Model No. 165. Generator current regulation is by the third brush system. Maximum charging rate is 11-15 amperes, reached at 1200 R.P.M. of the armature, or 16-20 miles per hour.

Generator Data

Amperes	R.P.M.
0	550
4	800
8	1000
11-15	1200
11-14	2000

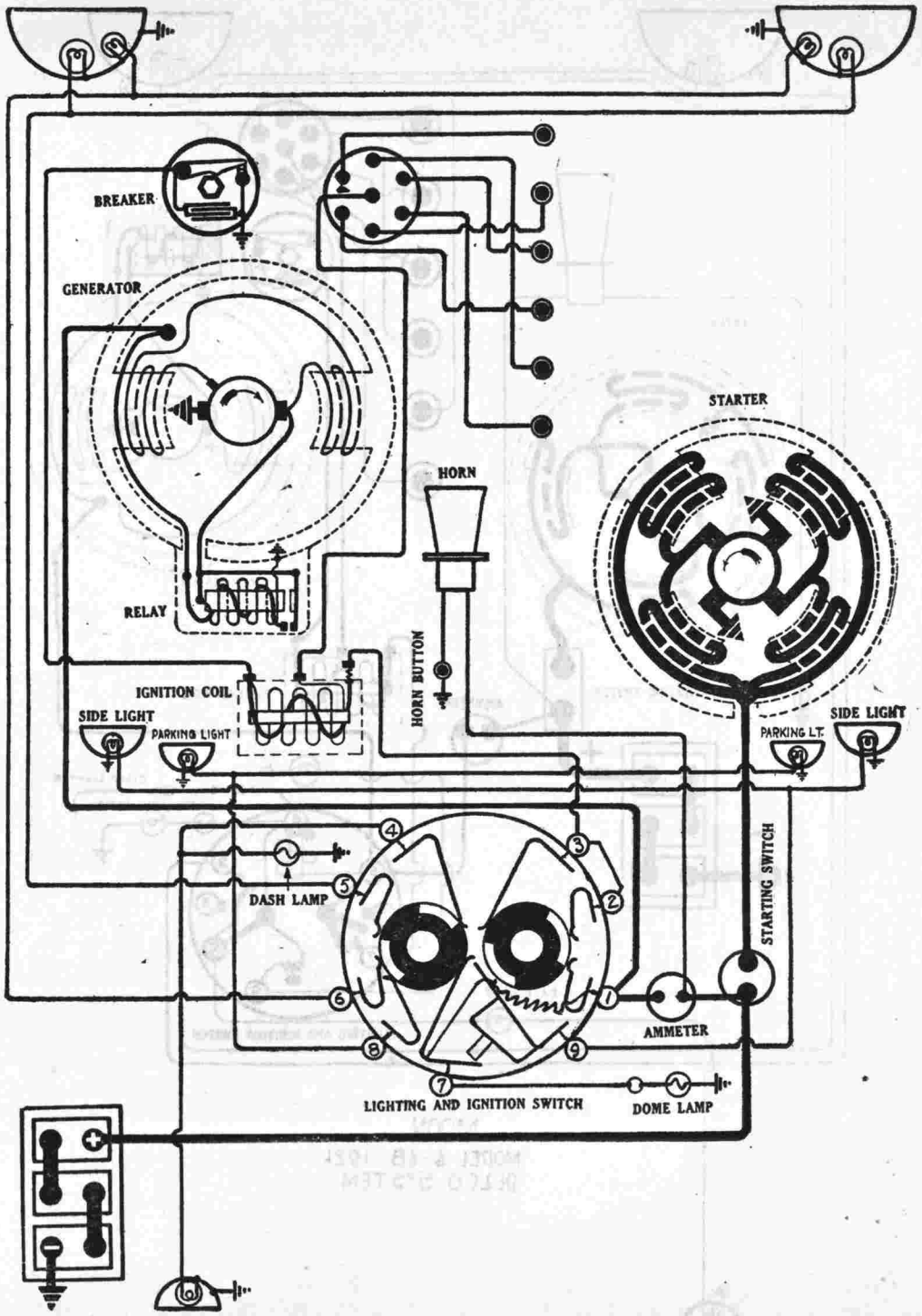
To move the third brush, loosen the three screws holding the bearing retainer plate on the commutator end and shift the plate. Move in the same direction as armature turns to increase the charging rate, or in the opposite direction to decrease the charging rate. Maximum charging rate must not exceed 16 amperes.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes at 550-600 R.P.M. of the armature or 7-8 miles per hour, and opens at 500-550 R.P.M. of armature or 5-6 miles per hour. Relay contacts separate .046 to .062 inch. Air gap between the relay armature and coil core is.020 to .035 inch, contacts closed. To adjust relay connect a voltmeter between the positive (+) generator brush and ground. Then slowly speed up the generator and adjust the relay spring tension by turning the thumb nut until the contacts close when the voltmeter indicates 7.5 volts. Clean relay contacts by drawing unglazed between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

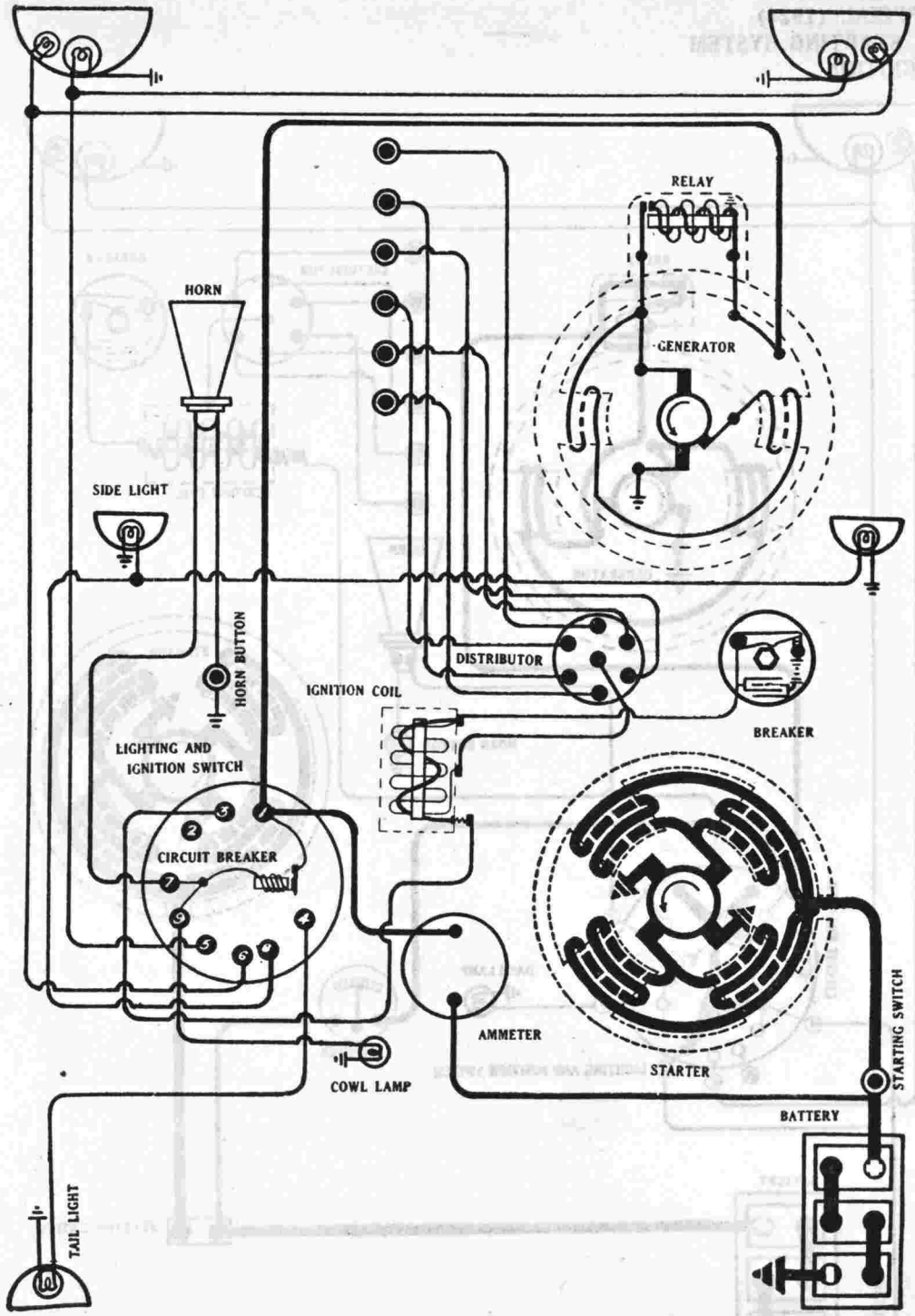
LAMPS.—Head lamps are 6-8 volt, 20 cp. Dimmer lamps are 6-8 volts, 5 cp. Dash and tail lamps are 6-8 volts, 2 cp. Side lamps are 6-8 volts, 4 cp. Parking lamps are 6-8 volts, 4 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires a



MOON

MODEL 6-40 (1922-23-24)
NEWPORT MODEL (1925)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION



BATTERY.—Exide, Type 3-XC-13-1, 6 volts, 85 ampere-hours capacity. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2178. Breaker contacts separate .020 inch. They are made of tungsten. If condition affects ignition, remove and resurface on a medium hard oilstone.

Oiling.—Put 4 or 5 drops of light engine oil into distributor oiler once a week. If car is driven over 250 miles in one week, this care must be given each 250 miles.

Timing.—Breaker contact opens when piston No. 1 is at top dead center, entering on power stroke, spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps separate .025 inch.

STARTER.—Model 240. The direction of rotation looking at commutator end is counter-clockwise. The starter is connected to the engine through a Bendix drive. The lock torque is 12 pound feet.

Starter Test Data

Torque	R.P.M.	Amperes
0.0		50
1.0	2600	110
1.5	2175	140
2.0	1900	160
2.5	1650	180
3.0	1450	200

The brush tension should be 2¼ to 2¾ pounds on each brush.

Oiling.—Put 4 or 5 drops of light engine oil into starter oilers every week. If car is driven over 250 miles in one week, this care must be given every 250 miles.

GENERATOR:—Model Nos. 241, 257. The direction of rotation, looking at the commutator end, is counter-clockwise. The third brush system is employed for current regulation. The maximum charging rate is 17 amperes, reached at 1400 R.P.M. of the generator armature.

Generator Test Data

Amperes	Hot Test R.P.M.	Amperes	Cold Test R.P.M.
0	460	0	440
4	600	4.5	600
9.5	800	10	800
13.5	1000	15	1000
15.5	1400	17	1400

To adjust the charging rate, loosen the generator cover band and shift the third brush mounting plate by means of the handle on the plate. Shifting the third brush in the direction of generator rotation (counter-clockwise) increases the charging rate and in the opposite direction decreases the charging rate.

Oiling.—Put 4 or 5 drops of light engine oil into generator oiler every week. If car is driven over 250 miles in one week, this care must be given every 250 miles.

RELAY.—Relay closes at 7 to 8 miles per hour or 550 to 600 R.P.M. of armature, and opens at 5 to 6 miles per hour or 500 to 550 R.P.M. Relay contacts separate .046-.062 inch. Air gap between relay armature and coil core is .020 to .035 inch.

LAMPS.—Head lamps are 6 volts, 21 cp. Auxiliary lamps are 6 volts, 4 cp. Dash and side lamps are 6 volts, 2 cp.

CIRCUIT BREAKER.—Circuit breaker begins to vibrate when the current reaches 25 amperes, and continues to vibrate with 3 to 5 amperes.

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MOON

MODEL 6-58 (1923-24)
MODEL 6-48 SPECIAL (1924)
DELCO GENERATING, STARTING SYSTEM
DELCO IGNITION

BATTERY:—Exide, Type 3-XC-15-1. 6 volts. Battery capacity is 100 ampere hours. Starting capacity (20 minute rate) is 114 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model 2178. Distributor Model 5256. Breaker contacts separate .020-.0275 inch. They are made of tungsten. If the condition of the contacts affects the ignition, resurface on a fine flat contact file or on a medium hard oilstone. It is not necessary to grind the points if they are burned or pitted. Just brighten the surface of the point and remove the raised portion of the opposite point.

Mounting:—To remove the distributor, remove distributor head with high tension cables intact. Disconnect primary lead and manual advance rod. Remove manual advance stop screw and lift unit from position.

Oiling:—Put 8 or 10 drops of light engine oil into each distributor oiler every two weeks. If the car is driven more than 500 miles in two weeks this care must be given every 500 miles. Repack the distributor housing with medium soft cup grease up to the advance ring and yoke once each season. Place a small bit of vaseline on the face of the breaker cam every 2000 miles.

Timing:—Breaker contacts just begin to separate when piston No. 1 is at top dead center on compression stroke, mark "UD" on flywheel opposite the indicator on the flywheel housing, spark control lever and breaker assembly in the fully retarded position. To set timing, loosen advance lever clamp screw and turn housing in a counter-clockwise direction until the contacts begin to separate. See that rotor is under contact which is connected to cylinder No. 1 Tighten clamp screw after making the adjustment.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .030 inch.

STARTER:—Model 181. The starter is connected to the engine through a Bendix drive and reduction gears. The electrical circuit to the starter is completed through the starter switch, **Model 1955.** The direction of rotation is clockwise, looking at the commutator end. Starter cranks the engine at 150 R.P.M. drawing 125-200 amperes at 5 volts. Brush spring tension is 2¼-2¾ pounds each.

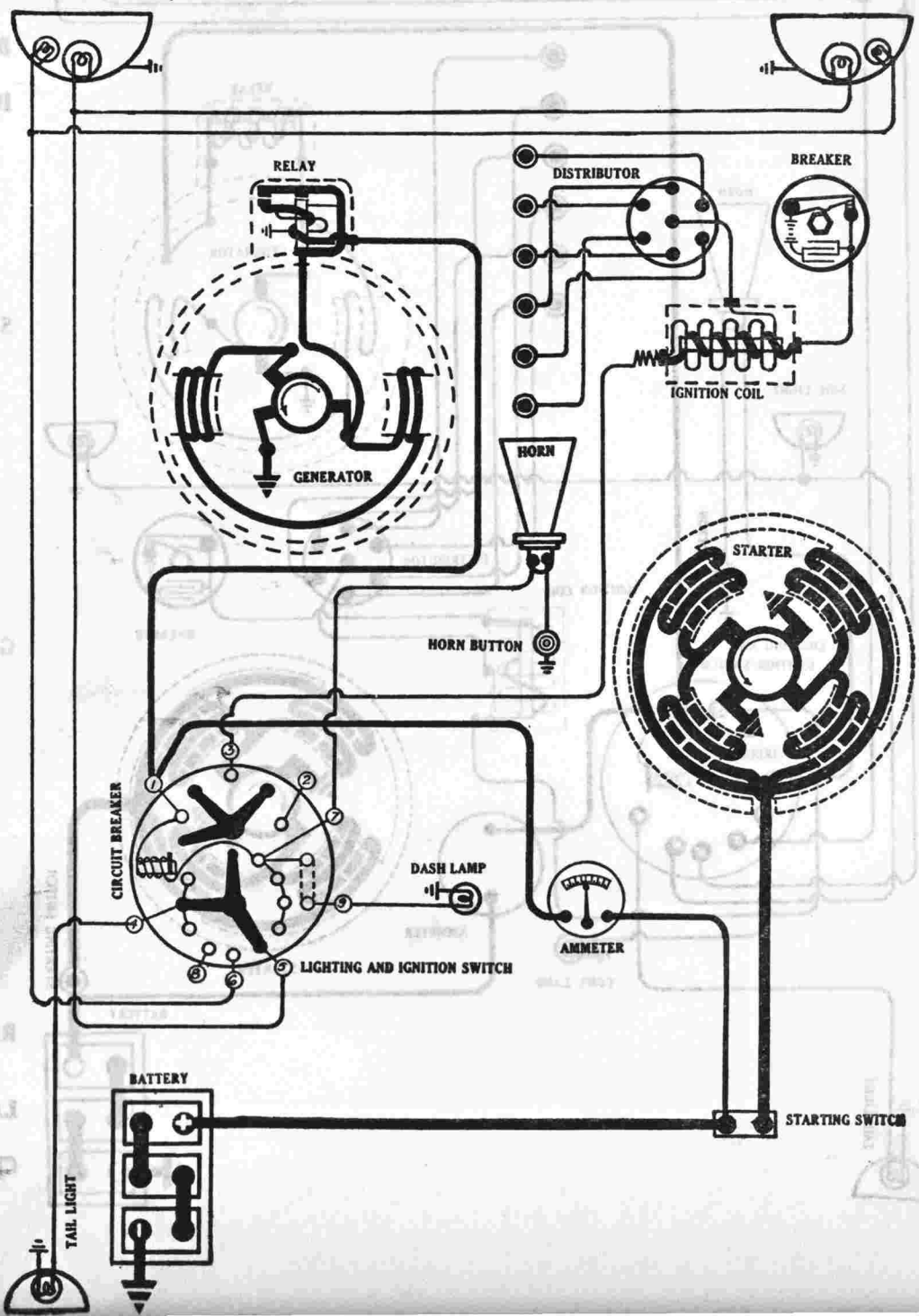
Starter Data

Torque	R.P.M.	Volts	Amperes
Free	4500	5.5	40-50
27 lb. ft.	Lock	2.75	450-550

Mounting:—Starter is mounted at the right of the engine. To remove starter, disconnect lead from starter terminal. Remove large hold-down screw. Pull starter forward and out from engine.

Oiling:—Put 8 or 10 drops of light engine oil in each of the starter oilers every 1000 miles or each month. Saturate the wick in the oiler on the Bendix gear case once each year. Remove grease plug and fill reduction gear case with medium heavy cup grease twice a year.

GENERATOR:—Model 165, 258. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for regulating the current. To adjust the charging rate, remove the cover band on the commutator end of the generator housing, and by means of an



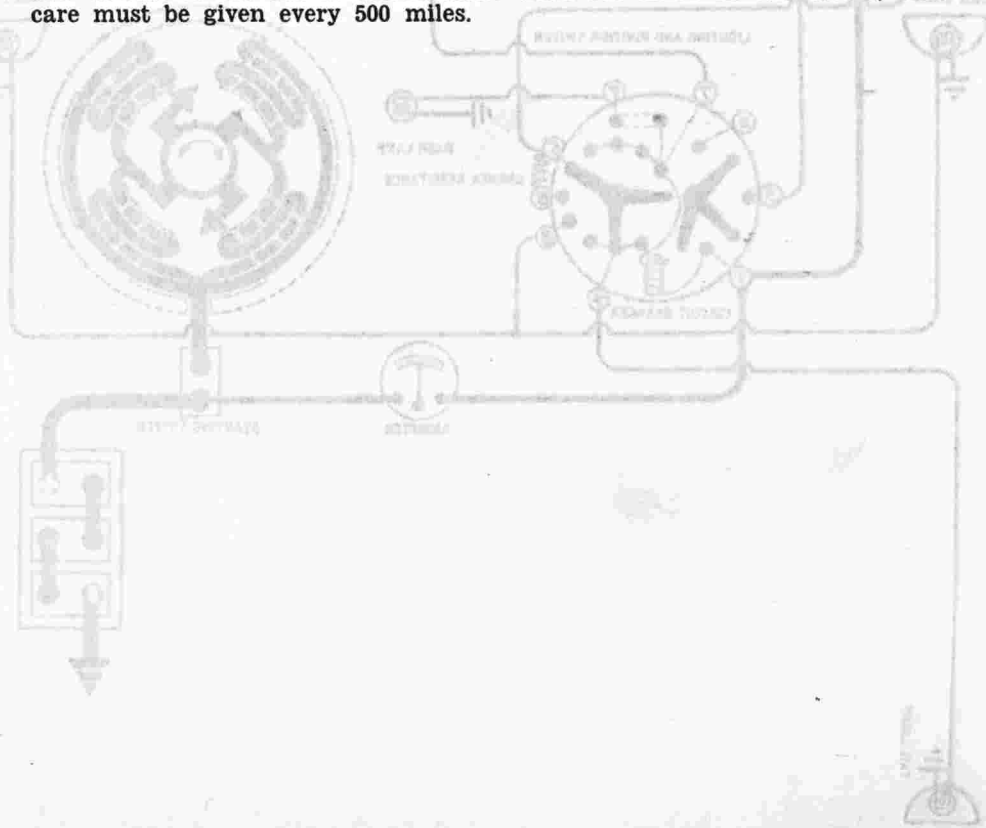
extension handle, shift the third brush in the direction of rotation (counter-clockwise) to increase the charging rate. To decrease the charging rate, shift the third brush in the opposite direction (clockwise) of rotation. The third brush plate is held in any position by means of a friction clamp. The maximum charging rate is 14-16 amperes, reached at 1600 R.P.M. of armature. Brush spring tension is 1¼-1¾ pounds each.

Generator Data

Amperes	R.P.M.
5	700
11	1000
14-16	1600
15	2000

Mounting:—The generator is mounted at the left of the engine. To remove the generator, remove lead and disconnect coupling. Remove hold-down screws and lift generator from engine.

Oiling:—Put 8 or 10 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.



RELAY:—Relay is mounted on the generator. Relay contacts close at 450-550 R.P.M. or 6-8 M.P.H. when the generator voltage reaches 6.7-7.5 volts and open at 400-450 R.P.M. with a current discharge of 0-3 amperes. Contact gaps are .025-.035 inch. Air gap is .025-.035 inch with contacts closed. Spring tension is controlled by bending long brass stop; the gap by bending short brass stop. To raise the cut-in voltage, increase the spring tension or increase the gap. To lower cut-in voltage, decrease gap and if necessary slightly decrease the spring tension. To decrease discharge current, increase spring tension and decrease gap.

LIGHTING:—Combination Switch Model 1239. Head lights are 6-8 volt, 21 cp. S.C. Auxiliary headlights are each 6-8 volt, 4 cp. S.C. Tail and dash lights are 6-8 volt, 2 cp. S.C.

CIRCUIT BREAKER:—A circuit breaker is mounted on the back of the combination switch and takes the place of fuses. A current flow of 25-30 amperes will cause the circuit breaker to operate. It will continue to operate with a current flow of not more than 15 amperes. Also not over 15 amperes must pass with a dead short circuit across the circuit breaker terminals.

MOON

SERIES "A" (1924)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM.

DELCO IGNITION.

BATTERY:—Exide, Type 3-XC-13-1, 6 volt, 90 ampere hour. The starting capacity is 98 amperes for 20 minutes. The lighting capacity is 5 amperes for 16.8 hours. The negative (-) terminal is grounded.

IGNITION: — Coil Model No. 2182. The distributor is mounted on the commutator end of the generator. The breaker contacts separate .020 to .025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or an a medium hard oilstone.

OILING: — Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles. Place a small bit of grease on the face of the breaker cam every 1000 miles. Once each year, remove the grease plug on the side of the gear housing and repack compartment with medium heavy cup grease.

TIMING: — Breaker contacts begin to separate when the piston entering power stroke is on the top dead center with the spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER: — The firing order is 1-5-3-6-2-4.

SPARK PLUGS: — Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER: — Model No. 286. The starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Running free the starter takes 60 amperes at 6 volts. Lock torque is 10 lb. ft. at 3.1 volts. The pressure of the starter brushes should be 2¼-2¾ pounds each.

OILING: — Oilless bearing are used. They require no attention.

GENERATOR:—Model No. 287. Generator current regulation is by the third brush system. The direction of rotation is counter-clockwise, looking at the commutator end. The maximum charging rate is 17 amperes, reached at 1600 R.P.M. of the generator armature or 20 M.P.H.

Generator Data.

Amperes	R. P. M.
8	1000
17	1600

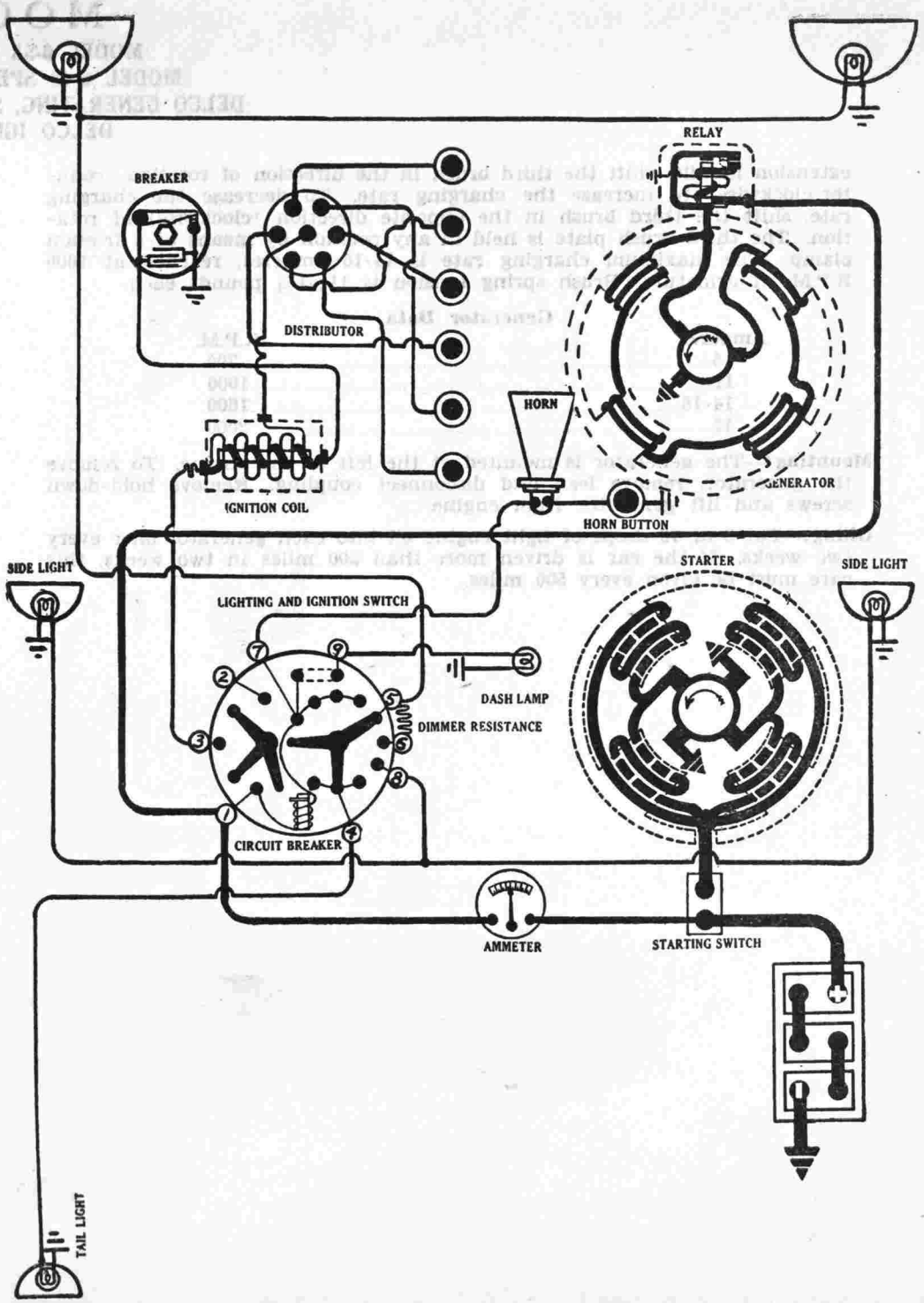
To adjust the generator output, loosen the generator cover band and shift the third brush mounting plate by means of the handle attached. Shifting the plate in the direction of armature rotation (counter-clockwise) increases the charging rate and in the opposite direction decreases the charging rate. The plate is held in any desired position by means of friction washers. The pressure of the generator brushes on the commutator should be 1¼ to 1¾ pounds each.

OILING: — Put 8 or 10 drops of light engine oil in the bearing oiler on the commutator end of the generator every two weeks or each 500 miles.

RELAY: — Model No. 5754. Relay contacts close at a car speed of 8 M. P. H. when the voltage of the generator reaches 6.75 to 7.5 volts and open with a discharge current of 0 to 3 amperes. Contacts separate .030 inch. The air gap between the relay armature and coil core is .015-.020 inch, contacts closed.

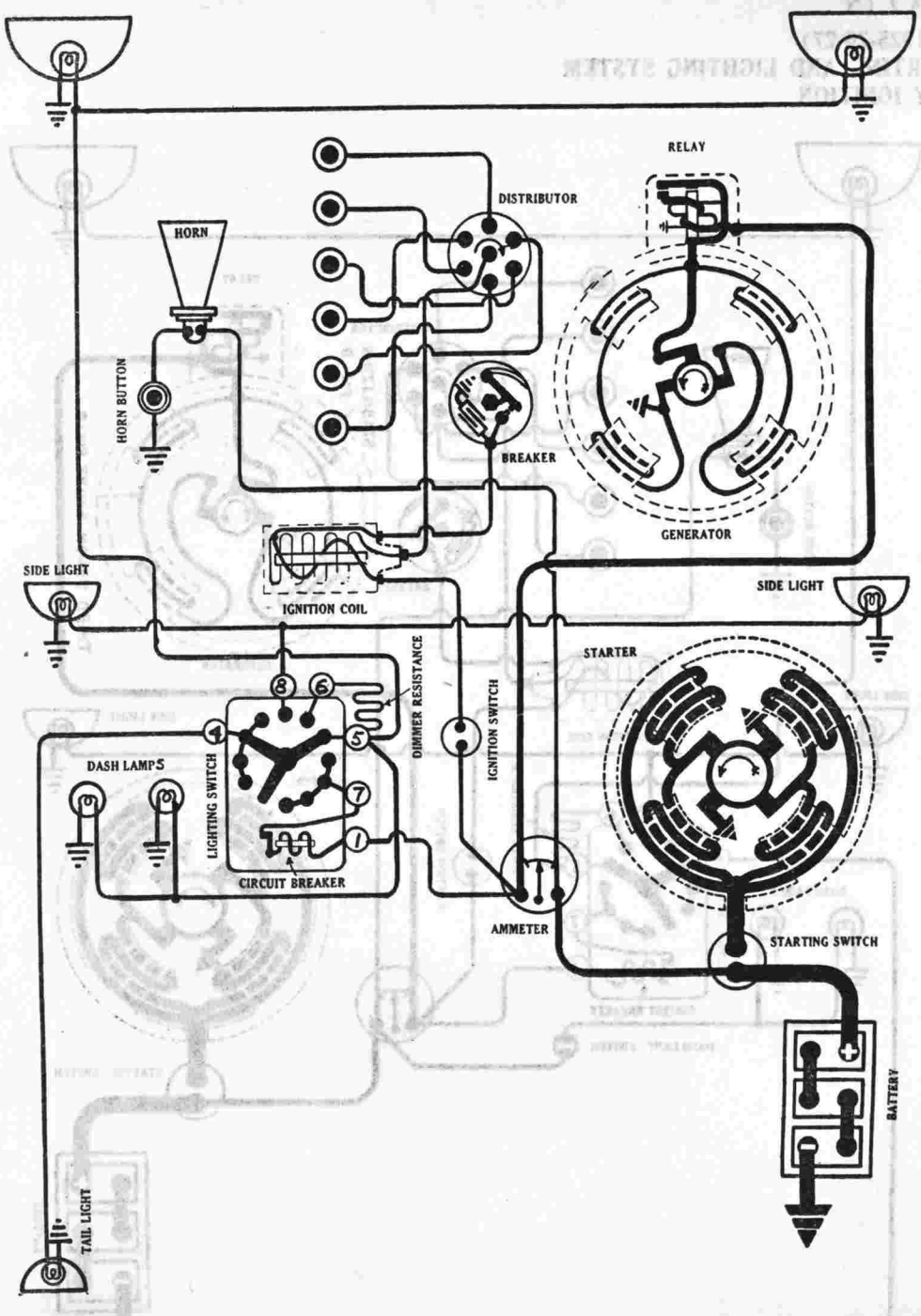
LIGHTING:—Switch Model No. 1260. Head lamps are 6-8 volt, 21 cp. Dash and tail lamps are each 6-8 volt, 2 cp. A dimmer resistance is used.

CIRCUIT BREAKER: — A vibrating circuit breaker, mounted on the back of the switch, takes the place of fuses. A current of 25-30 amperes will cause the circuit breaker to vibrate. While operating the current is 10-15 amperes.



MOON

SERIES A (1925)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION



BATTERY:—Exide, Type 3-XC-13-1. 6 volt. The starting capacity is 98 amperes for 20 minutes. The lighting capacity is 5 amperes for 16.8 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. 2182. Distributor Model No. 5274. Breaker contacts separate .014 to .020. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone, or with a fine flat jeweler's file. Manual advance provided is 30°. Automatic advance begins at 550 R.P.M. and reaches a maximum of 18-24° at 2000 R.P.M. The tension of the breaker arm spring should be 13-16 ounces.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Place a small bit of medium heavy grease on the face of the breaker cam every 1000 miles. Twice each year remove the grease plug on the side of the gear compartment and repack gears with medium heavy cup grease.

Timing:—Breaker contacts begin to separate when piston entering power stroke reaches top dead center with the manual spark control lever in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Model No. 286. Starter is connected to the engine by means of a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	60
10 "	Lock	3.1	—

The starter brush tension should be 2¼ to 2¾ pounds each.

Oiling:—Oilless bearings are used. They require no attention.

GENERATOR:—Model No. 296, 308. The direction of rotation of the generator is counter-clockwise, looking at the commutator end. Current regulation is by means of the third brush system in connection with a compensating field. Two field coils are connected between the third brush and the positive main brush. The other two coils are connected between the positive main brush and the negative main brush. To adjust the generator output, remove the generator cover band and shift the third brush mounting plate by means of the handle attached. Shifting the brush in the direction of armature rotation (counter-clockwise) increases the charging rate and in the opposite direction decreases the charging rate. The mounting plate is held in any desired position by friction clamp washers.

Generator Data

Amperes	R.P.M.
5	800
10-12	1600

The tension of the brushes should be 1¼ to 1½ pounds each.

Oiling:—Put on 8 or 10 drops of light engine oil in each of the two generator oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Relay contacts close when the voltage of the generator reaches 6.75 to 7.5 volts and open with a discharge current of 0 to 3 amperes. Contacts separate .030 inch. The air gap between the relay armature and coil core is .015 to .020 inch, contacts closed.

LIGHTING:—Head lamps are 6-8 volt, 21 cp. S.C. Side lamps are 6-8 volt, 2 cp. S.C. Dash and tail lamps are each 6-8 volt, 2 cp. S.C.

SWITCHES:—Lighting switch is Model No. 1264 or 1283. Ignition switch Model No. 1285. Starting switch is Model No. 1953.

CIRCUIT BREAKER:—A vibrating circuit breaker mounted on the switch takes the place of fuses in the lighting circuit. A current of 25-30 amperes will start this device vibrating. While vibrating the current is 10-15 amperes.

MOON

SERIES A (1925-26-27)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—U.S.L. Type XY-13. 6 volt. The starting capacity is 98 amperes for 20 minutes. The lighting capacity is 5 amperes for 16.8 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. 2182. Distributor Model No. 5274. Breaker contacts separate .014 to .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone, or with a fine, flat jeweler's file. Manual advance provided is 30°. Automatic advance begins at 550 R.P.M. and reaches a maximum of 18-24° at 2000 R. P. M. The tension of the breaker arm spring should be 13- 16 ounces.

Mounting.—Distributor is mounted on generator at right of engine. To remove, remove manual advance lever stop screw and lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Place a small bit of medium heavy grease on the face of the breaker cam every 1000 miles. Twice each year remove the grease plug on the side of the gear compartment and repack gears with medium heavy cup grease.

Timing:—Breaker contacts begin to separate when piston entering power stroke reaches top dead center with the manual spark control lever in the fully retarded position.

Valve Timing:—INLET VALVES:—Head diameter, 1½ inches; stem diameter, ⅜ inch; stem length, 5 9/32 inches; tappet clearance, .004 inch; spring pressure, 51 pounds; valve lift, 5/16 inch; intake opens at 4° past top dead center, and closes 46° past lower dead center.

EXHAUST VALVES:—Head diameter, 1½ inches; stem diameter, ⅜ inch; stem length, 5 9/32 inches; tappet clearance, .006 inch; spring pressure, 51 pounds; valve lift, 5/16 inch; exhaust opens 41° before lower dead center, and closes 1° past top dead center. The guide stems are removable. No oversize valve stems are made.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

STARTER:—Model No. 286. Starter is connected to the engine by means of a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data.

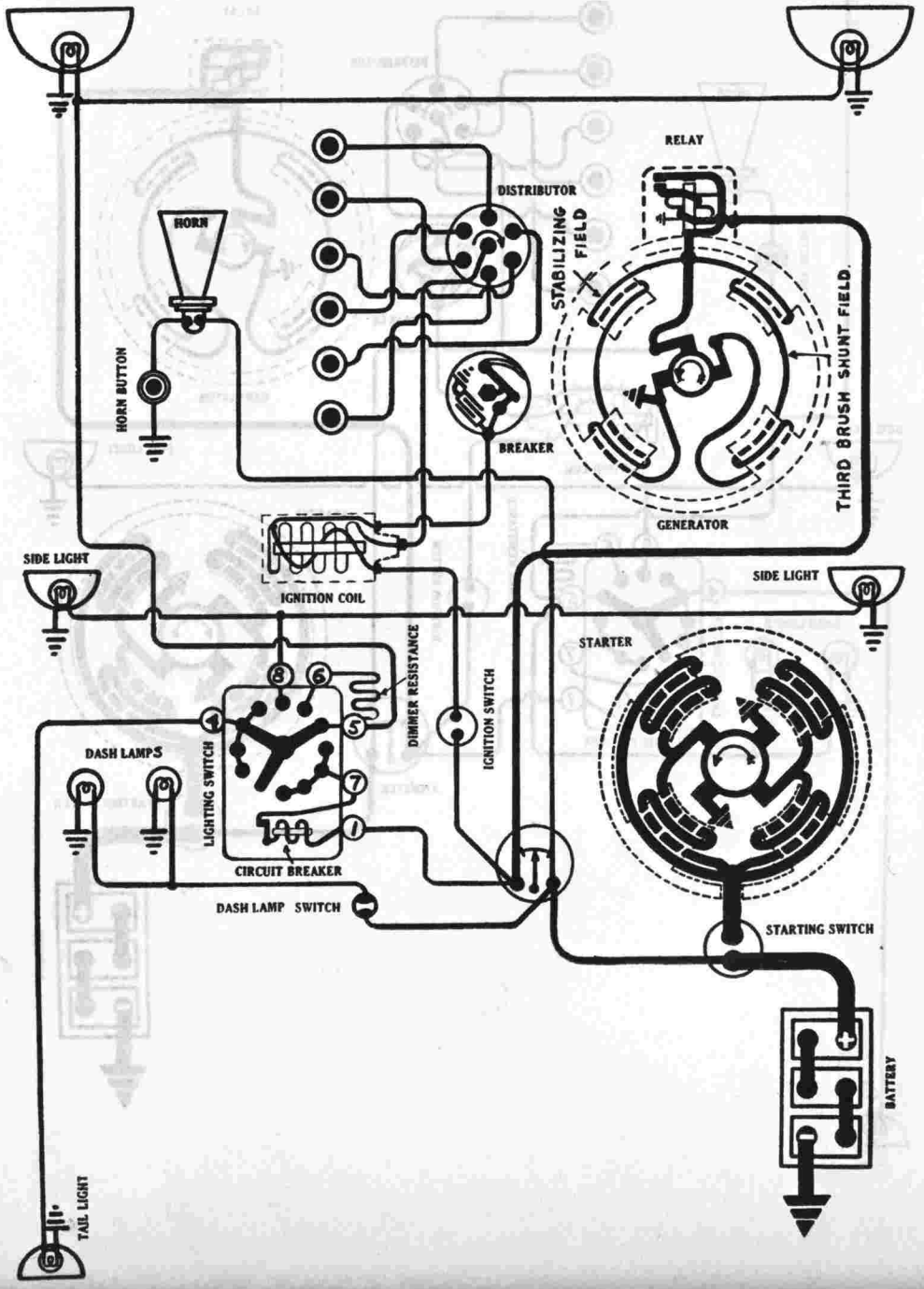
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	60
10 "	Lock	3.1	—

The starter brush tension should be 2¼ to 2¾ pounds each.

Mounting.—Starter is mounted at the right of the engine. To remove, remove three flange screws holding starter in position. Then pull unit forward and out.

Oiling:—Oilless bearings are used. They require no attention.

GENERATOR:—Model No. 308. The direction of rotation of the generator is counter-clockwise, looking at the commutator end. Current regulation is by means of the third brush system in connection with a compensating field. Two field coils are connected between the third brush and the positive main brush. The other two coils are connected between the positive main brush and the negative main brush. To adjust the generator output, remove the generator cover band and shift the third brush mounting plate by means of the handle attached. Shifting the brush in the direct-



MOON

SERIES A (1925-26-27)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

ion of armature rotation (counter-clockwise) increases the charging rate and in the opposite direction decreases the charging rate. The mounting plate is held in any desired position by friction clamp washers.

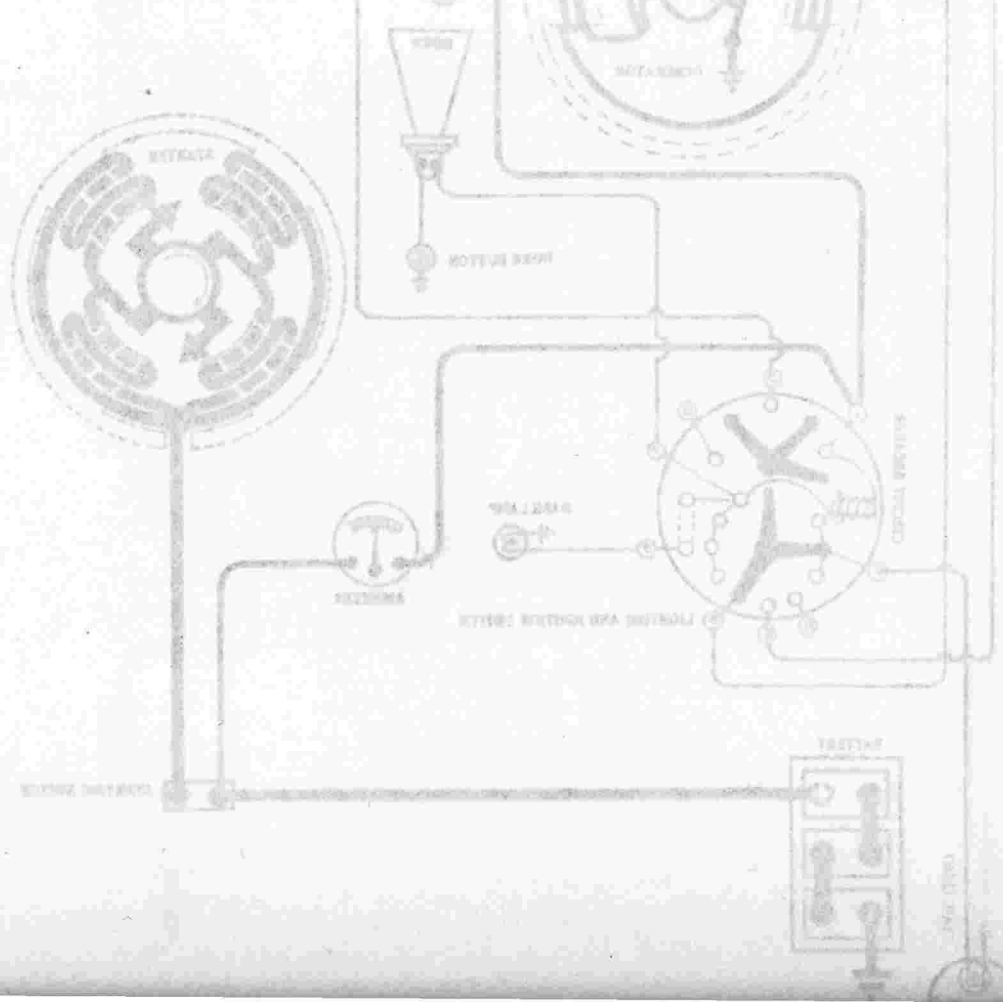
Generator Data.

Amperes.	R.P.M.
5	800
10-12	1600

The tension of the brushes should be 1¼ to 1½ pounds each.

Mounting.—Generator is mounted at the right of the engine and is chain driven from the crankshaft. To remove generator, disconnect pump shaft coupling. Then remove round plate on front side of chain case and nut holding sprocket on generator shaft. Loosen clamp adjustment screw and remove two flange mounting screws. Then slide generator to rear and lift out.

Oiling:—Put 8 or 10 drops of light engine oil in each of the two generator oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.



RELAY:—Relay contacts close when the voltage of the generator reaches 6.75 to 7.5 volts and open with a discharge current of 0 to 3 amperes. Contacts separate .030 inch. The air gap between the relay armature and coil core is .015 to .020 inch, contacts closed.

LIGHTING:—Head lamps are 6-8 volt, 21 cp.S.C. Side lamps are 6-8 volt, 2 cp.S.C Dash and tail lamps are each 6-8 volt, 2 cp. S.C.

SWITCHES:—Lighting switch is Model No. 1283. Ignition switch Model No. 1285. Starting switch is Model No. 1953.

CIRCUIT BREAKER:—A vibrating circuit breaker mounted on the switch takes the place of fuses in the lighting circuits. A current of 25-30 amperes will start this device vibrating. While vibrating the current is 10-15 amperes.

MOON

LONDON MODEL (1925-26-27)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY.—Exide, Type 3-XC-15-1, 6 volts, 100 ampere-hour capacity. The starting capacity is 114 amperes for 20 minutes. The lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2178. Distributor Model No. 5256. Breaker contacts separate .020-.0275 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone or with a fine flat jeweler's file. It is not necessary to grind the points if they are burned or pitted. Just brighten the surface of the point and remove the raised portion of the opposite point.

Mounting.—To remove distributor, remove manual advance lever stop screw and lift unit from position.

Oiling.—Put 8 or 10 drops of light engine oil into each distributor oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles. Repack the distributor housing with medium soft cup grease up to the advance ring and yoke once each season. Place a small bit of vaseline on the face of the breaker cam every 2000 miles.

Timing.—Breaker contacts just begin to separate when piston No. 1 is at top dead center on compression stroke, mark "UD" on flywheel opposite indicator in flywheel housing, spark control lever and breaker assembly in the fully retarded position. To set timing, loosen advance lever clamp screw and turn housing in a counter-clockwise direction until the contacts begin to separate. See that rotor is under contact which is connected to cylinder No. 1. Tighten clamp screw after making adjustment.

Valve Timing:—INLET VALVES:—Head diameter, 1½ inches; stem diameter, ⅜ inch; stem length, 5¾ inches; tappet clearance, .004 inch; valve lift, 5/16 inch; intake opens at 12° past top dead center, and closes 40° past lower dead center. EXHAUST VALVES:—Head diameter, 1½ inches; stem diameter, ⅜ inch; stem length, 5¾ inches; tappet clearance, .006 inch; valve lift, 5/16 inch; exhaust opens 40° before lower dead center, and closes 8° past top dead center. No over-size valves are made.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plugs.—The spark plug diameters are ⅞ inch, and the gaps are .030 inch.

STARTER.—Model No. 181.. The starter is connected by a Bendix drive to the engine. The direction of rotation is clockwise, looking at the commutator end. Starter cranks the engine at 150 R.P.M., and takes a current of 125-200 amperes at 5 volts.

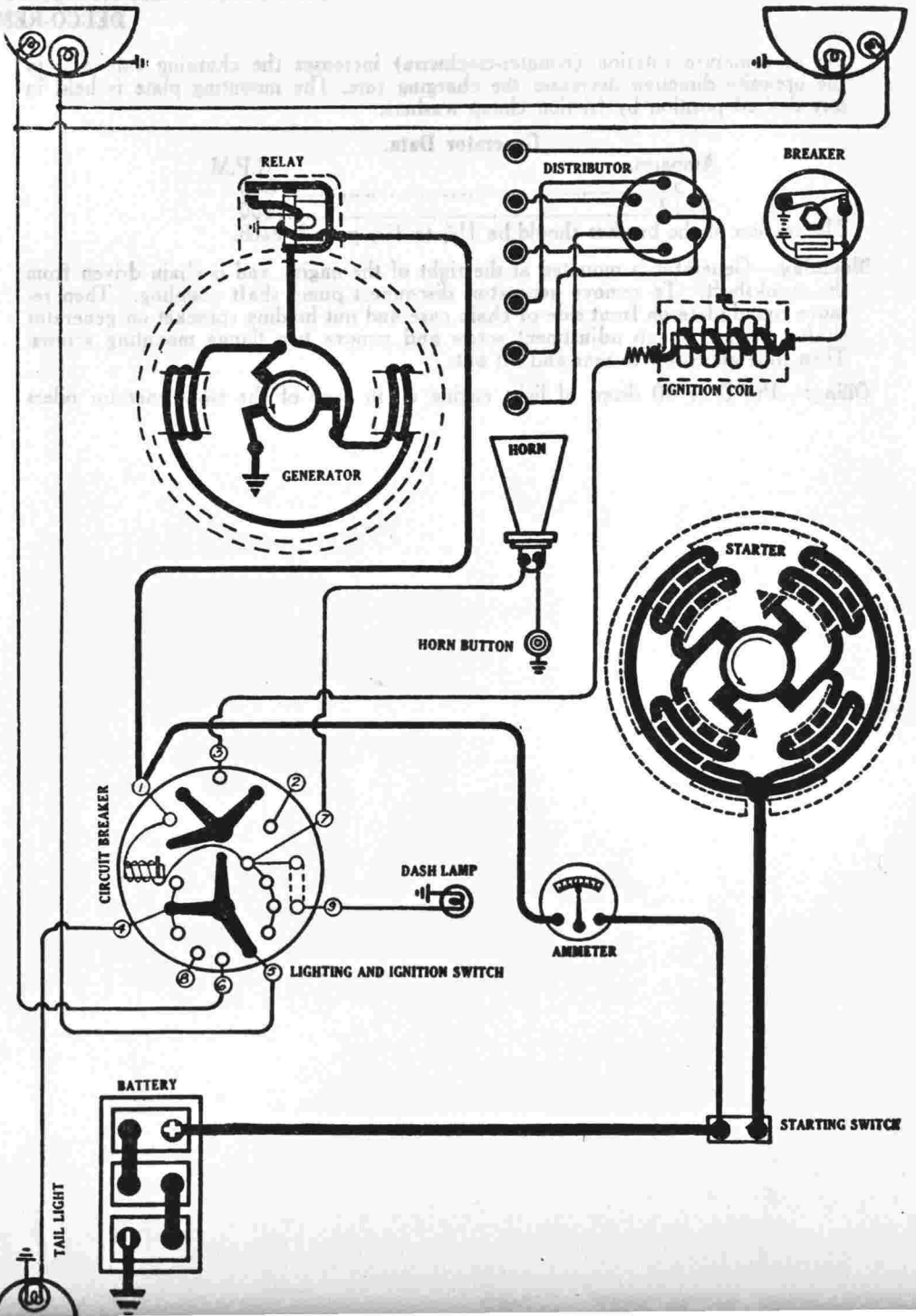
Starter Test Data

Amperes	Volts	Torque	R.P.M.
40-50	5.5	Running Free	4500
450-550	2.75	27 lb. ft.	Lock

Mounting.—Starter is mounted at right of engine in a sleeve mounting. To remove starter, remove large hold-down screw and pull starter forward from position.

Oiling.—Put 8 or 10 drops of light engine oil in each of the starter oilers every 1000 miles or each month. Saturate the wick in the oiler on the Bendix gear case once each year. Remove grease plug and fill reduction gear case with medium heavy cup grease twice a year.

GENERATOR.—Model No. 258. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. To adjust the charging rate, remove the cover band on the commutator end of generator housing, and by means of an extension handle, shift the third brush in the direction of rotation (counter-clockwise) to increase the charging rate. To decrease the



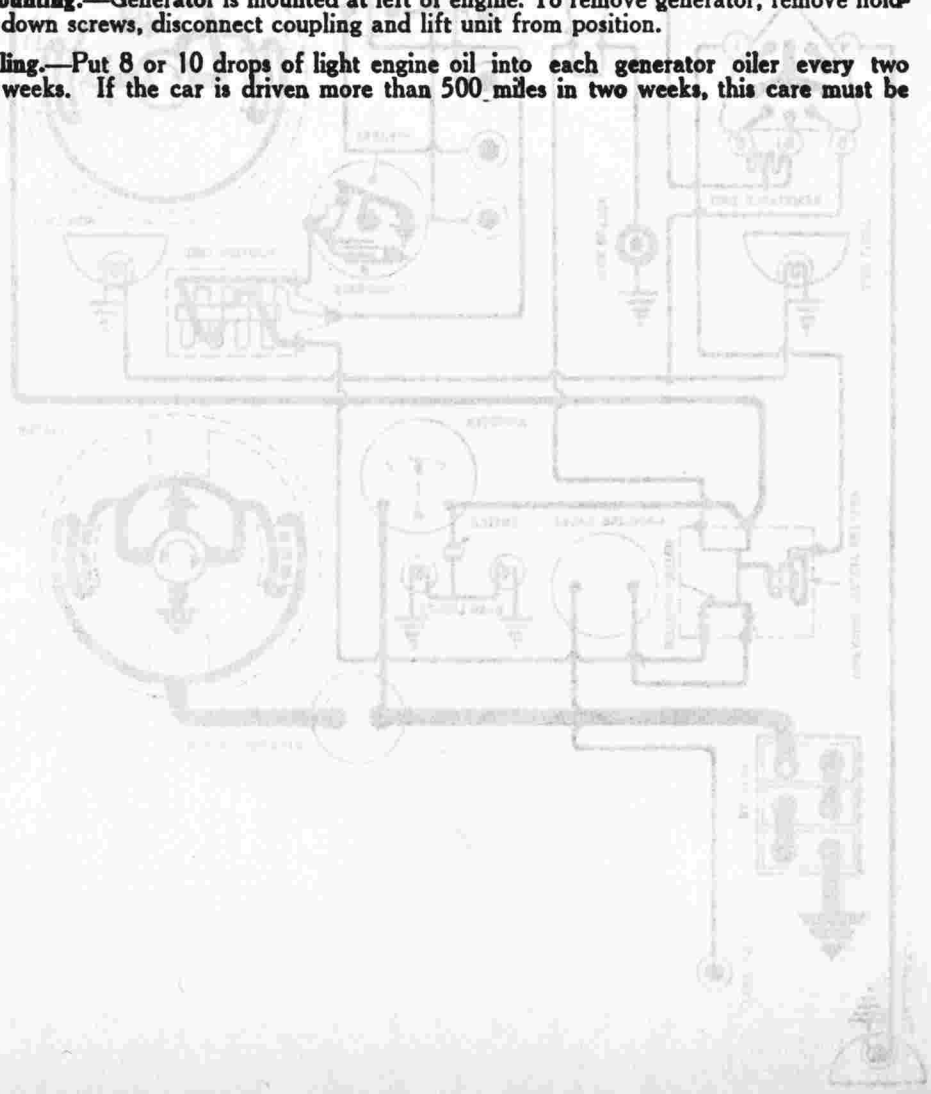
charging rate, shift the third brush in the opposite direction (clockwise) of rotation. The third brush plate is held in any position by means of a friction clamp. The maximum charging rate is 14-16 amperes, reached at 1600 R.P.M. of armature.

Generator Test Data

Amperes	R.P.M.
5	700
11	1000
14-16 (Max.)	1600
15	2000

Mounting.—Generator is mounted at left of engine. To remove generator, remove hold-down screws, disconnect coupling and lift unit from position.

Oiling.—Put 8 or 10 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.



RELAY.—Relay closes at 450-550 R.P.M. or 6-8 M.P.H., at 7 volts, and opens at 400-450 R.P.M., with a current discharge of 0-3 amperes. The contact gap is .025-.035 inch, contacts fully separated. The air gap is .025-.035 inch, with the contacts fully closed.

LIGHTING.—Combination Switch No. 1238 is used. Head lights are each 6-8 volts, 21 cp. Auxiliary headlights are each 6-8 volts, 4 cp. Tail and dash lights are each 6-8 volts, 2 cp. All the above lights are of the single contact type.

CIRCUIT BREAKER.—A circuit breaker is mounted on the back of the combination switch takes the place of fuses. A current flow of 25-30 amperes will cause the circuit breaker to operate, and will continue to operate with a current flow of not more than 15 amperes. Also not over 15 amperes must pass with a dead short circuit across the circuit breaker terminals.

MOON

MODEL 6-60 (1927-28)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—U.S.L. Type XY-13X. Starting capacity is 86 amperes for 20 minutes. Lighting capacity is 5 amperes for 17 hours. The negative (—) terminal is grounded. Battery is mounted under the driver's seat on the right hand side.

IGNITION:—Coil Model 525-A. Distributor Model 4017. Breaker contacts separate .015-.0225 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine, flat contact file. Distributor is of the full automatic type. Automatic advance begins at 600 R.P.M. and reaches a maximum of 23-27° at 1600 R.P.M. The tension of the breaker arm spring should be 13-16 ounces. The Ignition Switch is Model 1302.

Mounting:—Ignition coil is mounted on top of the generator. Distributor is mounted at commutator end of generator. To remove distributor, disconnect breaker lead and high tension lead from coil. Remove distributor head or disconnect spark plug leads. Then remove clamp screw and lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles. Place a small bit of vaseline on the face of the breaker cam under the fiber bumper of the contact arm. Once every six months add medium cup grease to the gear compartment.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the breaker assembly in the fully retarded position. With piston No. 1 in this position the flywheel marking "DC" will be opposite the mark on the flywheel case.

Valve Timing:—INLET VALVES:—Head diameter, 1 5/16 inches; stem diameter, 3/8 inch; stem length, 5 19/32 inches; tappet clearance, .004 inch; spring pressure, 53 pounds; valve lift, 5/16 inch; intake opens at 4° past top dead center, and closes at 46° past lower dead center.
EXHAUST VALVES:—Head diameter, 1 3/16 inches; stem diameter, 3/8 inch; stem length, 5 19/32 inches; tappet clearance, .006 inch; spring pressure, 53 pounds; valve lift, 5/16 inch; exhaust opens 41° before lower dead center, and exhaust closes 1° past top dead center. The guide stems are removable. No oversize valve stems are made.

Firing Order:—The firing order is 1-5-3-6-2-4.

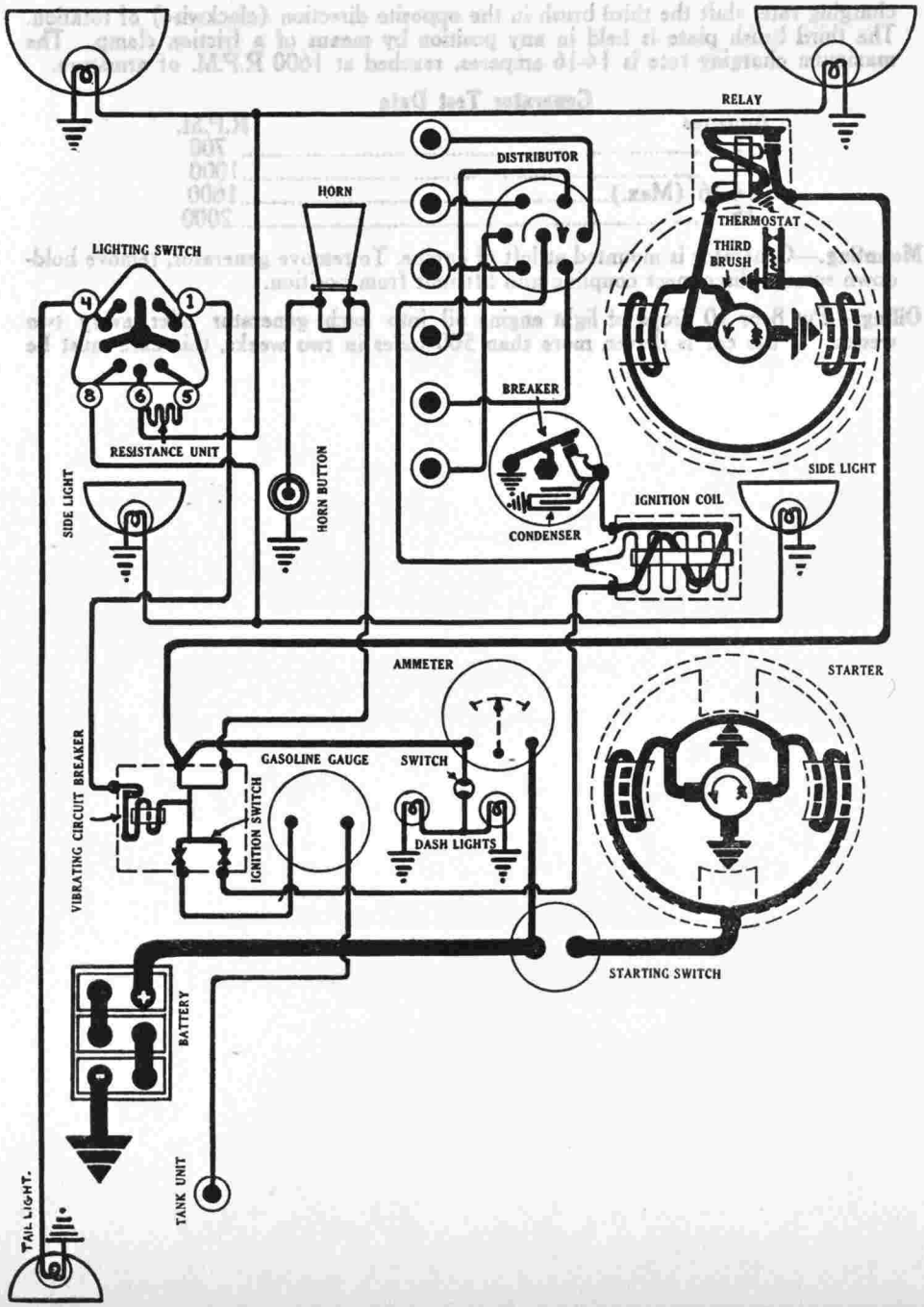
Spark Plugs:—Spark plugs are 7/8-18 S.A. Standard. Gaps are .025 inch.

STARTER:—Model 714-E. Starter is connected to the engine through an outboard Bendix drive Type R-11-X. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 24-28 ounces each. Starter switch is Model 1953.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
12 "	Lock	3.63	475

Mounting:—Starter is mounted in front of the flywheel on the right side of the engine. Mounting is by a No. 1 S.A.E. flange mounting. To remove starter, disconnect starter cable and remove three flange mounting bolts. Then slide starter forward and lift from place.



MOON

MODEL 6-60 (1927-28)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

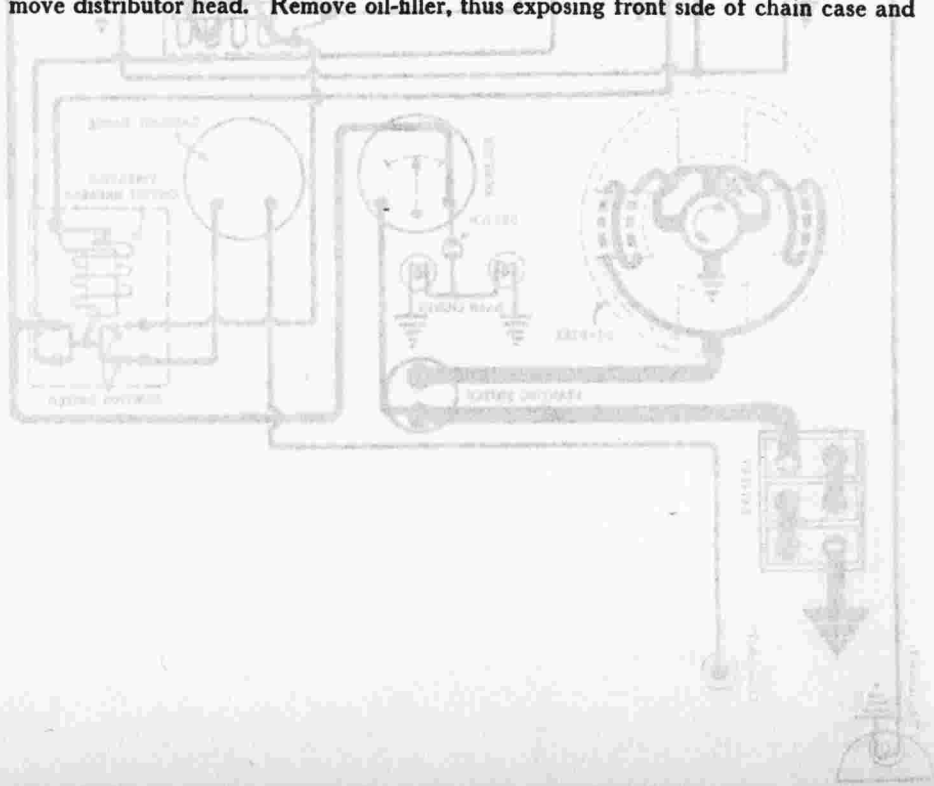
Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is of the oilless type.

GENERATOR:—Model 940-C. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system combined with a thermostat. Thermostat contacts open at 162° F., cutting a resistance of .75 ohm into the shunt field circuit and reducing the output approximately 40 per cent. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Brush tension is 14-18 ounces.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7-7.3	750			
19-21	8.5	1450	11	7.65	1900

Mounting:—Generator is mounted at the right of the engine to the rear of the chain case. To remove generator, disconnect generator lead and ignition leads and remove distributor head. Remove oil-filler, thus exposing front side of chain case and remove nut holding sprocket on generator shaft. Then loosen clamp adjusting screw on flange and remove two flange mounting screws. Then slide generator to rear and lift from place.



Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles. The drive end is oiled by the oil spray from the chain case.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay contacts close when the voltage of the generator reaches 7.25 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is 1-3 amperes. Contacts separate .015-.025 inch. Air gap between relay armature and coil core is .018-.022 inch, contacts closed.

LIGHTING—Switch Model 1303. Head lamps are 6-8 volt, 21 cp. S.C. Dimming is by resistance on the switch. Side, dash, dome and tail lamps are each 6-8 volt, 3 cp. S.C.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the back of the ignition switch. It protects the head, side and tail lamp circuits. A current of 25-30 amperes will cause this device to operate, limiting the current to 10-15 amperes.

ACCESSORIES:—A National Electric gasoline gauge is mounted on the dash.

MOON

MODEL 6-72 (1928)

DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—U.S.L., Type XY-15X6, 6 volt, 15 plates. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 119 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 21 hours. Battery is mounted under the left front seat.

IGNITION:—Coil Model 525-C. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped. Ignition coil is mounted on the engine side of the dash.

Distributor Model 640F. Breaker contacts separate .018-.024 inch. Adjust contact by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw directly behind breaker arm until proper gap is secured. Tighten the lock screw. Resurface contacts with a fine contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 500 R.P.M. of engine. Maximum automatic advance is 30 degrees reached at 3200 R.P.M. Ignition switch is Model 1302 or 1325.

Mounting:—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and manual advance rod and remove head with cables intact. Then loosen clamp screw and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium heavy grease and turn down one turn every 500 miles. Every month put a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual advance lever fully retarded. To set timing, crank engine until piston No. 6 enters compression stroke (the upstroke with both valves closed). Fully retard spark lever. Then continue to crank engine until piston No. 6 reaches top dead center when the flywheel mark 'IGN' will be opposite the indicator on the flywheel housing. Loosen clamp screw and rotate distributor until contacts begin to separate. Connect the segment opposite the rotor button with the spark plug in cylinder No. 6 and connect the remaining plugs in order 2-4-1-5-3 counter-clockwise around the distributor head.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. After car No. 11-1477, plugs are 18 MM. Metric. Gaps are .025 inch.

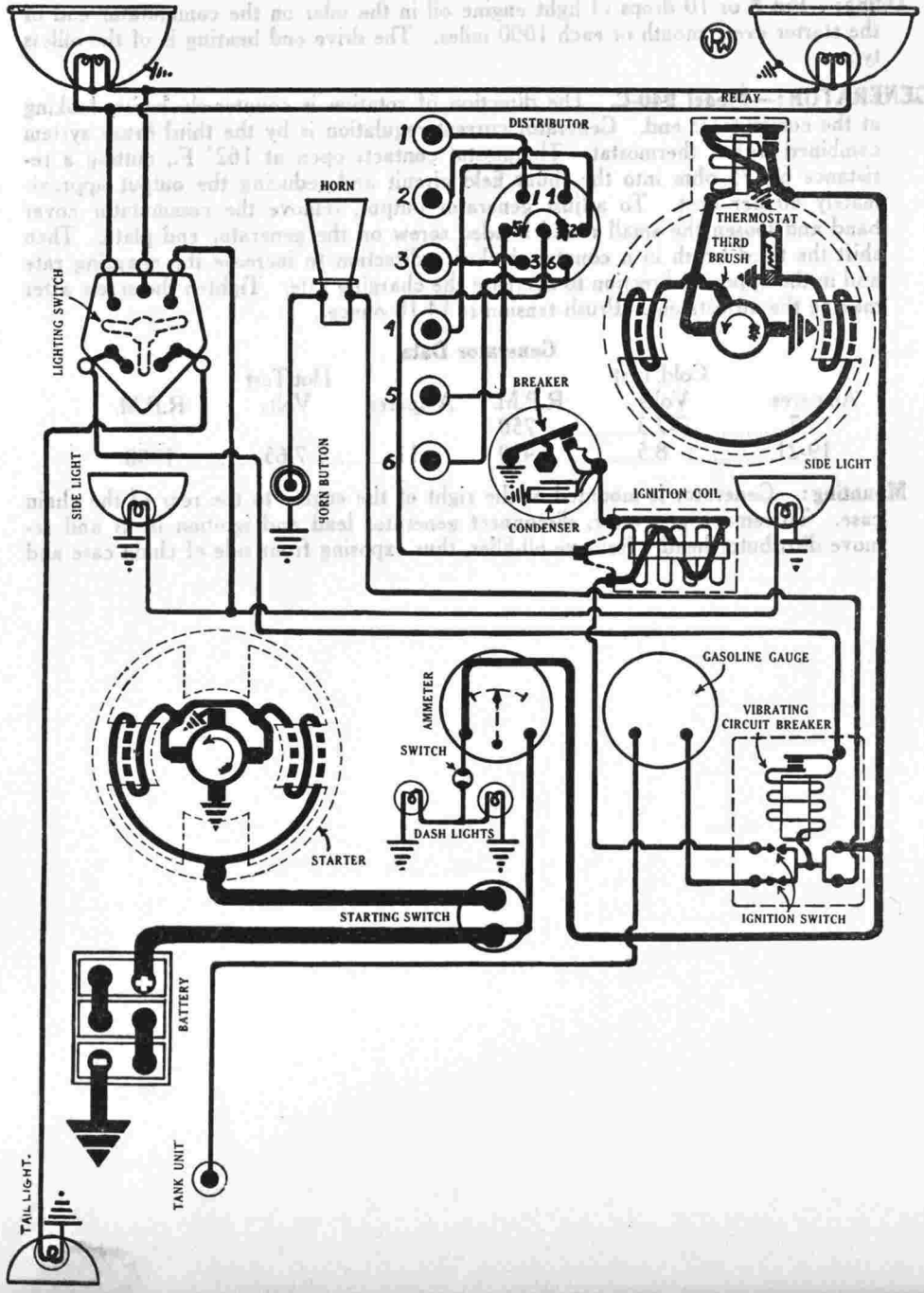
VALVE TIMING:—INLET VALVES:—Head diameter, 1 5/16 inches; stem diameter, 11/32 inch; stem length, 5 11/32 inches. Tappet clearance, .004 inch (hot). Valve lift, 5/16 inch. Intake valves open 5 degrees after top dead center and close 45 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 3/16 inches; stem diameter, 11/32 inch; stem length, 5 11/32 inches. Tappet clearance, .006 inch (hot). Valve lift, 5/16 inch. Exhaust valves open 40 degrees before lower dead center and close 5 degrees after top dead center.

STARTER:—Model 714-G. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter switch is Model 406-A. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
12 "	Lock	3.63	475



MOON

MODEL 6-72 (1928)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove 3 flange mounting bolts. Then pull starter forward and lift from place.

Oiling:—Put 5 or 6 drops of light oil in the oiler on the commutator end of the starter every 1000 miles. The drive end bearing is oilless.

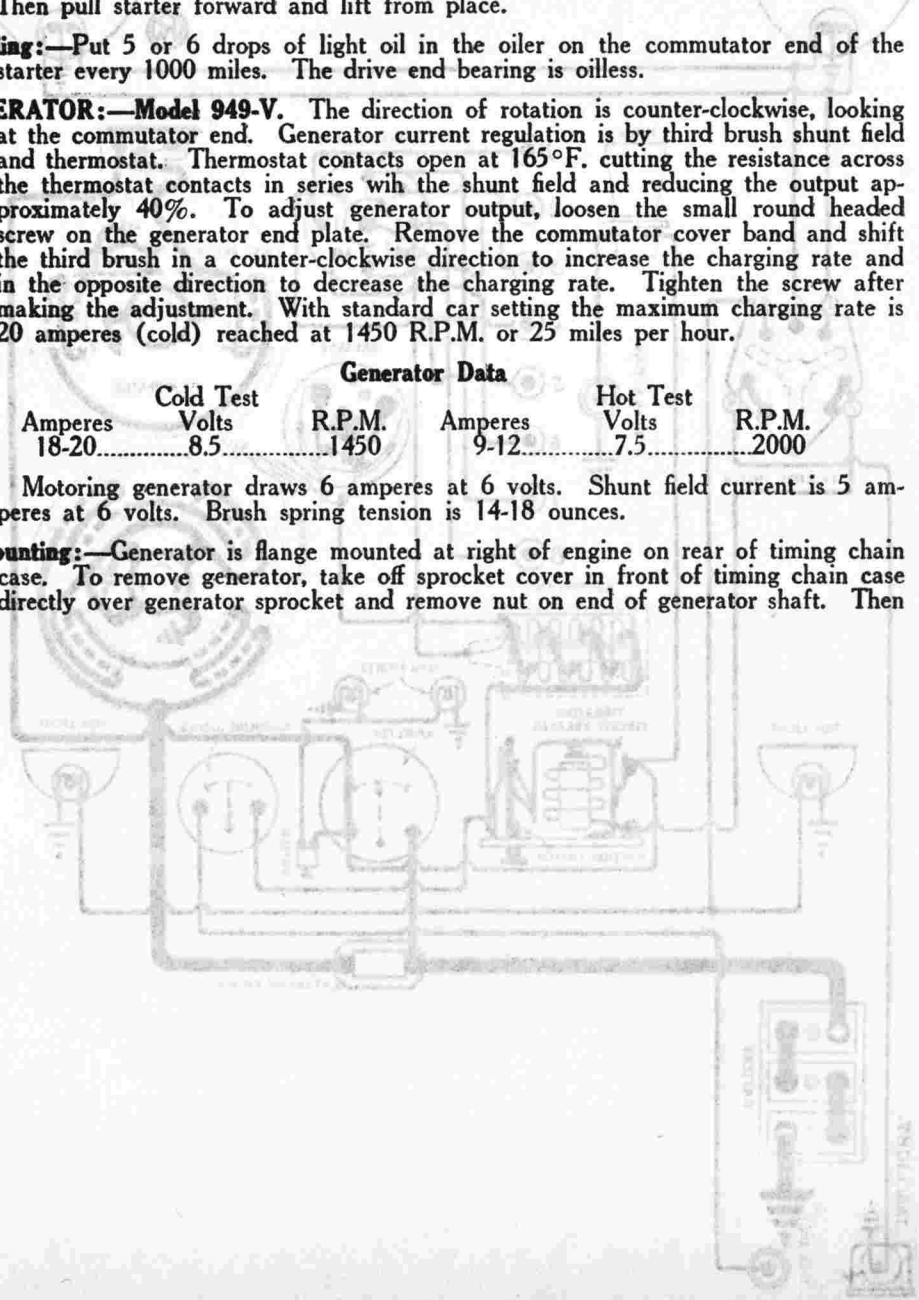
GENERATOR:—Model 949-V. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series wih the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate. Remove the commutator cover band and shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting the maximum charging rate is 20 amperes (cold) reached at 1450 R.P.M. or 25 miles per hour.

Generator Data

	Cold Test			Hot Test	
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
18-20	8.5	1450	9-12	7.5	2000

Motoring generator draws 6 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, take off sprocket cover in front of timing chain case directly over generator sprocket and remove nut on end of generator shaft. Then remove flange mounting bolts and pull generator to rear. Be careful not to disturb chain on generator sprocket and do not attempt to crank engine with generator out.



Timing Chain Adjustment:—Timing chain is adjusted by shifting generator. To adjust chain, loosen two generator flange mounting cap screws and turn up adjusting set screw with engine running until chain begins to hum. Then back off adjustment screw until chain runs noiselessly and tighten cap screws.

Oiling:—Put 8 to 10 drops of light oil in the oiler on the commutator end of the generator every 1000 miles. The drive end bearing is oiled by splash from the chain case.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay closes when the voltage of the generator reaches 6.75-7.5 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 1309. Switch is mounted on the lower end of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dome light is 6-8 volt, 6 cp. D.C. Mazda No. 82. Side (cowl) lights are 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the ignition switch. Circuit breaker begins to vibrate at 25-30 amperes and continues with a current of 10-15 amperes.

MOON

MODEL 8-80 (1928)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—U.S.L., Type 3-HVX-7X, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 148.5 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 28.4 hours.

IGNITION:—Coil Model 525-C. Ignition coil is mounted on the dash. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

Distributor Model 658-F or 658-H. Breaker contacts separate .022 inch. Set contact gap by loosening lock nut on stationary contact plate and turning eccentric adjusting screw until contact gap is .022 inch with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. There are two sets of breaker contacts on a single four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval for the Moon engine and contacts must be synchronized to secure proper firing interval. See Timing. Distributor is semi-automatic. Maximum manual advance is 33 degrees (engine) on the 658-F and 22 degrees (engine) on the 658-H. Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 18 degrees reached at 3200 R.P.M.

Mounting:—Distributor is mounted at right of engine directly in front of the generator. To remove distributor, disconnect manual advance rod and primary lead and remove head with cables intact. Then remove manual advance stop screw and lift distributor from place.

Oiling:—Fill the grease cup under the distributor head and turn down two turns every 1000 miles. Every 5000 miles remove the head and rotor and saturate the wick oiler in the center of the shaft with light engine oil. Put a small amount of heavy grease on the face of the breaker cam.

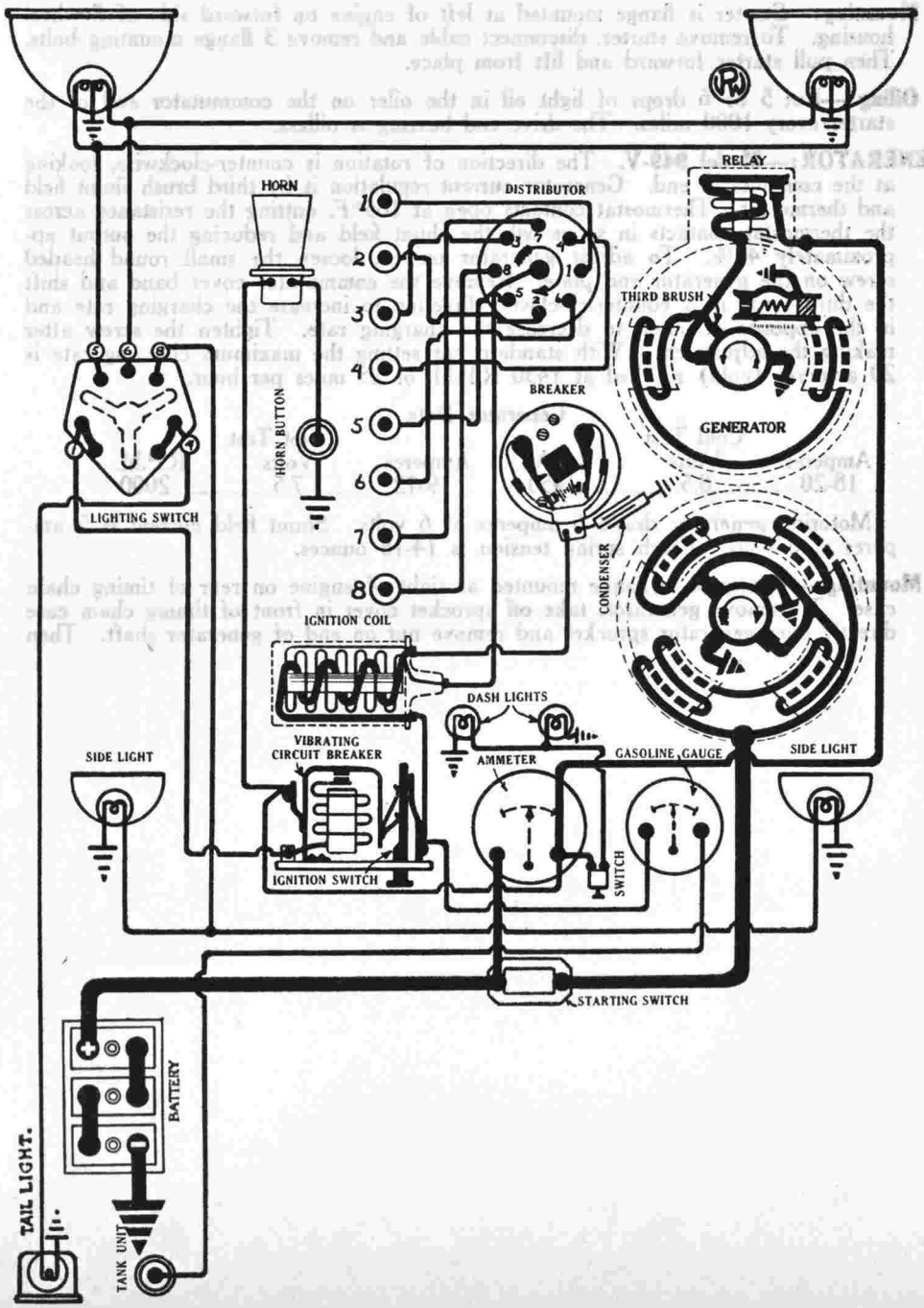
Timing:—Synchronization of Contacts:—To synchronize contacts, use Delco-Remy Tool, Part No. 820738, and follow directions given on Page S-2 of Reed Service Manual. Contacts can be synchronized without tool after distributor has been timed to engine by turning over engine 90 degrees from firing position of piston No. 1 when piston No. 6 will reach top dead center entering firing stroke. Make certain that manual spark control is fully retarded. If one set of breaker contacts are not separating, loosen lock screws on breaker plate and turn eccentric adjusting screw until contacts begin to separate. Tighten the lock screws and check contact gap. If it is outside limits of .018-.024 inch, reset at .022 inch and repeat synchronizing operation.

Timing Distributor to Engine:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully retard spark lever. Continue to crank engine until piston reaches top dead center. If one set of contacts is not opening, loosen advance arm clamp screw and rotate distributor until contacts open. Tighten the clamp screw. Connect the segment opposite the rotor to the spark plug in cylinder No. 1 and connect the remaining spark plugs in order 6-2-5-8-3-7-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. After car No. 15S-418, plugs are 18 MM. Metric. Gaps are .025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1 3/8 inches; stem diameter, 5/16 inch. Valve lift, 5/16 inch. Tappet clearance, .004 inch (hot). Inlet valves open 8 degrees after top dead center and close 40 degrees after lower dead center.



MOON

MODEL 8-80 (1928)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

EXHAUST VALVES:—Head diameter, 1¼ inches; stem diameter, 5/16 inch. Valve lift, 5/16 inch. Tappet clearance, .006 inch (hot). Exhaust valves open 40 degrees before lower dead center and close 8 degrees after top dead center.

STARTER:—Model 724-J or 716-B. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, looking at the commutator end. Starter brush spring tension is 24-28 ounces. Starter switch is Model 406-A.

Starter Data—Model 724-J

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3500	5	70
22 "	Lock	3	600

Starter Data—Model 716-B

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	5	70
15 "	Lock	3.7	450

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove flange mounting cap screws. Then pull starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the starter oiler every 1000 miles.

GENERATOR:—Model 940-K or 940-H. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the commutator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting the maximum charging rate is 20 amperes reached at 1450 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
20	8.5	1450	9-12	7.5	2000

Generator motoring draws 5.5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and remove the flange mounting cap screws. Remove carburetor. Then slide generator to rear and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay closes when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 3 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Lighting switch is mounted at base of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dome light is 6-8 volt, 6 cp. S.C. Mazda No. 81. Side (cowl) lights are 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

Switches:—Lighting switch is Delco-Remy Model 1309. Ignition switch is Delco-Remy Model 1302 or 1325.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the back of the ignition switch. It begins to vibrate when the current reaches 25-30 amperes and limits the current to 10-15 amperes while operating.

Moore

Model 30 (1917-18)
Dyneto Starting and Lighting System
Eisemann Magneto Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Magneto breaker contacts should separate .014 inch to .018 inch. Should they become badly burned or pitted, affecting the ignition, resurface them with a fine, flat jeweler's file or a strip of worn No. 00 sand paper.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 2, 4, 3.

Spark Plug Gaps.—Spark plug gaps should be about .025 inch.

Oiling.—Put 2 or 3 drops of light machine oil in each of the magneto oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

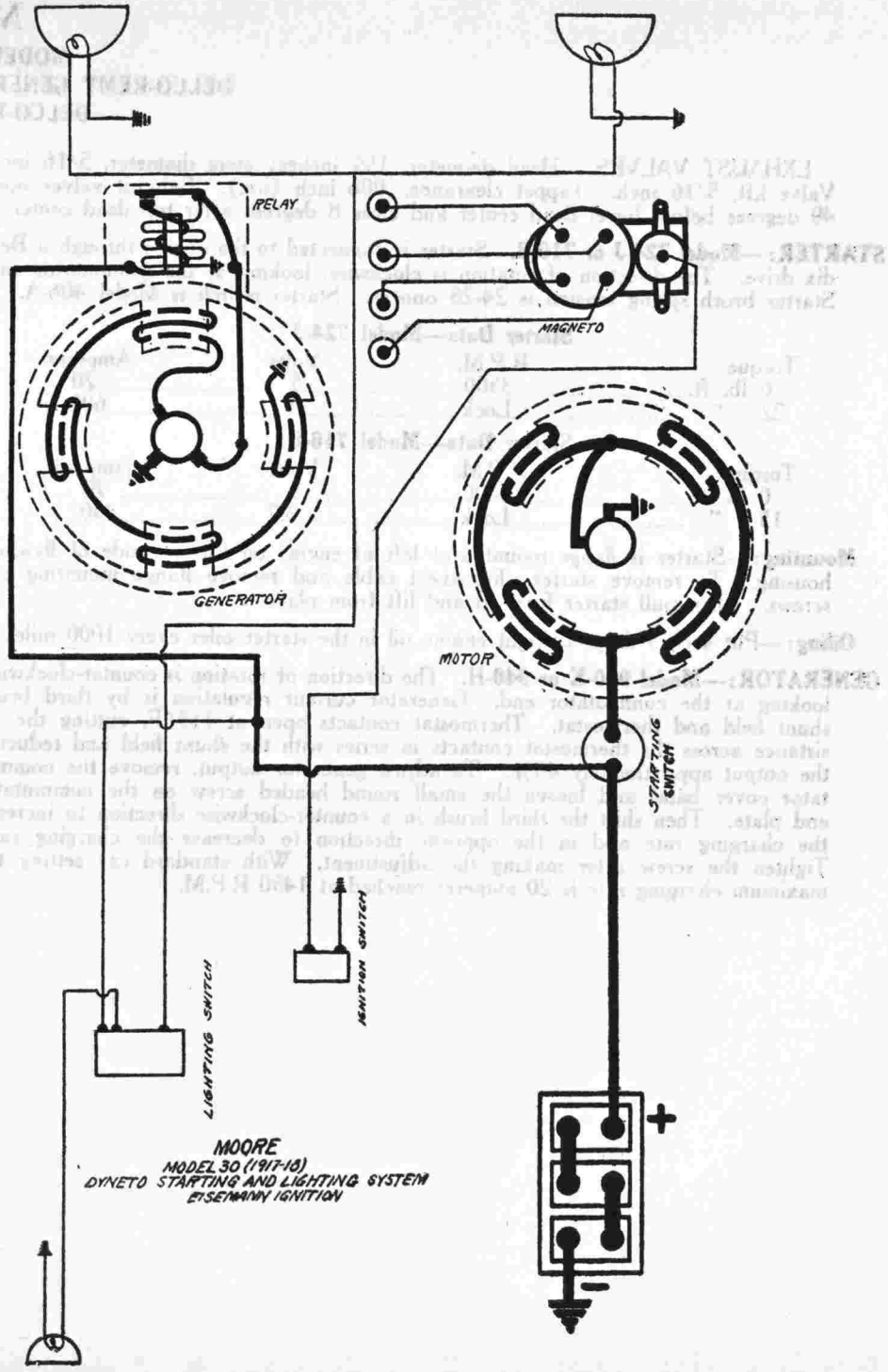
Starter.—Starter is connected to the engine through a Bendix drive. Cold engine, tight bearings, heavy oil or other obstructions, or damp, grounded or short circuited motor windings or commutator bars will cause low speed and excessive current during the cranking operation.

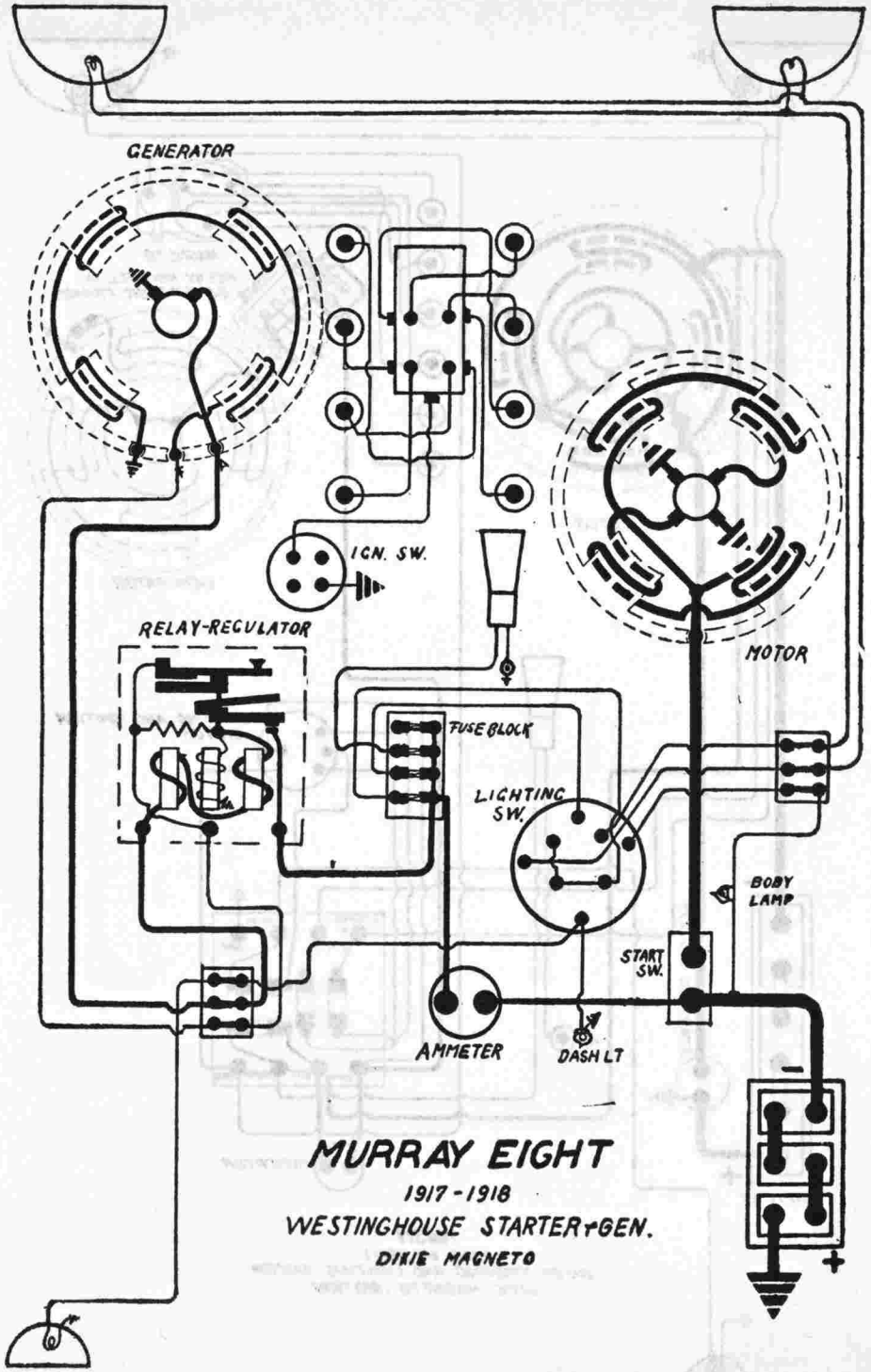
Oiling.—Put 4 or 5 drops of light engine oil on the felt wick of starter bearing oilers every month.

Generator.—Generator current regulation is by third brush system. Relay should close at 6 to 8 miles per hour. The maximum generator output of 11-13 amperes is reached at about 16 miles per hour. Clean relay contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a piece of worn No. 00 sand paper, drawing a piece of unglazed paper between them, to remove all grit, before again putting into service.

Oiling.—Put 3 or 4 drops of light engine oil in each of the bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 20 cp. Tail lamp is 6-8 volts, 2 cp.





Murray Eight

1917-18

Westinghouse Starting and Lighting System
Dixie Magneto Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Magneto breaker contacts should open .018 inch to .022 inch. Clean contact with gasoline whenever necessary. Should contacts become badly burned or pitted, they must be resurfaced with a fine, flat jeweler's file or a piece of worn No. 00 sand paper. Full directions for the care and adjustment of the magneto are given on Page 189.

Timing.—Breaker contacts should begin to separate when the top dead center mark on the flywheel is 1 inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1R, 1L, 3R, 3L, 4R, 4L, 2R, 2L.

Spark Plug Gaps.—Spark plug gaps should be .020 inch to .025 inch.

Oiling.—Fill oil cup every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

Starter.—Starter is connected to the engine through a Bendix drive. The motor should develop about 14 foot pounds lock torque.

Oiling.—Put 3 or 4 drops of light engine oil in each of the motor oilers every month.

Generator.—Generator voltage regulation is by a vibrating regulator. Relay should close at 8-10 miles per hour and open 6-8 miles per hour. The maximum generator output should be reached at 25-30 miles per hour. It should remain practically constant at all higher speeds. As the regulator holds the generator voltage constant at these speeds, the generator output will vary with the state of charge of the battery. When the battery is nearly discharged the output will be as high as 15-20 amperes, but this rate will be gradually reduced to 5-8 amperes when the battery is fully or nearly fully charged.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 17-20 cp. Dimmer lamps (when supplied) are 6-8 volts, 5-7 cp. Dash and tail lamps are 6-8 volts, 2 cp. Tonneau lamp is 6-8 volts, 2-4 cp.

Fuses.—Fuses are 15 amperes.

NASH

MODEL 671 (1917)

BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
DIXIE MAGNETO IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded

IGNITION.—Magneto breaker contacts separate .018 to .020 inch. When the condition of the points affects the ignition, resurface witn a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Fill magneto bearing oilers with light machine oil every month. If car is driven more than 1000 miles in a month, oiling must be done every 1000 miles.

TIMING.—Breaker contacts begin to separate when mark "1-6 DC" on flywheel is ½ inch past indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .020 to .025 inch.

STARTER.—Type F-65, M664. or, M460A, clocwwise rotation, commutator end. Starter is connected to engine through a Bendix drive.

OILING.—Put several drops of light engine oil in each of starter bearing oilers every month.

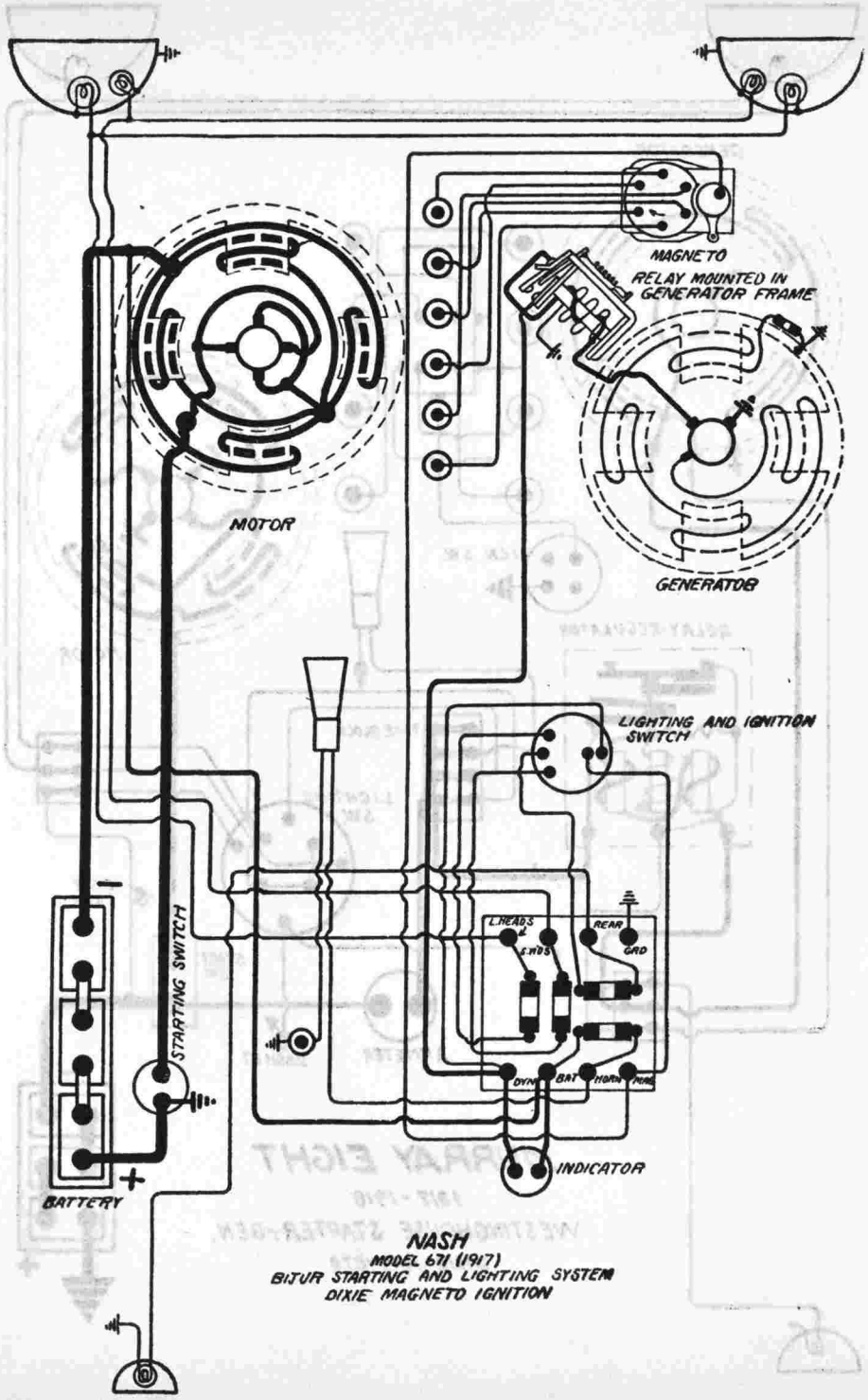
GENERATOR.—Type L61, M399, M467, M677 or M767. Rotation is anti-clockwise, commutator end. Generator current regulation is by third brush system. Maximum generator output is 12-16 amperes, reached at 20-25 miles per hour or 1400-1600 R.P.M. of armature. Output is varied by shifting third brush. Third brush is secured to generator by two stud bolts, the nuts of which appear in a recess in the front head of generator. Loosen these nuts with a socket wrench and shift the brush by gently tapping the shank of the wrench. Shifting brush in the direction of armature rotation will increase the output. Shifting brush in the opposite direction will decrease the outpt. Shifting the brush 1/16 inch will vary the output 2 or 3 amperes. Tighten nuts after adjusting brush. Brush adjustment is made to give the desired rate with generator hot and charging a 3 cell battery, battery reading 1.250 or above. There is a 20 ampere fuse in the small aluminum cap on generator housing to protect generator windings, should excessively high resistance occur in the charging circuit.

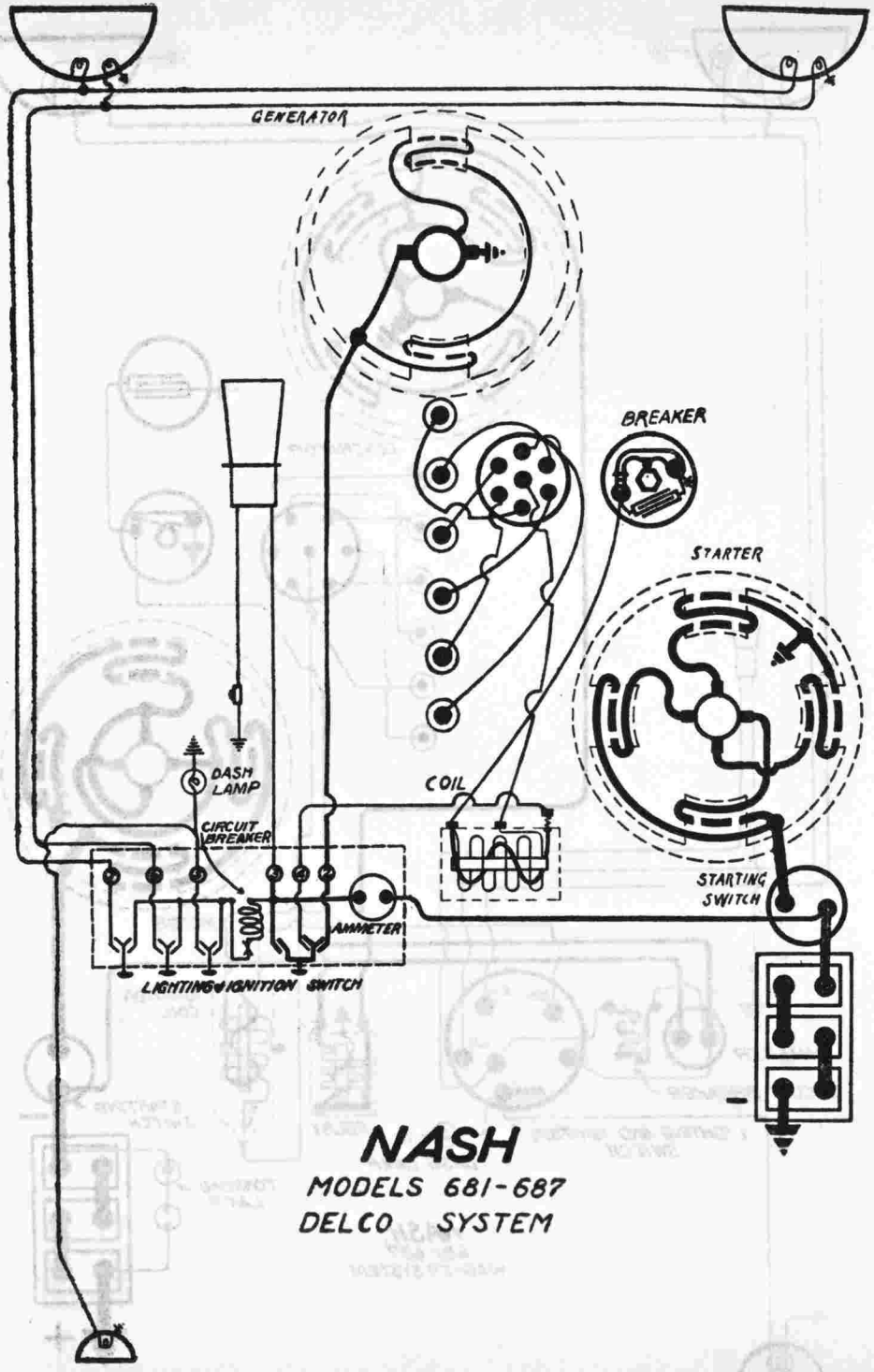
OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Relay closes at 10-12 miles per hour or 500-600 R.P.M. of armature, and opens at 8-10 miles per hour, or 450-500 R.P.M. of armature. The charging current is 1 to 3 amperes at closing, and the discharge current 0 to 1 ampere at opening of relay.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Side lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

FUSES.—Fuses are 15 ampere.





NASH

MODELS 681 TO 684 (1917-18)
MODELS 685 TO 687 (1919-20)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2163. Distributor Model No. 5169. Breaker contacts separate .018 inch. They are made of tungsten When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth, or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 4 or 5 drops of light engine oil in the upper oiler of the distributor unit and fill the lower oil well every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—The spark plug gaps are .030 inch.

STARTER.—Model No. 126. Starter is connected to the engine through a Bendix drive. Lock torque is 16 pound-feet, at 3.5 to 3.8 volts. Running freely, starter takes 40 amperes.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Model No. 125. Generator current regulation is by third brush system. Generator begins to supply current at 500 R.P.M. of the armature or 6-8 miles per hour, and reaches its maximum current output of 18 amperes at 1400 R.P.M. of the armature or 20 miles per hour.

Generator Data

Cold Test Amperes	R.P.M.	Hot Test Amperes	R.P.M.
Neutral	500	Neutral	500
11.5-13.5	900	11-13	900
16.5-19.5	1400	16-18	1400
15.0-18.0	2000	14-16	2000

Charging rate is varied by adjusting the third brush setting. Loosen the two screws holding the third brush arm, and move the brush in a counter-clockwise direction to increase the charging rate. Move the third brush in a clockwise direction to decrease the charging rate. Tighten the holding screws and reseat the brush after adjusting position.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—There is no relay The circuit between the generator and the battery is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

CIRCUIT-BREAKER—A vibrating circuit-breaker takes the place of fuses. It requires a current of 25 amperes to start the vibrator, but 3-5 amperes will cause it to continue.

NASH

MODELS 681 TO 687 (1920)
WAGNER GENERATING, STARTING AND LIGHTING SYSTEM
WAGNER IGNITION

BATTERY.—Willard, Type SJRN-4, 6 volt, 117 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model K-32. Distributor Model KC-335. Breaker contacts separate .024 to .029 inch. When the condition of the contacts affects the ignition, renew the lever arm and contact screw.

OILING.—Screw up the grease cup under the breaker head one-half turn every two weeks. If the car is driven more than 500 miles in two weeks, this must be done every 500 miles. Put 3 or 4 drops of light engine oil on the wick in the breaker lever spindle every 6 months.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .028 inch.

STARTER.—Model E.M.-279, Type 46-T. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 125 R.P.M., current being 200 amperes. Operating freely, starter current is 60-90 amperes, armature revolving at 6800 R.P.M. Lock torque is 13.8 pound-feet, current being 600 amperes.

OILING.—Put 5 or 6 drops of light engine oil in each of starter oilers every month. Remove the plug in the reduction gear housing and inject Gredag grease every six months.

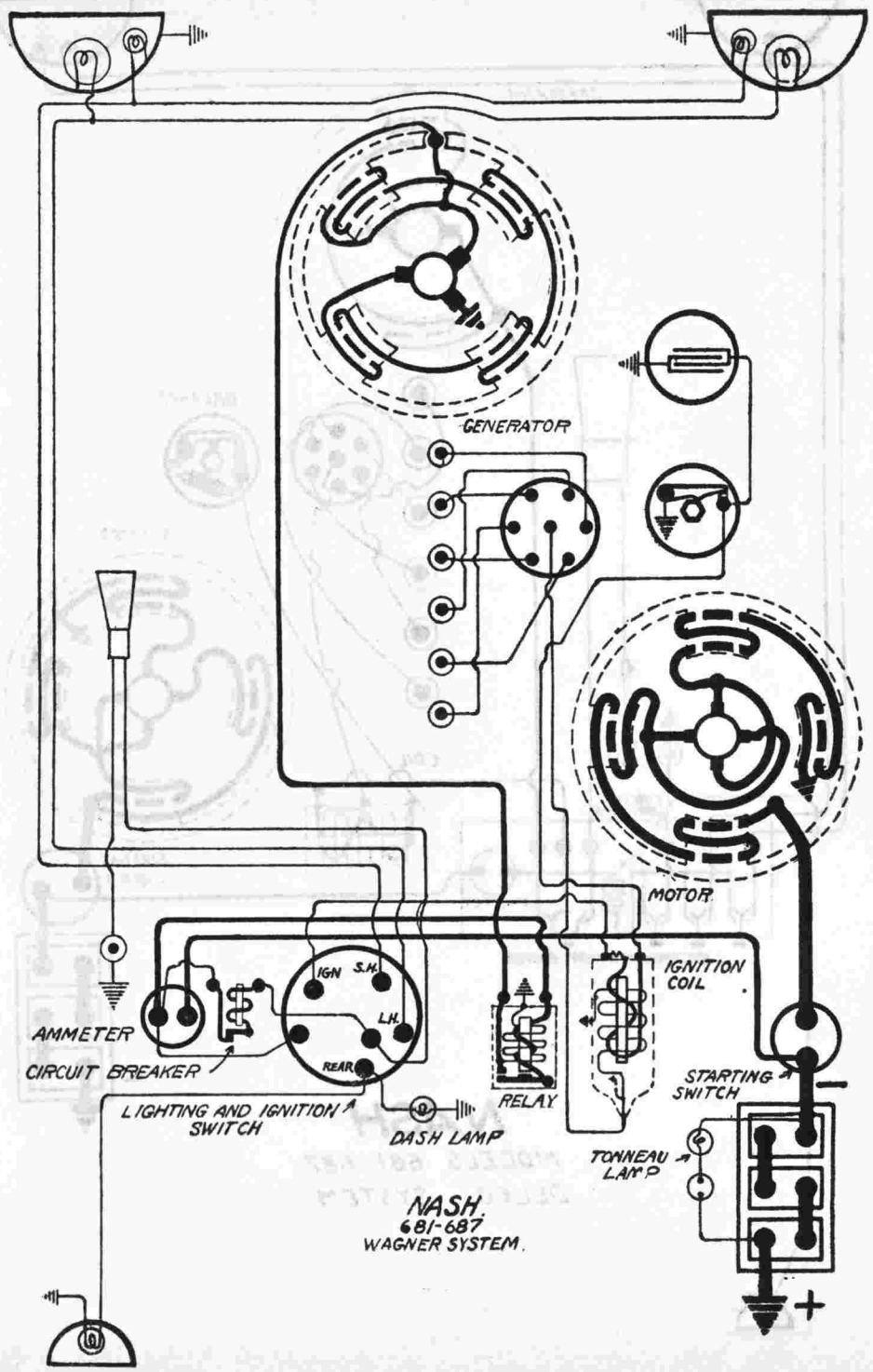
GENERATOR.—Model No. E.M.-337. Generator current regulation is by the third brush system. Maximum charging rate is 12 amperes, reached at 18-23 miles per hour.

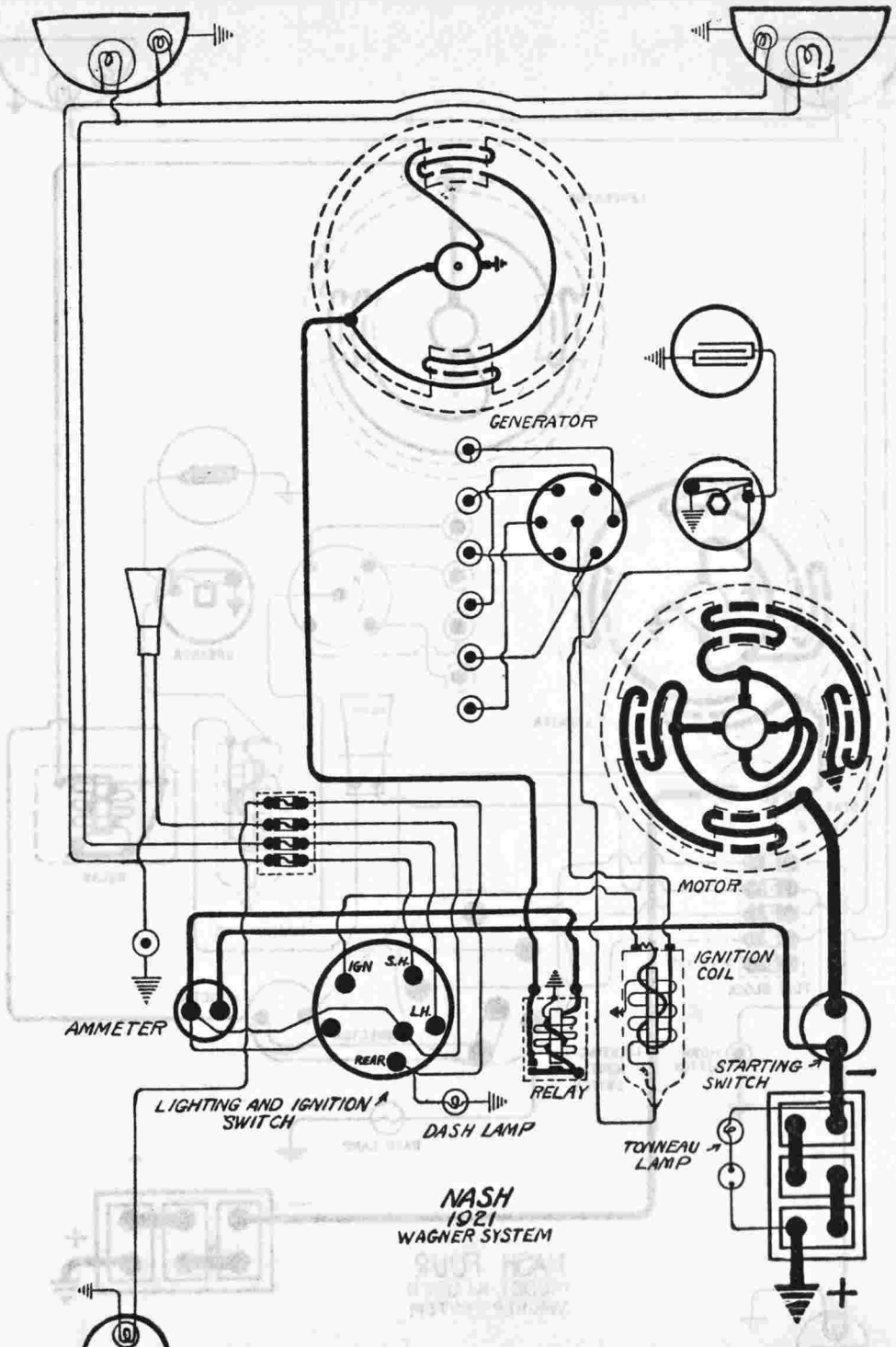
OILING.—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Model I-471. Relay closes at 8-10 miles per hour or 640-800 R.P.M. of the armature, and opens at 6-8 miles per hour or 480-640 R.P.M. of the armature. Charging current at closing is 2 amperes, and the discharge current is 0-4 amperes at opening of relay contacts. Relay contacts separate .035 to .065 inch. Air gap between relay armature (moving member) and coil core is .025 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 20 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

CIRCUIT BREAKER:—A vibrating circuit breaker mounted on the dash begins to vibrate when the current reaches 25-30 amperes limiting the current flow to 3-5 amperes.





NASH

MODELS 681 TO 687 (1921)
WAGNER GENERATING, STARTING AND LIGHTING SYSTEM
WAGNER IGNITION

BATTERY:—Willard, Type SJRN-4. 6 volt, 117 ampere-hour. The positive (+) terminal is grounded.

IGNITION:—Coil Model K-32. Distributor Model KC-335. Breaker contacts separate .024 to .029 inch. When the condition of the contacts affects the ignition, renew the lever arm and contact screw.

Oiling:—Screw up the grease cup under the breaker head one-half turn every two weeks. If the car is driven more than 500 miles in two weeks, this must be done every 500 miles. Put 3 or 4 drops of light engine oil on the wick in the breaker lever spindle every 6 months.

Timing:—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plug Gaps:—Spark plug gaps are .025 to .028 inch.

STARTER:—Model E.M.-279, Type 46-T. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 125 R.P.M., current being 200 amperes. Operating freely, starter current is 60-90 amperes, armature revolving at 6800 R.P.M. Lock torque is 13.8 pound-feet, current being 600 amperes.

Oiling:—Put 5 or 6 drops of light engine oil in each of starter oilers every month. Remove the plug in the reduction gear housing and inject Gredag grease every six months.

GENERATOR:—Model No. E.M.-337. Generator current regulation is by the third brush system. Maximum charging rate is 12 amperes, reached at 18-23 miles per hour.

Oiling:—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY:—Model I-471. Relay closes at 8-10 miles per hour or 640-800 R.P.M. of the armature, and opens at 6-8 miles per hour or 480-640 R.P.M. of the armature. Charging current at closing is 2 amperes, and the discharge current is 0-4 amperes at opening of relay contacts. Relay contacts separate .035 to .065 inch. Air gap between relay armature (moving member) and coil core is .025 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS:—Head lamps are 6-8 volt, 20 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES:—Fuses are 20 ampere.

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NASH FOUR

MODELS 41 TO 44 (1920-21)
WAGNER GENERATING, STARTING, AND LIGHTING SYSTEM
WAGNER IGNITION

BATTERY.—Willard, Type SJWN-3, 6 volt, 90 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model K-70, Distributor Model K-84. Breaker contacts separate .020 to .025 inch. When the condition of the contact affects the ignition, renew the lever arm and contact screw.

Oiling.—Screw up the grease cup under the breaker head one-half turn every two weeks. If the car is driven more than 500 miles in two weeks, this must be done every 500 miles. Put 3 or 4 drops of light engine oil on the wick in the breaker lever spindle every 6 months.

Timing.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4 ,2.

Spark Plug Gaps.—Spark plug gaps are .025 to .030 inch.

STARTER.—Model E.M.-353, Type 36-T. Starter is connectd to the engine through a set of reduction gears meshed by the operator. An overrunning clutch is provided which permits the starter to turn the engine but prevents the latter from turning the starter through the reduction gears. Starter cranks the engine at 100 to 125 R.P.M. the current being 150 to 175 amperes. Lock torque is 11.5 pound-feet, current 475 amperes. Running freely starter takes 60-90 amperes, armature revolving 8000 R.P.M.

Oiling.—Put 5 or 6 drops of light engine oil in each of starter oilers every month. Remove the plug in the reduction gear housing and inject Gredag grease every six months.

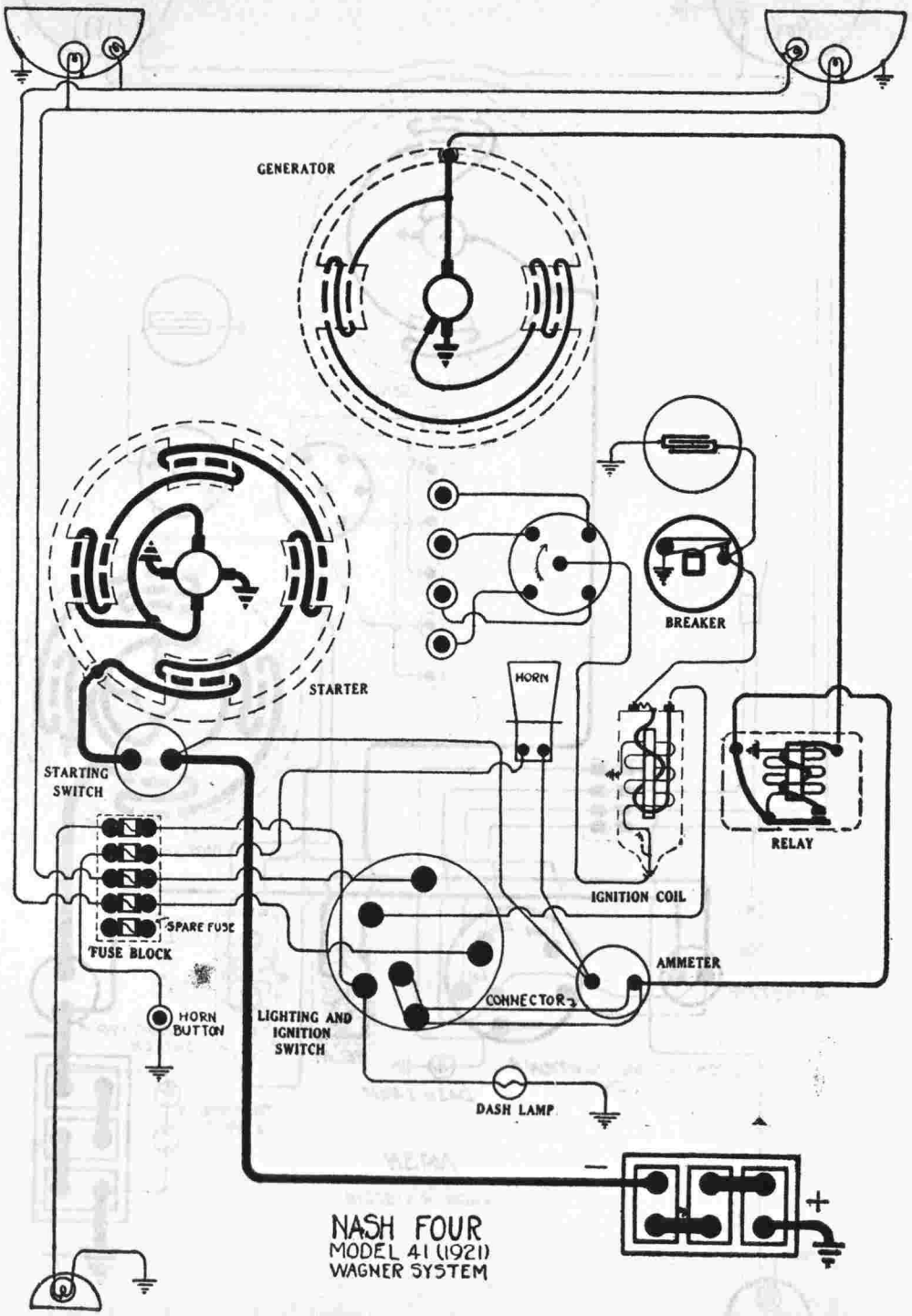
GENERATOR.—Model No. E.M.-337. Generator current regulation is by the third brush system. Maximum charging rate is 12 amperes, reached at 18-23 miles per hour.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Model 1-471. Relay closes at 8-10 miles per hour or 640-800 R.P.M. of the armature, and opens at 6-8 miles per hour or 480-640 R.P.M. of the armature. Charging current at closing is 2 amperes, and the discharge current is 0-4 amperes at opening of relay contacts. Relay contacts separate .035 to .065 inch. Air gap between relay armature (moving member) and coil core is .025 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No.00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.— Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Fuses are 20 ampere.

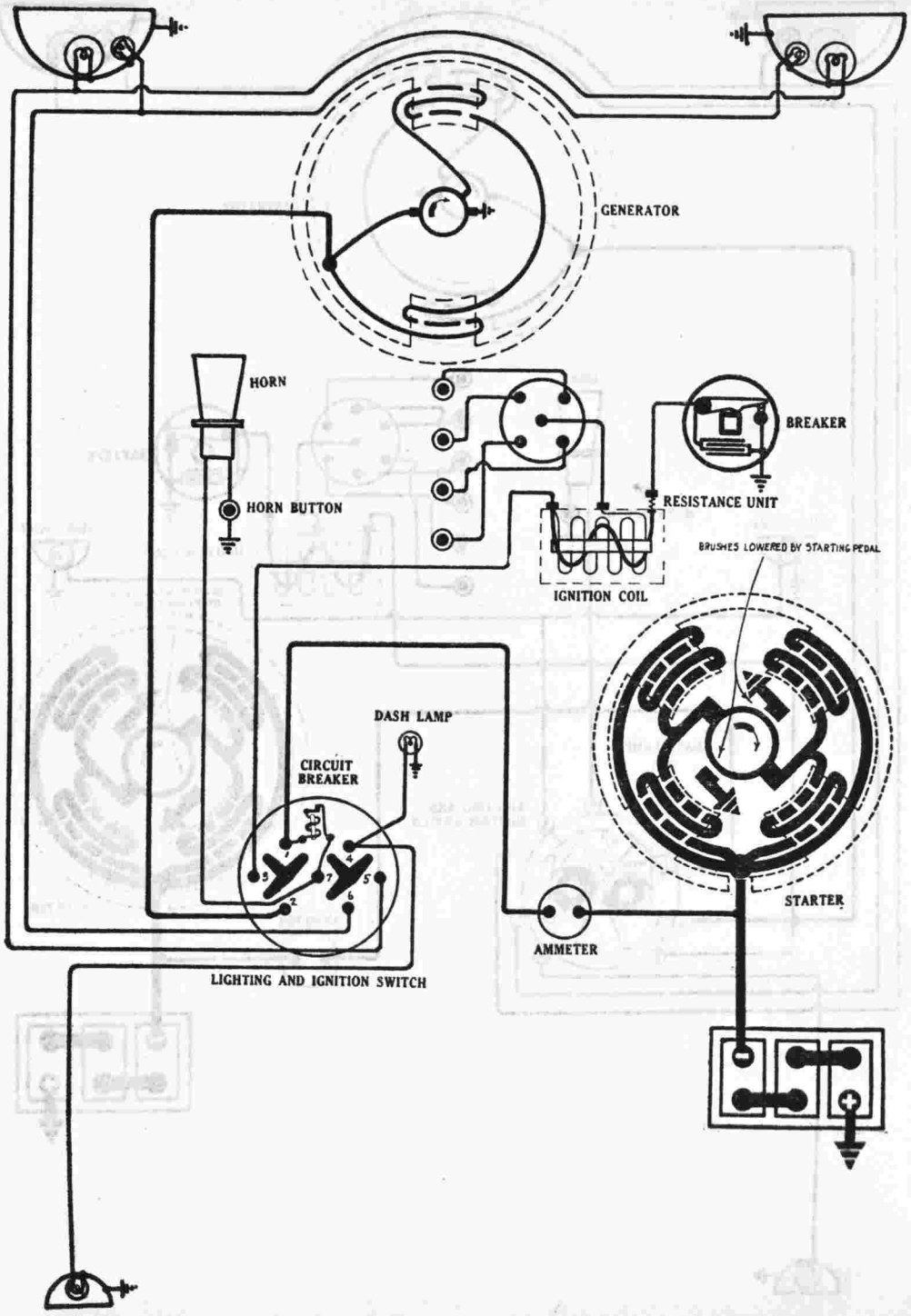


NASH FOUR

MODELS 41, 42, 43, 44 (1922)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION



BATTERY.—Type SJRN-4, 6 volt. The positive (+) terminal is grounded.

IGNITION.—Coil Model No. 2159. Distributor Model No. 5243.—Breaker contacts separate .020 to .0275 inch. They are made of tungsten. When the condition of the contacts affects the ignition, resurface them lightly on an oil stone.

Oiling.—Put 3 or 4 drops of light engine oil in the distributor oilers every 500 miles. If the track of the rotor button is not well polished, apply a very small amount of vaseline. Put a very small amount of soft grease or vaseline on the face of the breaker cam every 1000 miles. Pack the distributor housing with soft grease to a level above the advance ring and yoke once each season.

Timing.—Breaker contacts begin to separate when the piston entering the power stroke is on top dead center, spark control lever and breaker assembly iu the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—The spark plug gaps are .025 to .030 inch.

STARTER.—Model No. 228. The starter is connected to the engine through a set of reduction gears meshed by the operator. An overrunning clutch prevents the starter armature from being driven at excessive speed by the engine flywheel after the engine has started running under its own power. The direction of rotation is clockwise, looking at the commutator end. The lock torque is 21 to 23 pound-feet at 4 volts, the current being 560 amperes. The brush tension is 2¼ pounds.

Oiling. Put 4 or 5 drops of light engine oil in each of the two starter oilers each month. Remove the grease plug at the side of the reduction gear housing and repack the housing with medium cup grease once or twice each season. Every 2000 miles withdraw the starter from the engine and saturate the wick under the oiler on the outward bearing of the splined shaft with light engine oil.

GENERATOR.—Model No. 229. The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Generator is belt driven and care must be taken that the belt is not tight enough to cause undue wear to the armature bearings and should not be so loose that the generator will rotate when the ignition switch is "On" with the engine stopped. To adjust the belt tension loosen the two clamp screws holding the generator to the engine and shift the position of the generator slgihtly.

Generator Data.—No. 299

Amperes	R.P.M.
Neutral	650
4	800
8	1000
12-16	1600
8-12	2300

The charging rate is varied by adjustment of the third brush setting. Remove the cover band loosen the two adjusting screws attaching the third brush arm to the mounting plate. Move the third brush in the direction of armature rotation to increase the charging rate or in the opposite direction to decrease the charging rate. Tighten the adjusting screws and be sure all brushes are well seated.

Oiing.—Put 3 or 4 drops of light engine oil in each of the two generator oilers every 500 miles.

RELAY.—There is no relay. The circuit between the battery and the generator is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker, mounted on the back of the switch, takes the place of fuses. A current of 25 to 30 amperes will start it vibrating, and it will continue to vibrate with a maximum current flow of 15 amperes until the cause of the excessive current has been removed or the switch operated to cut off the current.

NASH

MODELS 691 TO 697 INCLUSIVE (1922)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SJRN-4, 6 volt, 111 ampere,hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model No. 2159. Distributor Model No. 5244. Breaker contacts separate .020 to .0275 inch. They are made of tungsten. When the conditon of the contacts affects the ignition, remove and resurface lightly on an oil stone.

Oiling.—Put 3 or 4 drops of light engine oil in the distributor oiler every 500 miles. If the track of the rotor button is not well polished, apply a very small amount of vaseline. Put a very small amout of soft grease or vaseline on the face of the breaker cam every 1000 miles. Pack the distributor housing with soft grease to a level above the advance ring and yoke once each season.

Timing.—Breaker contacts begin to separate when the piston entering the power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3. 6. 2. 4.

Spark Plug Gaps.—The spark plug gaps are .025 to .028 inch.

STARTER.—Model No. 230. Starter is connected to the engine through a set of reduction gears meshed by the operator. An overrunning clutch prevents the starter armature from being driven at excessive speed by the engine flywheel after the engine has started running under its own power. The direction of rotation is clockwise, looking at the commutator end. The lock torque is 21 to 23 pound-feet at 4 volts, the current being 560 amperes. The brush tension is 2¼ pounds.

Oiling.—Put 4 or 5 drops of light engine oil in each of the two starter oilers each month. Remove the grease plug in the side of the reduction gear housing and repack the housing with medium cup grease once or twice each season. Every 2000 miles withdraw the starter from the engine and saturate the wick under the oiler on the outward bearing of the splined shaft with light engine oil.

GENERATOR.—Model No. 229. The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Generator is belt driven, and care must be taken that the belt is not tight enough to cause undue wear to the armature bearings and should not be loose enough that the generator armature will rotate when the ignition switch is "On" with the engine stopped. To adjust the belt tension, loosen the clamp screws holding the generator to the engine and shift the position of the generator slightly.

Generator Data.—No. 229.

Amperes	R.P.M.
Neutral	650
4	800
8	1000
12-16	1600
8-12	2300

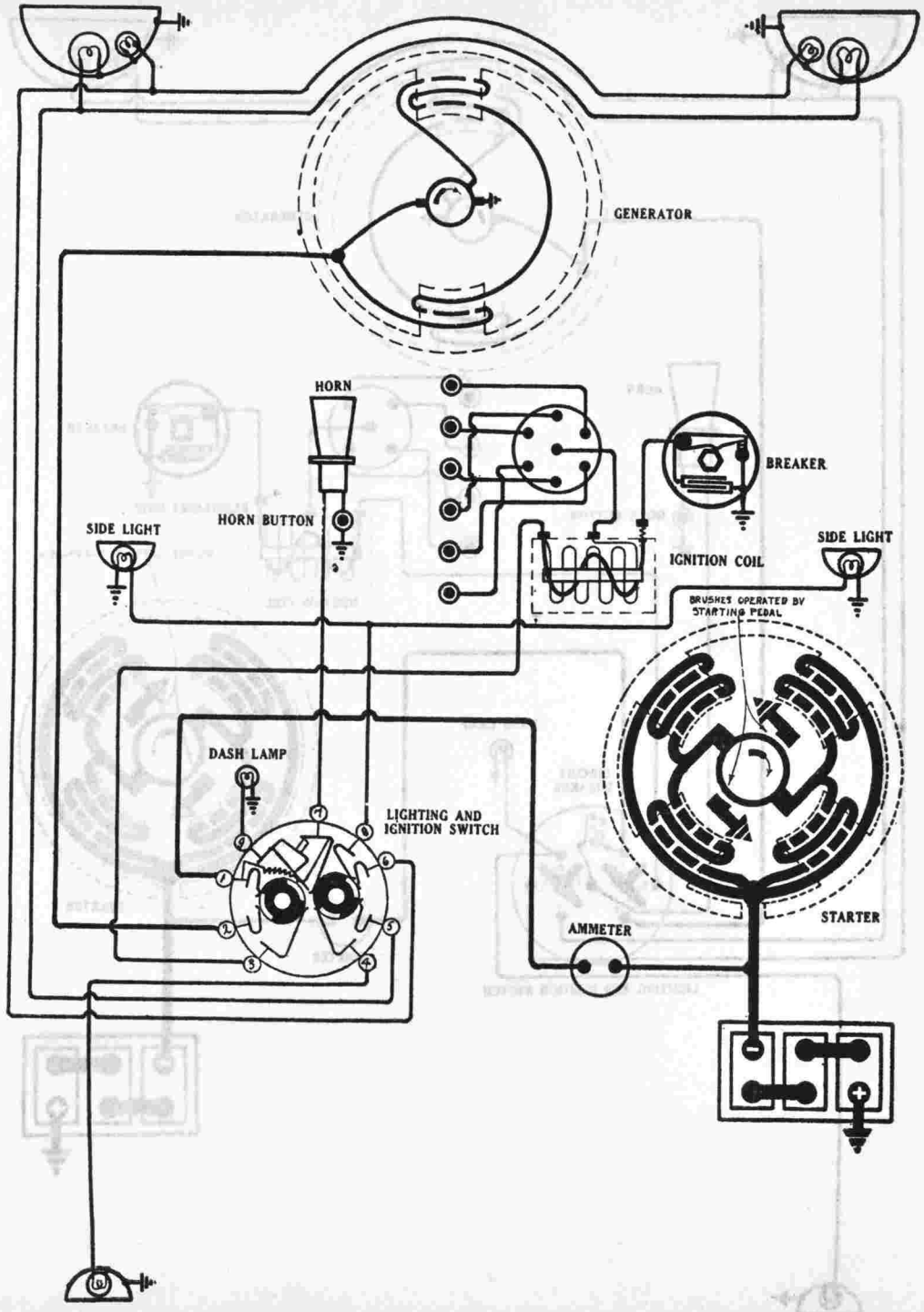
The charging rate is varied by adjustment of the thtrd brussh setting. Remove the cover band, loosen the two adjusting screws attaching the third brush arm to the mounting plate. Move the third brush in the direction of armature rotation to increase the charging rate, or in the opposite direction to decrease the charging rate. Tighten the adjusting screws and be sure that all of the brushes are well seated.

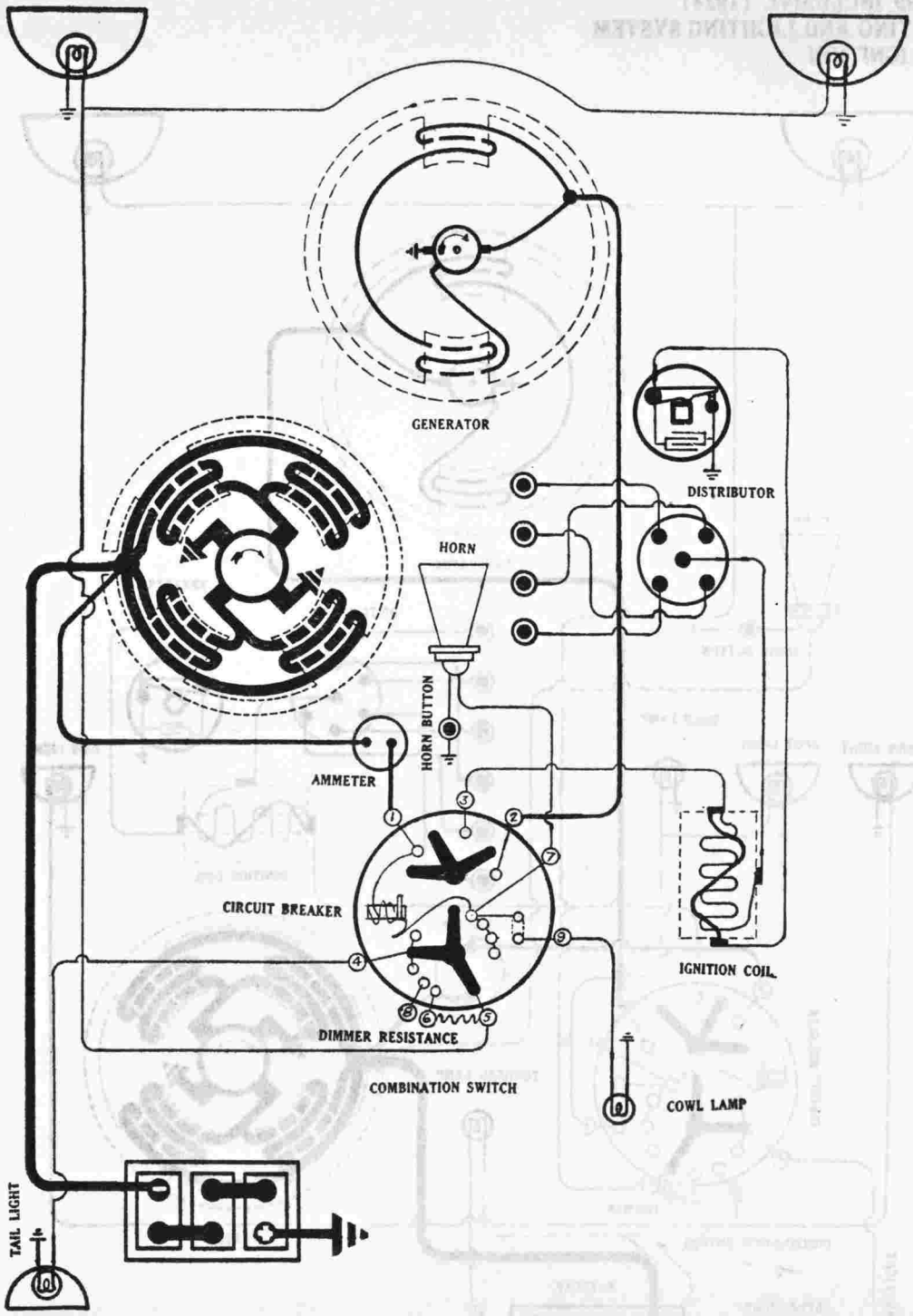
Oiling.—Put 3 or 4 drops of light engine oil in each of the generator oilers every 500 miles.

RELAY.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volts, 21 cp. Dimmers are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp. Tonneau lamp is 6-8 vot, 2 cp.

CIRCUITBREAKER.—A vibrating circuit breaker takes the place of fuses. A current of 25 amperes starts the vibrator, which will continue with a current of 3-5 amperes until the switch is opened or the cause is removed.





NASH

MODELS 41, 42, 43, 44, 45 (1923)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM, DELCO IGNITION

BATTERY.—Willard, Type SJRN-4, 6 volt, 111 ampere hour. The positive (+) terminal is grounded.

IGNITION:—Coil Model No. 2178. Distributor Model No. 5243. Breaker contacts separate .020 to .0275 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface lightly on an oilstone.

Oiling:—Put 3 or 4 drops of light engine oil in the distributor oiler every 500 miles. If the track of the rotor button is not well polished, apply a very small amount of vaseline. Put a very small amount of soft vaseline on the face of the breaker cam every 1000 miles.

Timing:—Breaker contacts begin to separate when the piston entering the power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-3-4-2.

Spark Plug Gaps:—The spark plug gaps are .025 to .030 inch.

STARTER:—Model No. 228. Starter is connected to the engine through a set of reduction gears meshed by the operator. An overrunning clutch prevents the starter armature from being driven at excessive speed by the engine flywheel after the engine has started running under it own power. The direction of rotation is clockwise, looking at the commutator end. Lock torque is 31 lb. ft. at 2.6 volts. Starter running free takes 60 amperes at 6 volts. The brush tension should be from 2¼ to 2¾ pounds on each of the starter brushes.

Oiling:—Put 4 or 5 drops of light engine oil in each of the two starter oilers each month. Remove the grease plug in the side of the reduction gear housing and repack the housing with medium cup grease once or twice each season. Every 2000 miles withdraw the starter from the engine and saturate the wick under the oiler on the outward bearing of the splined shaft with light engine oil.

GENERATOR:—Model No. 229. The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Generator is belt driven, and care must be taken that the belt is not tight enough to cause undue wear to the armature bearings and should not be so loose that the generator armature will rotate when the ignition switch is "On" with the engine stopped. To adjust the belt tension, loosen the clamp screws holding the generator to the engine and shift the position of the generator slightly.

Generator Data

	R.P.M.
Neutral	650
4	800
8	1000
12-16	1600
8-12	2300

The charging rate is varied by adjustment of the third brush setting. Remove the cover band, loosen the two adjusting screws attaching the third brush arm to the mounting plate. Move the third brush in the direction of armature rotation to increase the charging rate, or in the opposite direction to decrease the charging rate. Tighten the adjusting screws and be sure that all of the brushes are well seated. Maximum charging rate should not exceed 17 amperes (lights off, generator hot) in

Oiling:—Put 3 or 4 drops of light engine oil in each of the generator oilers every 500 miles.

RELAY:—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch.

LAMPS:—Head lamps are 6-8 volt, 21 cp., with dimmer resistance, 6-8 volt, 8 cp. Dash and tail lamps are 6-8 volt, 2 cp.

CIRCUIT BREAKER:—A vibrating circuit breaker, mounted on the back of the switch, takes the place of fuses. A current of 25 to 30 amperes will start it vibrating, and it will continue to vibrate with a maximum current flow of 15 amperes until the cause of the excessive current has been removed or the switch operated to cut off the current.

NASH

MODELS 691 TO 699 INCLUSIVE (1924)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SJRN-4, 6 volt, 111 ampere hour. The positive (+) terminal is grounded.

IGNITION:—Coil Model 2178. Distributor Model 5244, 5263. Breaker contacts separate .020-.0275 inch with breaker arm on lobe of cam. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 30-35 degrees. Automatic advance begins at 500-580 R.P.M. Maximum automatic advance is 20-24 degrees at 1400 R.P.M.

Mounting:—Distributor is mounted at right of engine. To remove, disconnect primary lead and manual advance rod. Remove distributor head with high tension cables intact. Remove hold-down screw at bottom of housing and lift distributor from place.

Oiling.—Put 3 or 4 drops of light engine oil in the distributor oiler every 500 miles. If the track of the rotor button is not well polished, apply a very small amount of vaseline. Put a very small amount of soft vaseline on the face of the breaker cam every 1000 miles.

Timing—Breaker contacts begin to separate when the piston entering the power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position. To set timing on Model 5244, loosen timing adjustment screw in center of cam and rotate cam until contacts separate. To set timing on Model 5263, loosen advance lever clamp screw and rotate distributor housing until contacts separate. Tighten the screws after making the adjustments and make certain that the rotor is opposite the segment connected to the spark plug in cylinder No. 1. Connect the remaining plugs in order 5-3-6-2-4 around the distributor head.

STARTER.—Model No. 230. Starter is connected to the engine through a set of reduction gears meshed by the operator. An overrunning clutch prevents the starter armature from being driven at excessive speed by the engine flywheel after the engine has started running under its own power. The direction of rotation is clockwise, looking at the commutator end. Starter brush tension is 2¼-2¾ pounds.

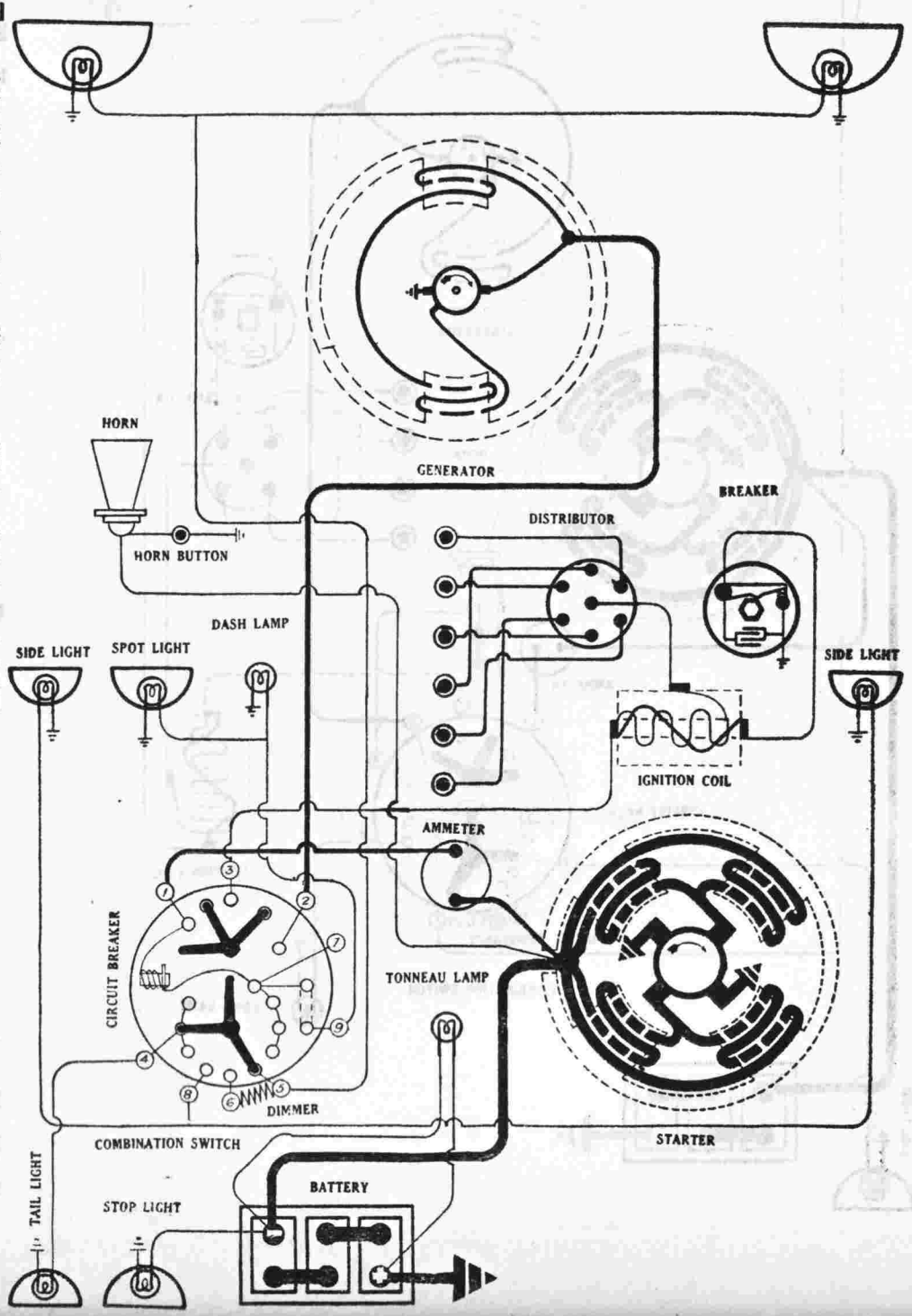
Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	60
31 "	Lock	2.6	—

Mounting:—Starter is mounted at left of engine. To remove starter, disconnect all leads from starter and tape cable terminal to prevent a possible short circuit. Remove starting pedal return spring and pedal rod. Remove pilot mounting screw, pull starter from housing and lift out.

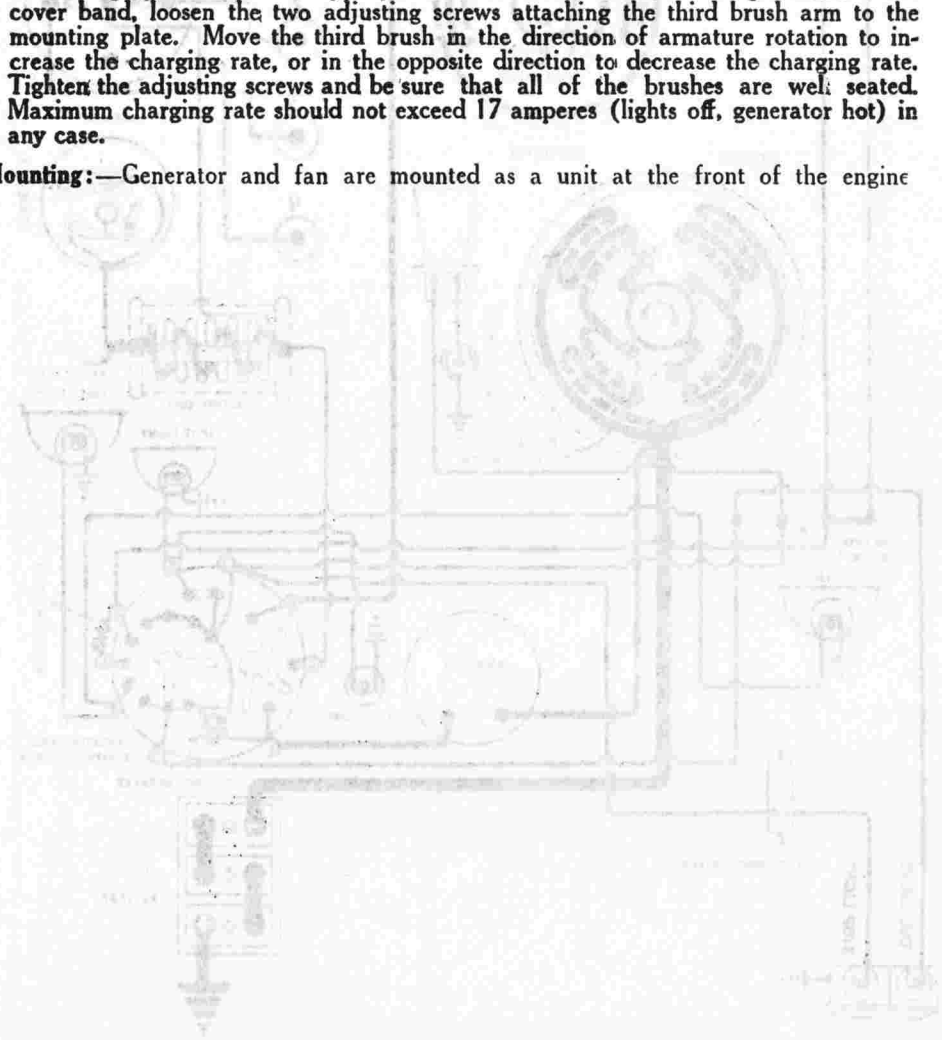
Oiling.—Put 4 or 5 drops of light engine oil in each of the two starter oilers each month. Remove the grease plug in the side of the reductioi gear housing and repack the housing wih medium cup grease once or twice each season. Every 2000 miles withdraw the starter from the engine and saturate the wick under the oiler on the outward bearing of the splined shaft wth light engine oil.

GENERATOR:—Model 229, 269. The direction of rotation is clockwise, looking at commutator end. Generator current regulation is by the third brush system. Generator is belt driven, and care must be taken that the belt is not tight enough to cause undue wear to the armature bearings and should be so loose that the generator armature will rotate when the ignition switch is "On" with the engine stopped. To adjust the belt tension, loosen the clamp screws holding the generator to the engine and shift the position of the generator slightly.



NASH

MODELS 691 TO 699 INCLUSIVE (1924)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION



Generator Data.

Amperes	R.P.M.
Neutral	650
4	800
8	1000
12-16	1600
8-12	2300

The charging rate is varied by adjustment of the third brush setting. Remove the cover band, loosen the two adjusting screws attaching the third brush arm to the mounting plate. Move the third brush in the direction of armature rotation to increase the charging rate, or in the opposite direction to decrease the charging rate. Tighten the adjusting screws and be sure that all of the brushes are well seated. Maximum charging rate should not exceed 17 amperes (lights off, generator hot) in any case.

Mounting:—Generator and fan are mounted as a unit at the front of the engine

To remove generator, disconnect lead and remove two mounting cap screws. Lower generator until belt can be slipped off and lift generator out.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearings every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volts, 21 cp. Dimmers are 6-8 volts, 4 cp. Side lamps are 6-8 volts, 2 cp. Dash and tail lamps are 6-8 volts, 2 cp. Tonneau lamp is 6-8 volt, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. A current of 25 amperes will cause this device to vibrate. While vibrating the current is 10-15 amperes.

NASH

MODELS 41, 46, 47, 48, 49 (1924)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—U. S. L., 6 volt, 111 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—**Coil Model 2178. Distributor Model 5262.** Breaker contacts separate .020 to .0275 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface lightly on an oilstone.

Oiling.—Put 3 or 4 drops of light engine oil in the distributor oiler every 500 miles. If the track of the rotor button is not well polished, apply a very small amount of vaseline. Put a very small amount of soft vaseline on the face of the breaker cam every 1000 miles.

Timing—Breaker contacts begin to separate when the piston entering the power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—The spark plug gaps are .025 to .030 inch.

STARTER.—**Model No. 228.** Starter is connected to the engine through a set of reduction gears meshed by the operator. An overrunning clutch prevents the starter armature from being driven at excessive speed by the engine flywheel after the engine has started running under its own power. The direction of rotation is clockwise, looking at the commutator end. Lock torque is 31 lb. ft. at 2.6 volts. Starter running free takes 60 amperes at 6 volts. The brush tension should be from 2¼ to 2¾ pounds on each of the starter brushes.

Oiling.—Put 4 or 5 drops of light engine oil in each of the two starter oilers each month. Remove the grease plug in the side of the reductioi gear housing and repack the housing wih medium cup grease once or twice each season. Every 2000 miles withdraw the starter from the engine and saturate the wick under the oiler on the outward bearing of the splined shaft wth light engine oil.

GENERATOR.—**Model No. 269.** The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Generator is belt driven, and great care must be taken that the belt is not tight enough to cause undue wear to the armature bearings and should not be so loose that the generator armature will rotate when the ignition is "On" with the engine stopped. To adjust the belt tension, loosen the clamp screws holding the generator to the engine and shift the position of the generator slightly.

Generator Data

Amperes	R.P.M.
Neutral	650
4	800
8	1000
17-19	1500
8-12	2300

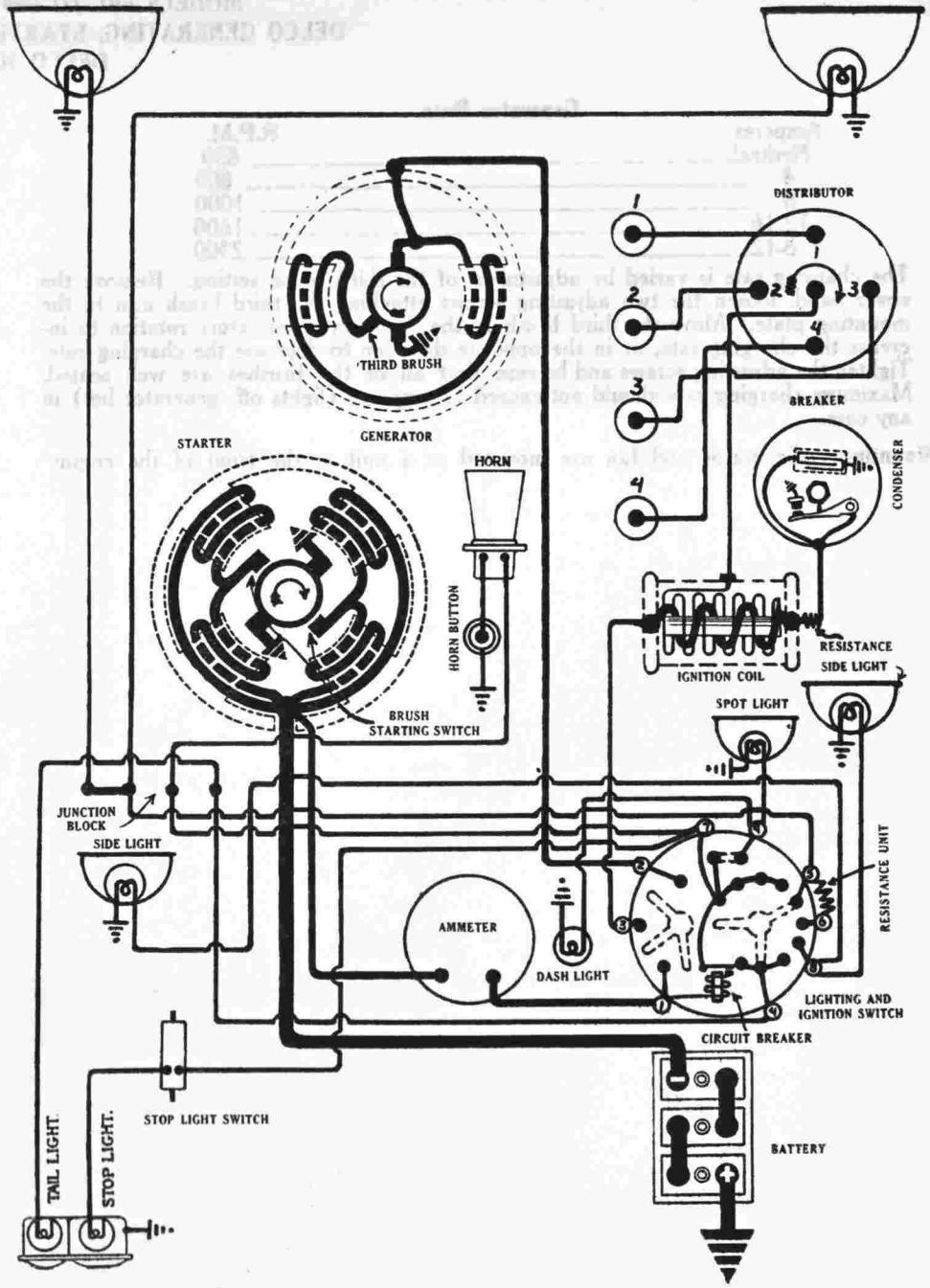
To adjust the charging rate, loosen the generator cover band and shift the third brush plate by means of the handle attached. Shifting the brush in the direction of rotation (clockwise) increases the charging rate and in the opposite direction decreases it.

Oilng.—Put 3 or 4 drops of light engine oil in each of the generator oilers every 500 miles.

RELAY:—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch.

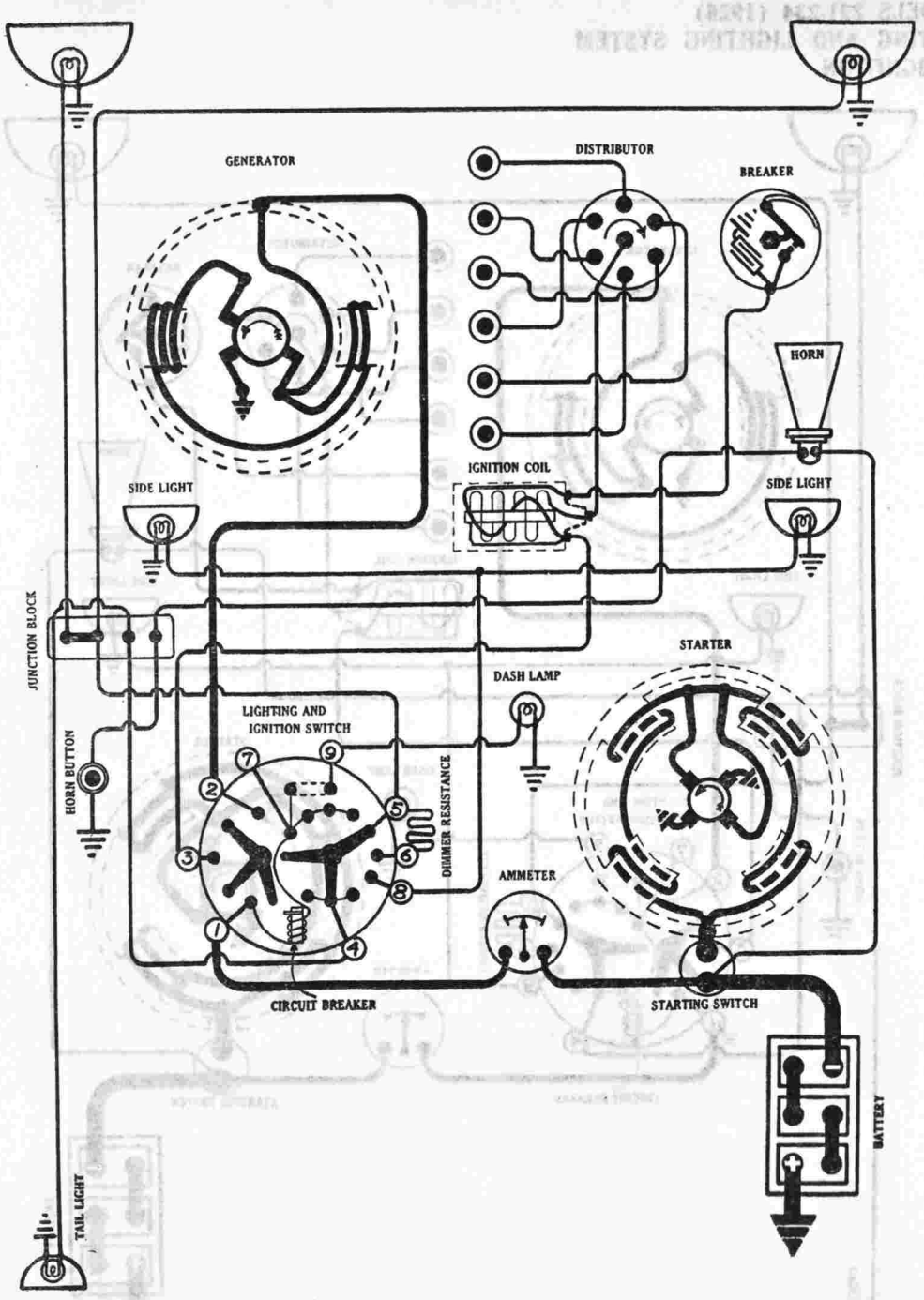
LAMPS.—Head lamps are 6-8 volts, 21 cp., with dimmer resistance, 6-8 volt, 8 cp. Dash and tail lamps are 6-8 volt, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker, mounted on the back of the switch, takes the place of fuses. A current of 25 to 30 amperes will start it vibrating, and it will continue to vibrate with a maximum current flow of 15 amperes until the cause of the excessive current has been removevd or the switch operated to cut off the current.



NASH

SPECIAL SIX, MODELS 131 TO 133 (1925)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION



BATTERY:—U.S.L. Type 3-HVX-5X. 6 volt. The starting capacity is 105 amperes for 20 minutes. The lighting capacity is 5 amperes for 18.4 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model No. 2182. Distributor Model No. 5272. Breaker contacts separate .014 to .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone. The manual advance provided is 33°. Automatic advance begins at 580 R.P.M. and reaches a maximum of 20-24° at 1400 R.P.M. The tension of the breaker arm spring should be 13-16 ounces.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Place a small bit of medium heavy grease on the face of the breaker cam every 1000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control lever in the fully retarded position. To time engine, loosen distributor cup clamp screw and turn distributor cup counter-clockwise until breaker contacts begin to separate. Make certain that rotor is under contact connected to cylinder which is ready to fire. Tighten the clamp screw after making adjustment.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025-.030 inch.

STARTER:— Model No. 292. The starter is connected to the engine through a mechanical gear shift incorporated in the starting switch. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	60
9.5 "	Lock	2.8	—

The starter brush tension should be 2¼ to 2¾ pounds each.

Oiling:—Oilless bearings are used. They require no attention.

GENERATOR:—Model No. 291. Generator is belt driven and care must be exercised that the belt is not tight enough to cause undue wear on the bearings and yet not so loose that the generator armature will turn when the ignition switch is turned on. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the charging rate, remove the generator cover band and shift the third brush mounting plate by means of the handle attached. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. The mounting plate is held in any desired position by means of friction washers.

Generator Data

Amperes	R.P.M.
4	800
15	1600

The generator brush tension should be 1¼ to 1¾ pounds each.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—No relay is used. The generator is connected to the battery through the ignition switch. Opening the switch disconnects the generator and prevents the battery discharging.

LIGHTING:—Combination Switch No. 1264. Head lamps are 6-8 volts, 21 cp. S.C. Side lamps are 6-8 volt, 2 cp. S.C. Dash and tail lamps are each 6-8 volt, 2 cp. S.C.

CIRCUIT BREAKER:—A vibrating circuit breaker mounted on the back of the switch protects the lighting circuits. A current of 25-30 amperes will cause this device to vibrate. While operating the current is 10-15 amperes.

NASH

SPECIAL SIX, MODELS 231-234 (1926)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—U.S.L. Type 3-HVX-5X. 6 volt. The starting capacity is 105 amperes for 20 minutes. The lighting capacity is 5 amperes for 18.4 hours. The positive (+) terminal is grounded

IGNITION:—Coil Model No. 2182. Distributor Model No. 5272. Breaker contacts separate .014 to .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone. The manual advance provided is 33°. Automatic advance begins at 580 R. P. M. and reaches a maximum of 20-24° at 1400 R.P.M. The tension of the breaker arm spring should be 13-16 ounces.

Mounting:—Distributor is mounted at right of engine. To remove, disconnect manual advance rod and remove manual advance stop screw. Then lift distributor from position.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Place a small bit of medium heavy grease on the face of the breaker cam every 1000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control lever in the fully retarded position. To time engine, loosen distributor cup clamp screw and turn distributor cup counter-clockwise until breaker contacts begin to separate. Make certain that rotor is under contact connected to cylinder which is ready to fire. Tighten the clamp screw after making the adjustment.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025-.030 inch.

STARTER:—Model No. 323. Starter is connected to the engine through a mechanical pinion shift combined with the starting switch. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 2¼-2¾ pounds each.

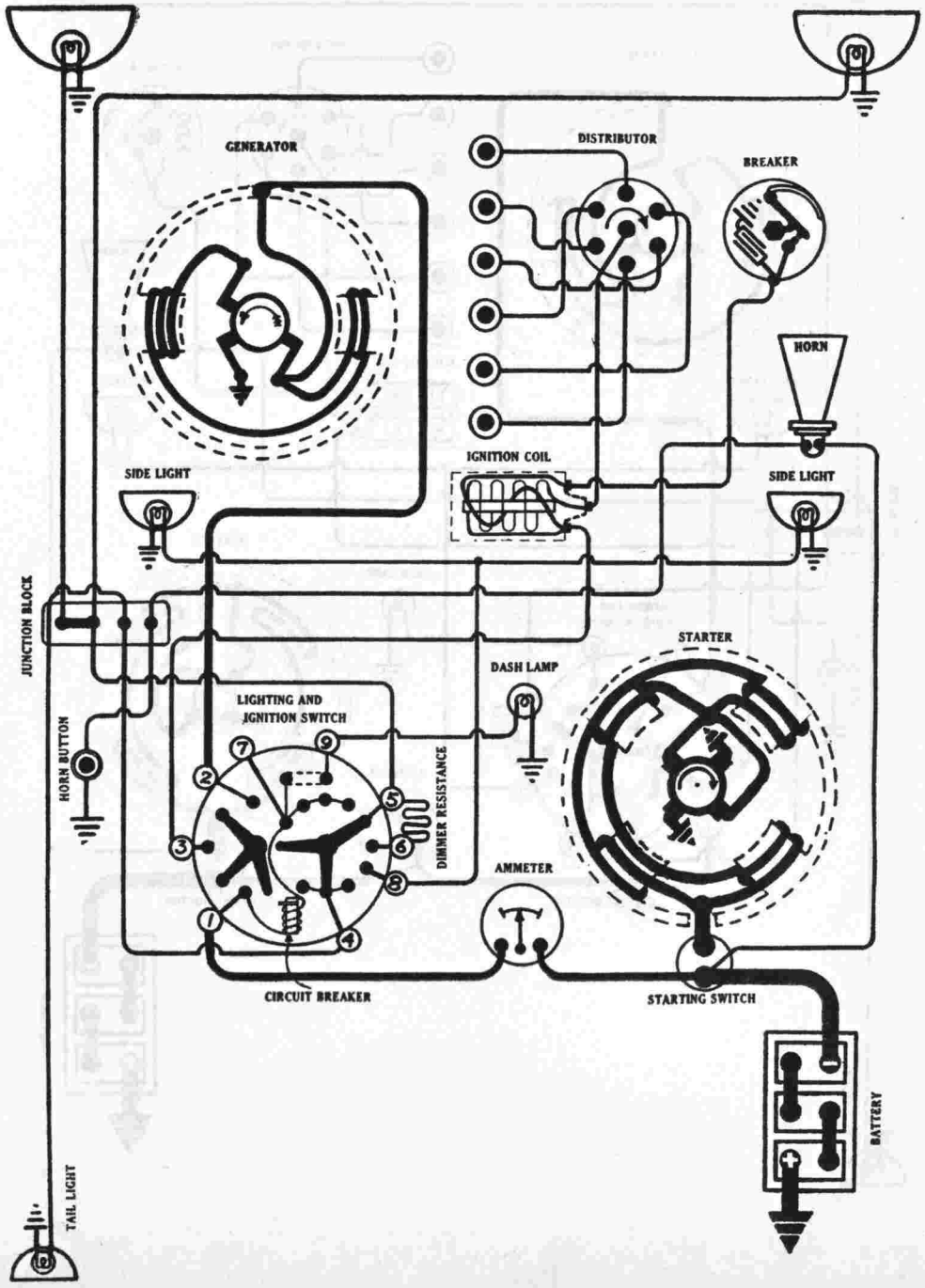
Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	50
16 "	Lock	3	—

Mounting:—Starter is mounted at right of engine. To remove, disconnect pedal return spring and pedal connecting rod. Remove large pilot mounting screw and pull starter forward from position.

Oiling:—Oilless bearings are used. They require no attention.

GENERATOR:—Model No. 291. Generator is belt driven and care must be exercised that the belt is not tight enough to cause undue wear on the bearings and yet not so loose that the generator armature will turn when the ignition switch is turned on. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the charging rate, remove the generator cover band and shift the third brush mounting plate by means of the handle attached. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. The mounting plate is held in any desired position by means of friction washers.



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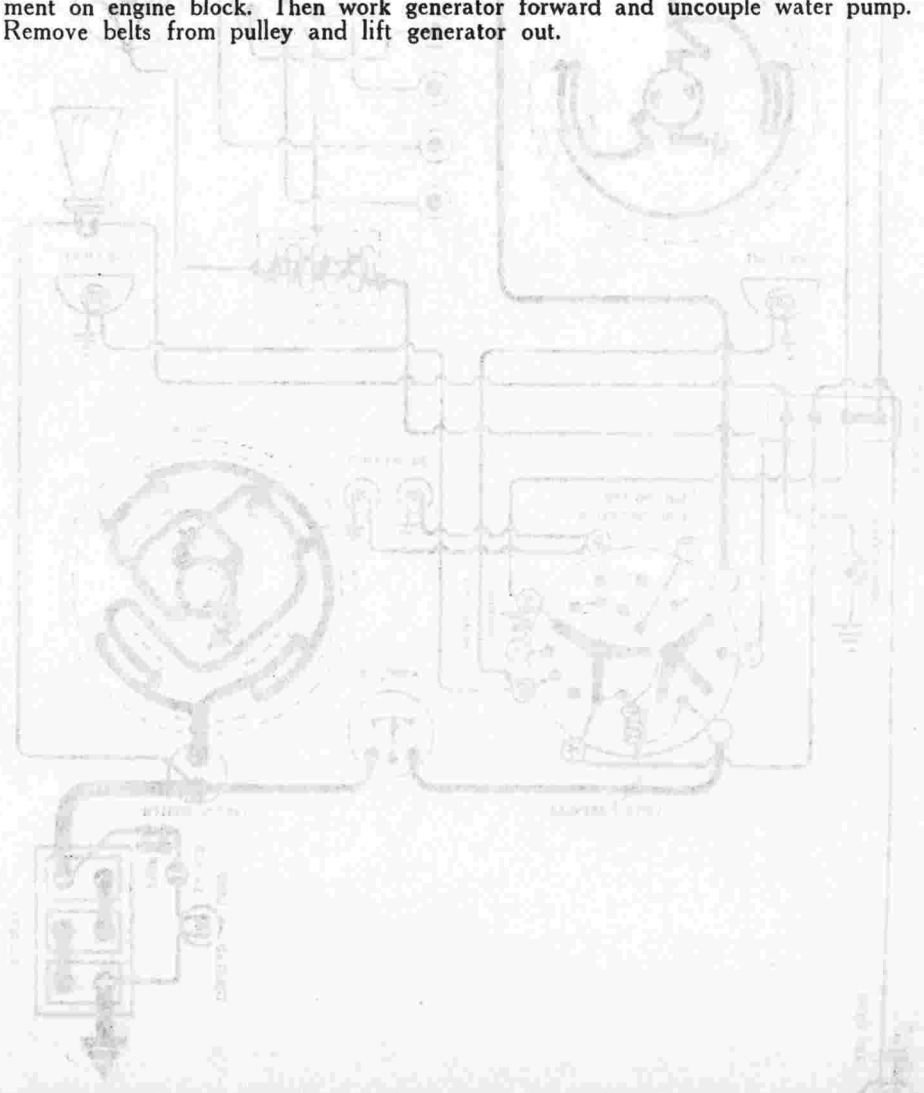
SPECIAL SIX, MODELS 231-234 (1926)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

Generator Data

Amperes	R.P.M.
4	800
15	1600

The generator brush tension should be 1¼ to 1¾ pounds each.

Mounting:—Generator is mounted at left of engine and is belt driven. To remove generator, remove hinge shaft clamp screw and cotterpin at forward end of shaft and slide shaft to rear. Disconnect throttle rod. Loosen belt adjustment nut on generator, remove two water pump attaching screws and loosen fan belt at adjustment on engine block. Then work generator forward and uncouple water pump. Remove belts from pulley and lift generator out.



Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearings oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—No relay is used. The generator is connected to the battery through the ignition switch. Opening the switch disconnects the generator and prevents the battery discharging.

LIGHTING:—Combination Switch No. 1264. Head lamps are 6-8 volt, 21 cp.S.C. Side lamps are 6-8 volt, 2 cp.S.C. Dash and tail lamps are each 6-8 volt, 2 cp.S.C.

CIRCUIT BREAKER:—A vibrating circuit breaker mounted on the back of the switch protects the lighting circuits. A current of 25-30 amperes will cause this device to vibrate. While operating the current is 10-15 amperes.

NASH

MODEL 131-133 (1925)
ADVANCED SIX, MODELS 261-269 (1926)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Gould, Type OSL-617. 6 volt. 117 ampere hour. The positive (+) terminal is grounded.

IGNITION:—Coil Model No. 2178. Distributor Model No. 5263. Breaker contacts separate .020 to .025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oil-stone. Manual advance is 35°. Automatic advance begins at 500 R.P.M. and reaches a maximum of 20-24° at 1400 R.P.M. The tension of the breaker arm spring should be 13-16 ounces.

Mounting:—Distributor is mounted on right of engine. To remove, disconnect manual advance rod and remove nut on hold-down screw at bottom of housing. Then lift distributor from position.

Oiling:—Put 3 or 4 drops of light engine oil in the distributor oiler every 500 miles. If the track of the rotor button is not well polished, apply a very small amount of vaseline. Put a very small amount of soft vaseline on the face of the breaker cam every 1000 miles.

Timing:—Breaker contacts begin to separate when the piston entering the power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position. To time engine, loosen advance lever clamp screw and shift distributor cup in a counter-clockwise direction until breaker contacts begin to separate. Tighten clamp screw after making the adjustment. Make certain that the rotor is under the contact connected to the cylinder which is ready to fire.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plug Gaps:—The spark plug gaps are .025 to .030 inch.

STARTER:—Model No. 271. Starter is connected to the engine through a mechanical pinion shift incorporated in the starting switch. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	50
11 "	Lock	2.7	—

The tension of the starter brushes should be 2¼ to 2¾ pounds each.

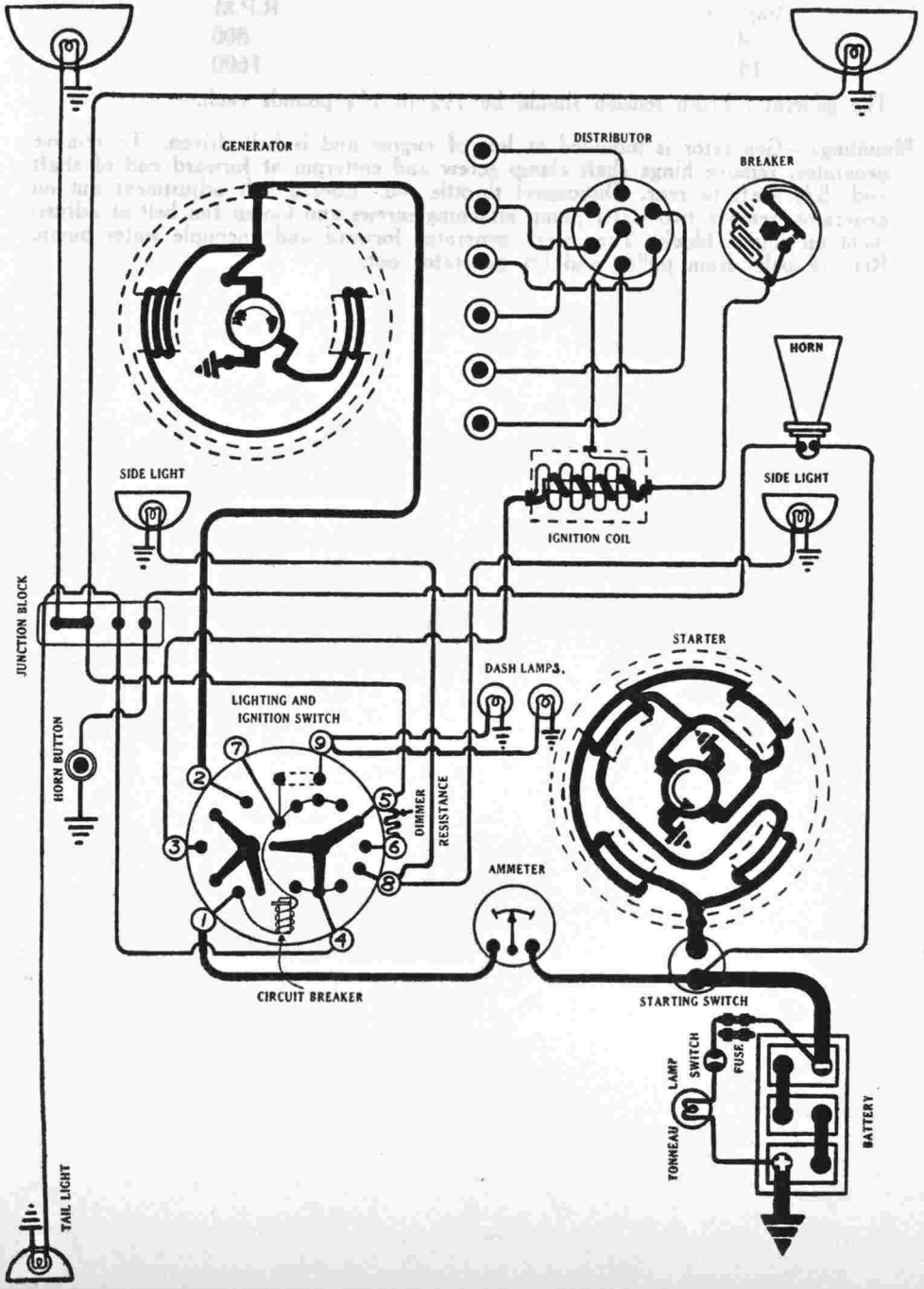
Mounting:—Starter is mounted at right of engine. To remove, disconnect pedal return spring and pedal connecting rod. Then remove large pilot mounting screw and pull starter forward from its place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR:—Model No. 269. The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Generator is belt driven, and care must be taken that the belt is not tight enough to cause undue wear to the armature bearings and should not be so loose that the generator armature will rotate when the ignition switch is "On" with the engine stopped. To adjust the belt tension, loosen the clamp screws holding the generator to the engine and shift the position of the generator slightly.

Generator Data

Amperes	R.P.M.
Neutral	650
4	800
8	1000
17-19	1500
8-12	2300



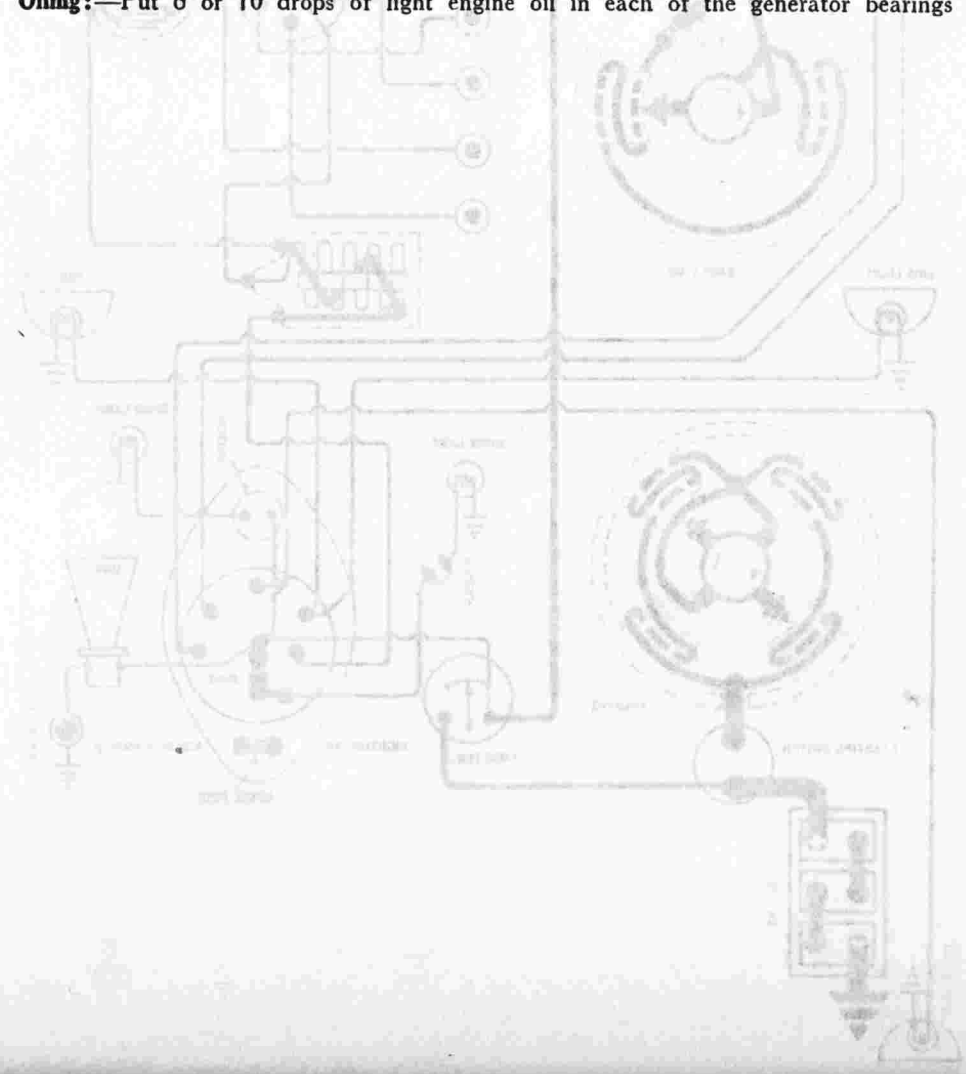
NASH

MODEL 131-133 (1925)
ADVANCED SIX, MODELS 261-269 (1926)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

The charging rate is varied by loosening the generator cover band and shifting the third brush mounting plate by means of the handle attached. Shift the third brush in the direction of rotation (clockwise) to increase the charging rate and in the opposite direction to decrease the charging rate. The brush tenson on each of the generator brushes should be from 1¼ to 1¾ pounds.

Mounting:—Generator is belt driven and is mounted at the forward end of the engine. To remove, remove the two flange mounting screws holding generator in position by the fan blade. Then lower generator fitting fan blade into space between car frame and engine just back of the hose connection. This will permit removal of the belt. Then lift generator from position.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearings every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.



RELAY:—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch.

LIGHTING:—Combination Switch No. 1267. Head lamps are each 6-8 volt, 21 cp.S.C. dome lamp is 6-8 volt, 4 cp.D.C. Side, dash and tail lamps are each 6-8 volt, 2 cp.S.C.

CIRCUIT BREAKER:—A vibrating circuit breaker takes the place of fuses. A current of 25 amperes will cause this device to vibrate. While vibrating the current is 10-15 amperes.

NASH

LIGHT SIX AFTER APRIL FIRST (1926)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY.—U. S. L. Type 3-HVX-5X, 6 volt. The negative (—) terminal is grounded. The starting capacity is 105 amperes for 20 minutes. Lighting capacity is 5 amperes for 18.4 hours. The battery is 7 7/16 by 9¾ by 9⅛ inches.

IGNITION.—Coil Model IG-4065. Distributor Model IG-4110. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine flat jeweler's file. The surface of the contacts should be flat and parallel. The distributor is of the full automatic type. Automatic advance begins at 200 R.P.M. of the distributor and reaches a maximum of 15° (distributor) at 1200 R.P.M. This is equivalent to a flywheel advance of 30° at 2400 R.P.M. of the engine.

Oiling.—Refill the grease cup under the distributor head with medium cup grease and turn down one turn every two weeks. Put one drop of light engine oil on the breaker arm hinge and place a small amount of vaseline on the face of the breaker cam every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing.—Breaker contacts begin to separate when piston entering power stroke reaches top dead center with the breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plug.—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

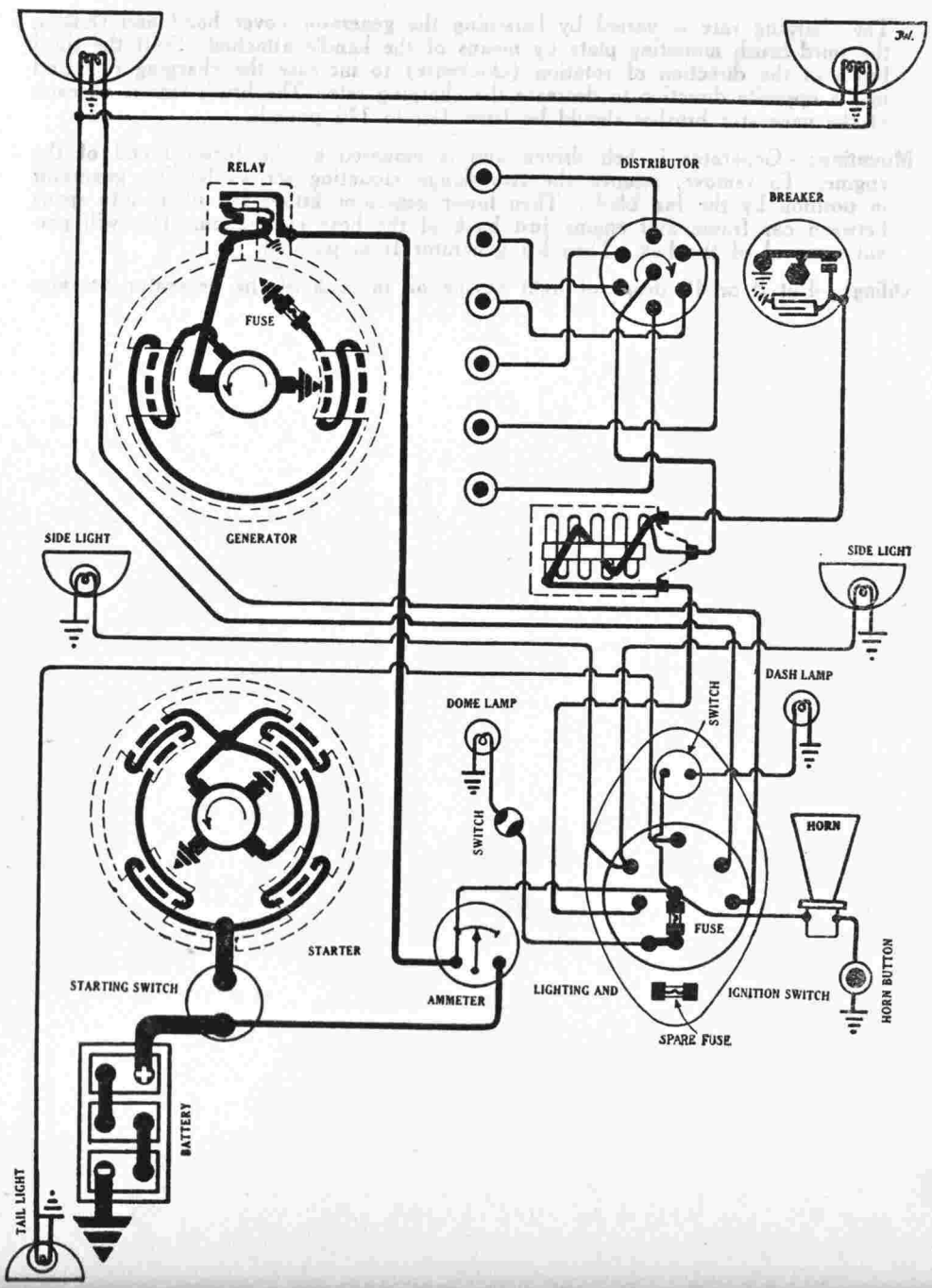
STARTER.—Model MN-4108. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 184 R.P.M. taking 160 amperes at 4.7 volts. Starter brush tension should be 1¼-1½ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	Free	5.5	45	(Without Bendix)
0 "	Free	5.5	50	(With Bendix)
.6 "	2700	5.5	100	
2.5 "	1500	5	200	
5 "	850	4.5	300	
7.5 "	650	4	400	
11.5 "	Lock	3	540	

Oiling.—Put 4 or 5 drops of light engine oil in oiler on the drive end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month. The commutator end bearing is of the self-lubricating type and requires no attention.

GENERATOR.—Model GYA-4201. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, remove the commutator cover band and shift the third brush mounting bracket by tapping the third brush mounting stud with a screwdriver. Shifting the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. The mounting bracket is held in any desired position by friction between the third brush mounting stud and the generator end plate.



NASH

LIGHT SIX AFTER APRIL FIRST (1926)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
2	6.6	620	2	....	700
5	7	700	5	....	840
10	7.3	860	10	....	1100
14	7.7	1050	14	....	1600
16	7.9	1200			
19	8	1300			

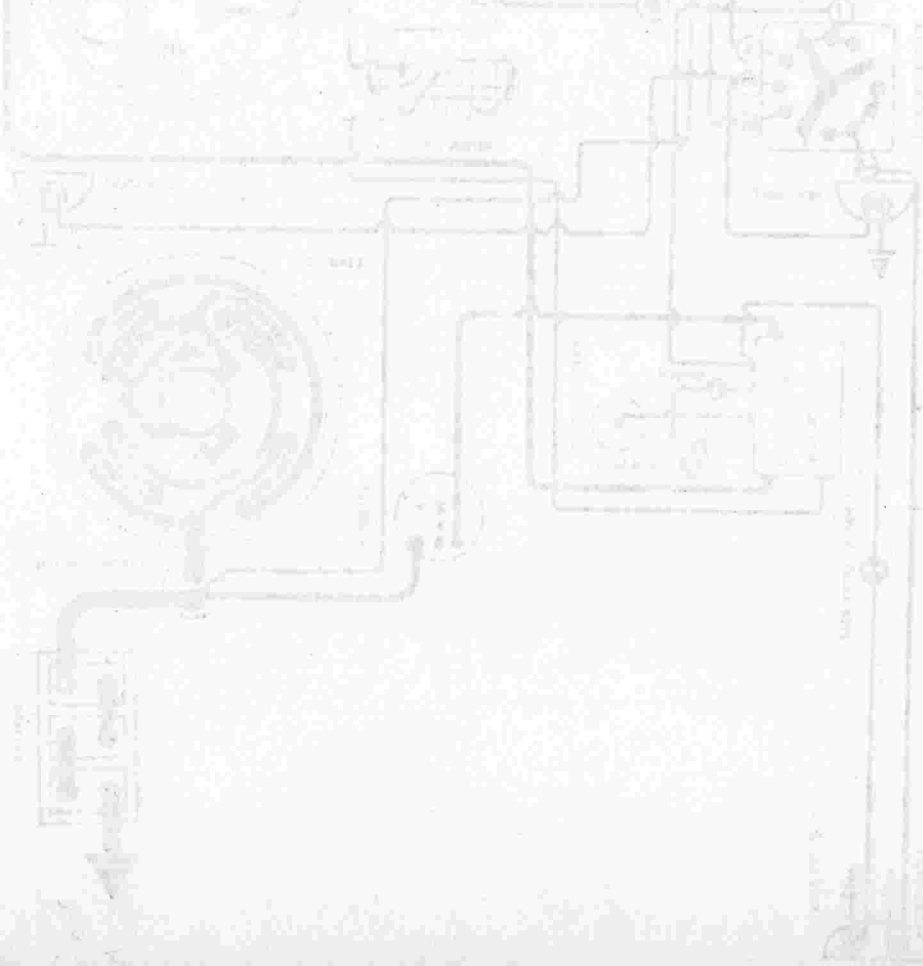
Motoring freely, generator draws 5 amperes at 6 volts. Shunt field current is 3.8 amperes at 6.2 volts. Generator brush spring tension is 1¼-1½ pounds each.

Oiling.—Put 3 or 4 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY.—Model CB-4007. Relay is mounted on top of the generator. Relay contacts close when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of .5-2.5 amperes. Contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING.—Switch B & S Type 39890. Head lamps are each 6-8 volt, 21 cp. Double filament using second 21 cp. filament for dimming. Dash lamp is 6-8 volt, 2 cp. S. C. Dome lamp is 6-8 volt, 4 cp. S. C. Side and tail lamps are each 6-8 volt, 3 cp. S. C.

FUSES.—Generator field fuse is 5 ampere.



NASH

SPECIAL SIX
MODEL 231 (1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—U.S.L. Type 3-HVX-5X6. 6 volt. The starting capacity is 105 amperes for 20 minutes. The lighting capacity is 5 amperes for 18.4 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model No. 2182. Distributor Model No. 4015. Breaker contacts separate .015 to .0225 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone. The manual advance provided is 33°. Automatic advance begins at 600 R.P.M. and reaches a maximum of 20-24° at 1400 R.P.M. The tension of the breaker arm spring should be 13-16 ounces.

Mounting.—Distributor is mounted at right of engine. To remove, disconnect manual advance rod and remove manual advance stop screw. Then lift distributor from position.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Place a small bit of medium heavy grease on the face of the breaker cam every 1000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control lever in the fully retarded position. To time engine, loosen distributor cup clamp screw and turn distributor cup counter-clockwise until breaker contacts begin to separate. Make certain that rotor is under contact connected to cylinder which is ready to fire. Tighten the clamp screw after making the adjustment.

Valve Timing:—INLET VALVES:—Head diameter, 1½ inches; stem diameter, ⅜ inch; stem length, 5¼ inches; tappet clearance, .010 inch; spring pressure, 55 pounds; valve lift, .348 inch; intake opens at 15° past top dead center and closes at 45° past lower dead center.

EXHAUST VALVES:—Head diameter, 1½ inches; stem diameter, ⅜ inch; stem length, 5¼ inches; tappet clearance, .010 inch; spring pressure, 55 pounds; valve lift, .348 inch; exhaust opens at 45° before lower dead center and closes 10° after top dead center. Stem guides are removable. No oversize valve stems are made.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .025-.030 inch.

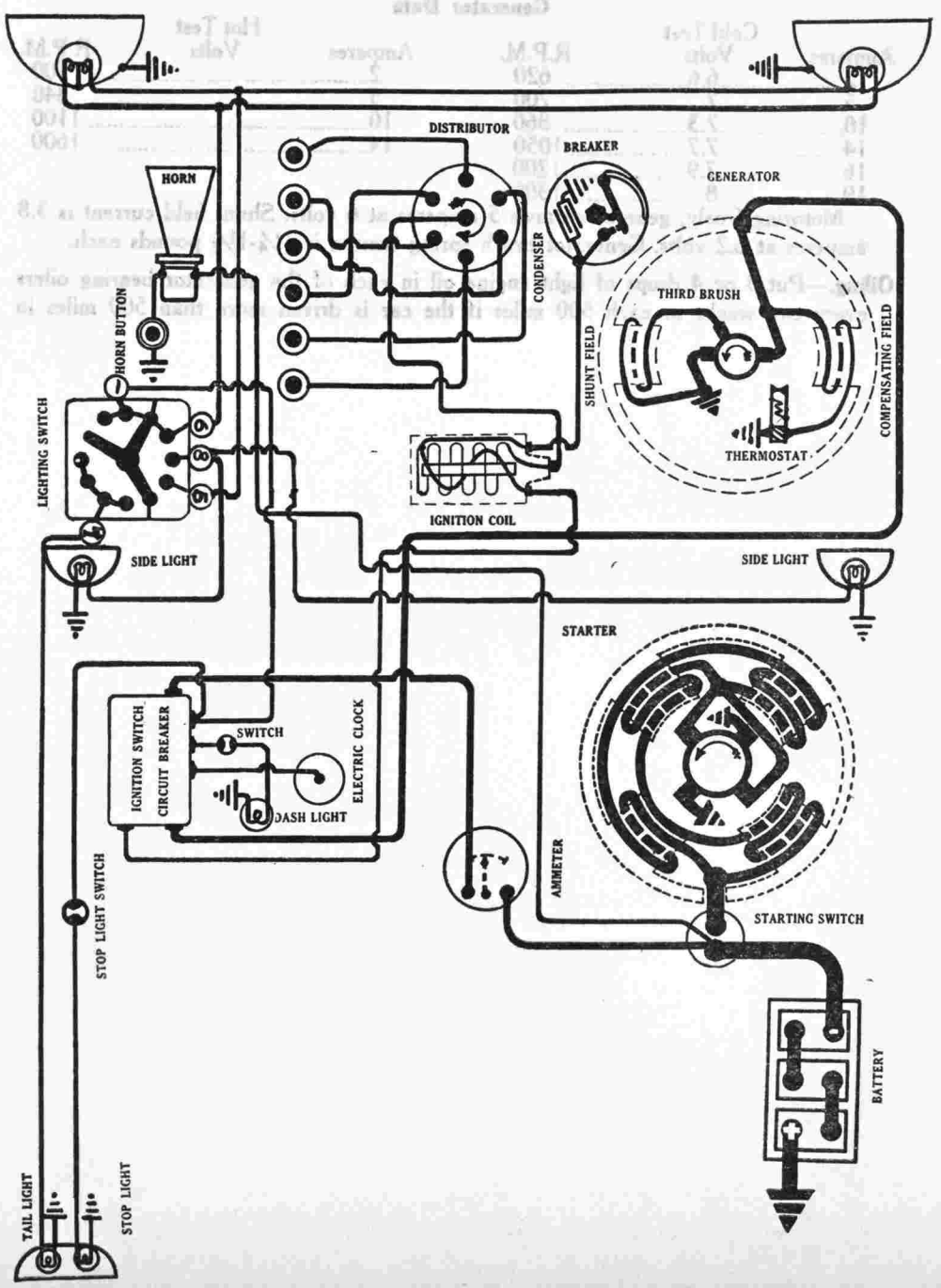
STARTER.—Model No. 323. Starter is connected to the engine through a mechanical pinion shift combined with the starting switch. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 2¼-2½ pounds each.

Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	4	60
11 lb. ft.	Lock	3	450

Mounting.—Starter is mounted at right of engine. To remove, disconnect pedal return spring and pedal connecting rod. Remove large pilot mounting screw and pull starter forward from position.

Oiling:—Oilless bearings are used. They require no attention.



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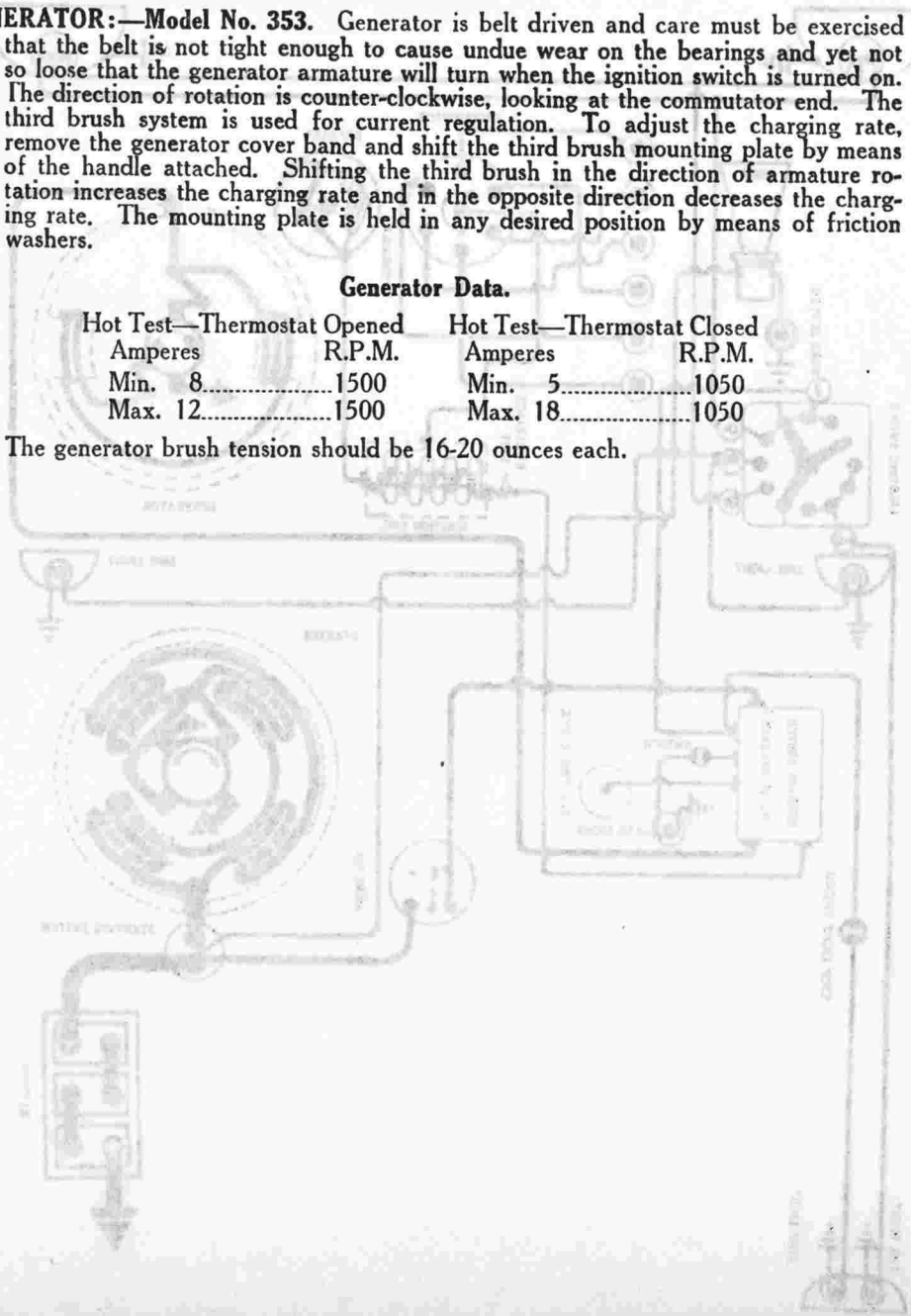
SPECIAL SIX.
MODEL 231 (1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

GENERATOR:—Model No. 353. Generator is belt driven and care must be exercised that the belt is not tight enough to cause undue wear on the bearings and yet not so loose that the generator armature will turn when the ignition switch is turned on. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the charging rate, remove the generator cover band and shift the third brush mounting plate by means of the handle attached. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. The mounting plate is held in any desired position by means of friction washers.

Generator Data.

Hot Test—Thermostat Opened		Hot Test—Thermostat Closed	
Amperes	R.P.M.	Amperes	R.P.M.
Min. 8	1500	Min. 5	1050
Max. 12	1500	Max. 18	1050

The generator brush tension should be 16-20 ounces each.



Mounting.—Generator is mounted at left of engine and is belt driven. To remove generator, remove hinge shaft clamp screw and cotterpin at forward end of shaft and slide shaft to rear. Disconnect throttle rod. Loosen belt adjustment nut on generator, remove two water pump attaching screws and loosen fan belt at adjustment on engine block. Then work generator forward and uncouple water pump. Remove belts from pulley and lift generator out.

RELAY.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch.

LIGHTING:—Ignition Switch No. 1299. Lighting Switch No. 1300. Lighting switch is mounted on the base of steering wheel. Head lamps are 6-8 volt, 21 cp. double filament, using second 21 cp. filament for dimming. Stop light is 6-8 volt, 15 cp. S.C. Dome light is 6-8 volt, 4 cp. S.C. Dash, side, tonneau and tail lights are 6-8 volt, 3 cp. S.C.

CIRCUIT BREAKER:—A vibrating circuit breaker mounted on the back of the switch protects the lighting circuits. A current of 25-30 amperes will cause this device to vibrate. While operating the current is 10-15 amperes.

NASH

ADVANCED SIX
MODELS 261-269 (1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type SJWR-4, 6 volt, 117 ampere hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model No. 2178. Distributor Model No. 5288. Breaker contacts separate .020 to .025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone. Manual advance is 35°. Automatic advance begins at 500 R.P.M. and reaches a maximum of 20-24° at 1400 R.P.M. The tension of the breaker arm spring should be 13-16 ounces.

Mounting.—Distributor is mounted on right of engine. To remove, disconnect manual advance rod and remove nut on hold-down screw at bottom of housing. Then lift distributor from position.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Place a small bit of medium heavy grease on the face of the breaker cam every 1000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control lever in the fully retarded position. To time engine, loosen distributor cup clamp screw and turn distributor cup counter-clockwise until breaker contacts begin to separate. Make certain that rotor is under contact connected to cylinder which is ready to fire. Tighten the clamp screw after making the adjustment.

Valve Timing:—INLET VALVES:—Head diameter, 1.787 inches; stem diameter, 3/8 inch; stem length, 5.530 inches; tappet clearance, .010 inch; valve lift, .348 inch; intake opens at 15° past top dead center and closes at 45° past lower dead center. EXHAUST VALVES:—Head diameter, 1.787 inches; stem diameter, 3/8 inch; stem length, 5.530 inches; tappet clearance, .010 inch; valve lift, .348 inch; exhaust opens at 45° before lower dead center and closes 10° after top dead center. Stem guides are removable. No oversize valve stems are made.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—The spark plug gaps are .025 to .030 inch.

STARTER:—Model No. 323. Starter is connected to the engine through a mechanical pinion shift combined with the starting switch. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 2¼-2½ pounds each.

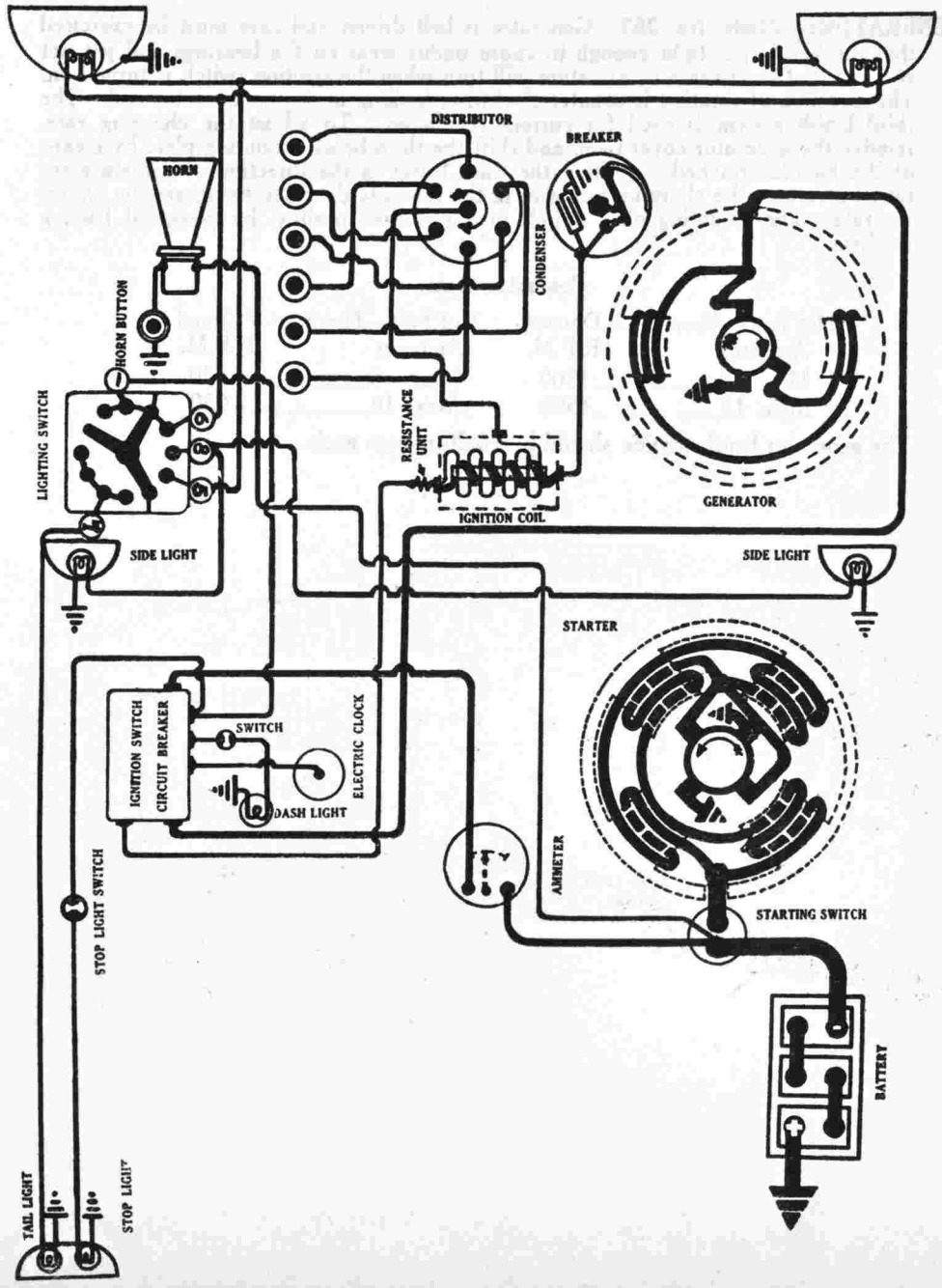
Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	4	60
11 lb. ft.	Lock	3	450

Mounting.—Starter is mounted at right of engine. To remove, disconnect pedal return spring and pedal connecting rod. Then remove large pilot mounting screw and pull starter forward from its place.

Oiling:—Oilless bearings are used. They require no attention.

GENERATOR.—Model No. 269. The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Generator is belt driven, and care must be taken that the belt is not tight enough to cause undue wear to the armature bearings and should be so loose that the generator armature



will rotate when the ignition switch is "On" with the engine stopped. To adjust the belt tension, loosen the clamp screws holding the generator to the engine and shift the position of the generator slightly.

Generator Data.

Amperes	R.P.M.
Neutral	650
4	800
8	1000
17-19	1500
8-12	2300

The charging rate is varied by loosening the generator cover band and shifting the third brush mounting plate by means of the handle attached. Shift the third brush in the direction of rotation (clockwise) to increase the charging rate and in the opposite direction to decrease the charging rate. The brush tension on each of the generator brushes should be from 1¼ to 1¾ pounds.

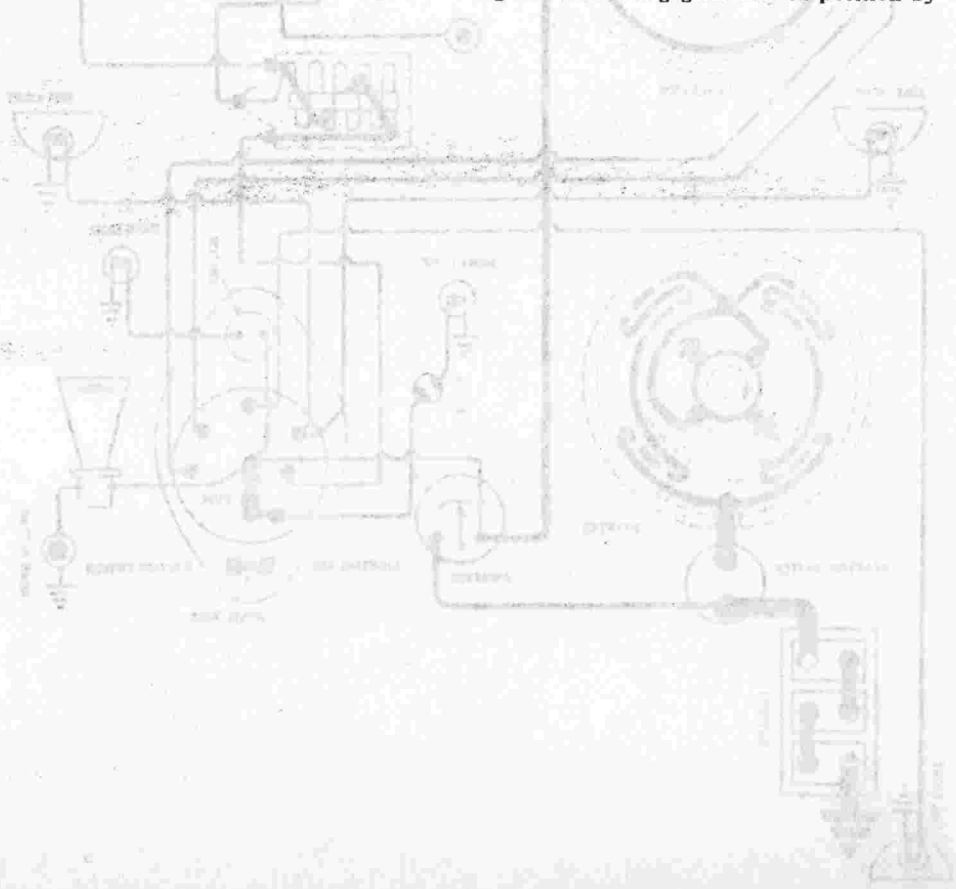
Mounting.—Generator is belt driven and is mounted at the forward end of the engine. To remove, remove the two flange mounting screws holding generator in position by the fan blade. Then lower generator fitting fan blade into space between car frame and engine just back of the hose connection. This will permit removal of the belt. Then lift generator from position.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearings oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch.

LIGHTING:—Ignition Switch No. 1299. Lighting Switch No. 1300. Lighting switch is mounted on the base of the steering wheel. Head lamps are 6-8 volt, 21 cp. double filament, using second 21 cp. filament for dimming. Stop light is 6-8 volt, 15 cp. S.C. Dome light is 6-8 volt, 4 cp. S.C. Dash, side, tonneau and tail lights are 6-8 volt, 3 cp. S.C.

CIRCUIT BREAKER:—A vibrating circuit breaker mounted on the back of the switch protects the lighting circuits. A current of 25-30 amperes will cause this device to vibrate. While operating the current is 10-15 amperes.



NASH

LIGHT SIX (1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L. Type 3-HVX-5X6. 6 volt. The negative (—) terminal is grounded. The starting capacity is 105 amperes for 20 minutes. Lighting capacity is 5 amperes for 18.4 hours. The battery is 7 7/16 by 9¾ by 9⅛ inches.

IGNITION:—Coil Model IG-4065. Distributor Model IG-4110. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affect the ignition, remove and resurface with a fine flat jeweler's file. The surface of the contacts should be flat and parallel. The distributor is of the full automatic type. Automatic advance begins at 200 R.P.M. of the distributor and reaches a maximum of 15° (distributor) at 1200 R.P.M. This is equivalent to a flywheel advance of 30° at 2400 R.P.M. of the engine.

Oiling:—Refill the grease cup under the distributor head with medium cup grease and turn down one turn every two weeks. Put one drop of light engine oil on the breaker arm hinge and place a small amount of vaseline on the face of the breaker cam every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing:—Breaker contacts begin to separate when piston entering power stroke reaches top dead center with the breaker assembly in the fully retarded position.

Valve Timing:—INLET VALVES:—Head diameter, 1 13/32 inches; stem diameter, 5/16 inch; stem length, 4 13/16 inches; tappet clearance, .005 inch (hot); spring pressure, 45 pounds; valve lift, ¼ inch; intake opens at 5° past top dead center and closes at 45° past lower dead center.

EXHAUST VALVES:—Head diameter, 1 13/32 inches; stem diameter, 5/16 inch; stem length, 4 13/16 inches; tappet clearance, .005 inch (hot); spring pressure, 45 pounds; valve lift, ¼ inch; exhaust opens at 45° before lower dead center and closes at 10° after top dead center. The stem guides are removable. Oversize valve stems are not made.

Firing Order:—The firing order is 1-5-3-6-2-4.

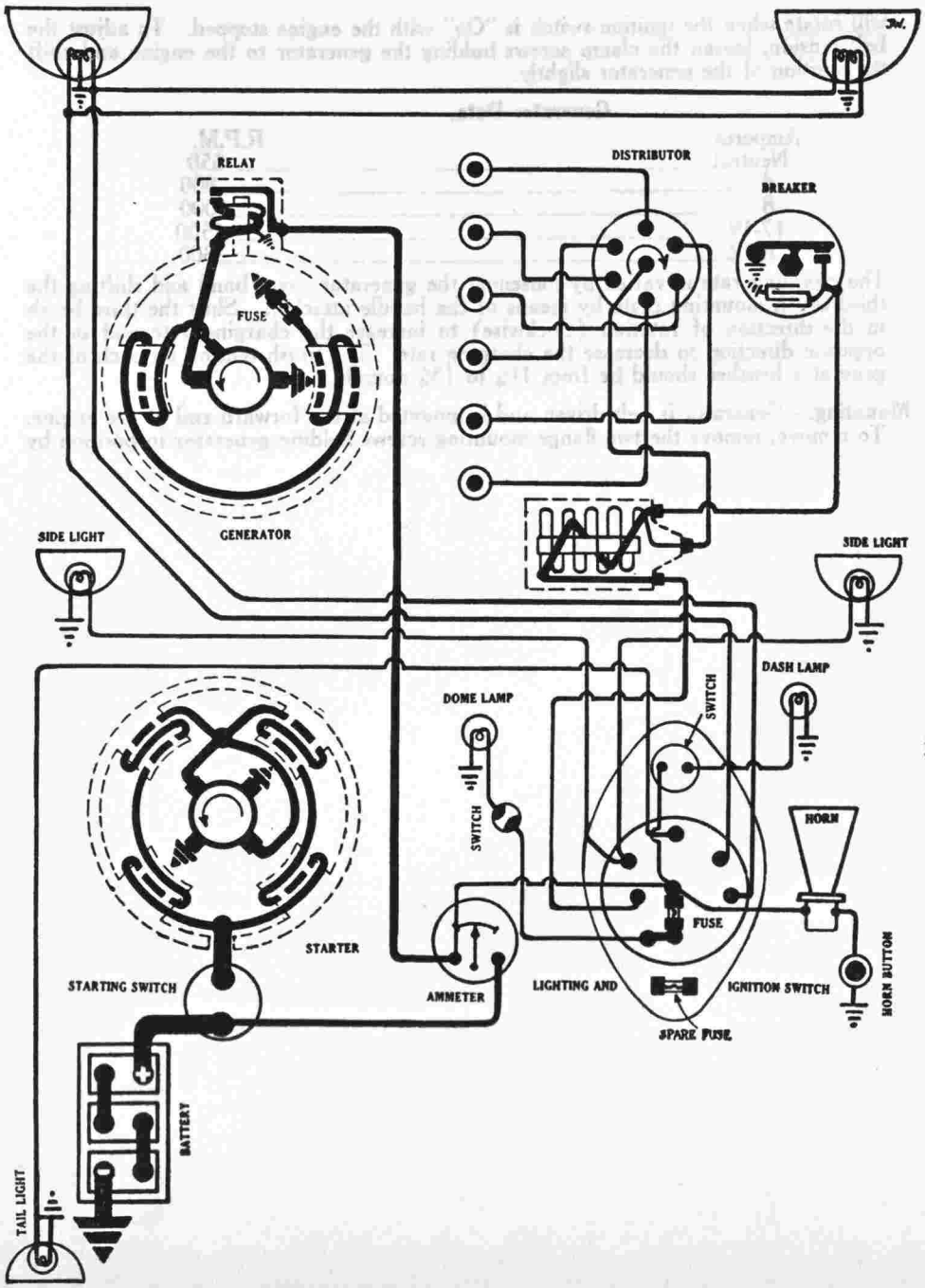
Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

STARTER:—Model MN-4108. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 184 R.P.M. taking 160 amperes at 4.7 volts. Starter brush tension should be 1¼-1½ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	5.5	45
	(Without Bendix)		
0 "	Free	5.5	50
	(With Bendix)		
.6 "	2700	5.5	100
2.5 "	1500	5	200
5 "	850	4.5	300
7.5 "	650	4	400
11.5 "	Lock	3	540

Oiling:—Put 4 or 5 drops of light engine oil in oiler on the drive end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month. The commutator end bearing is of the self-lubricating type and requires no attention.



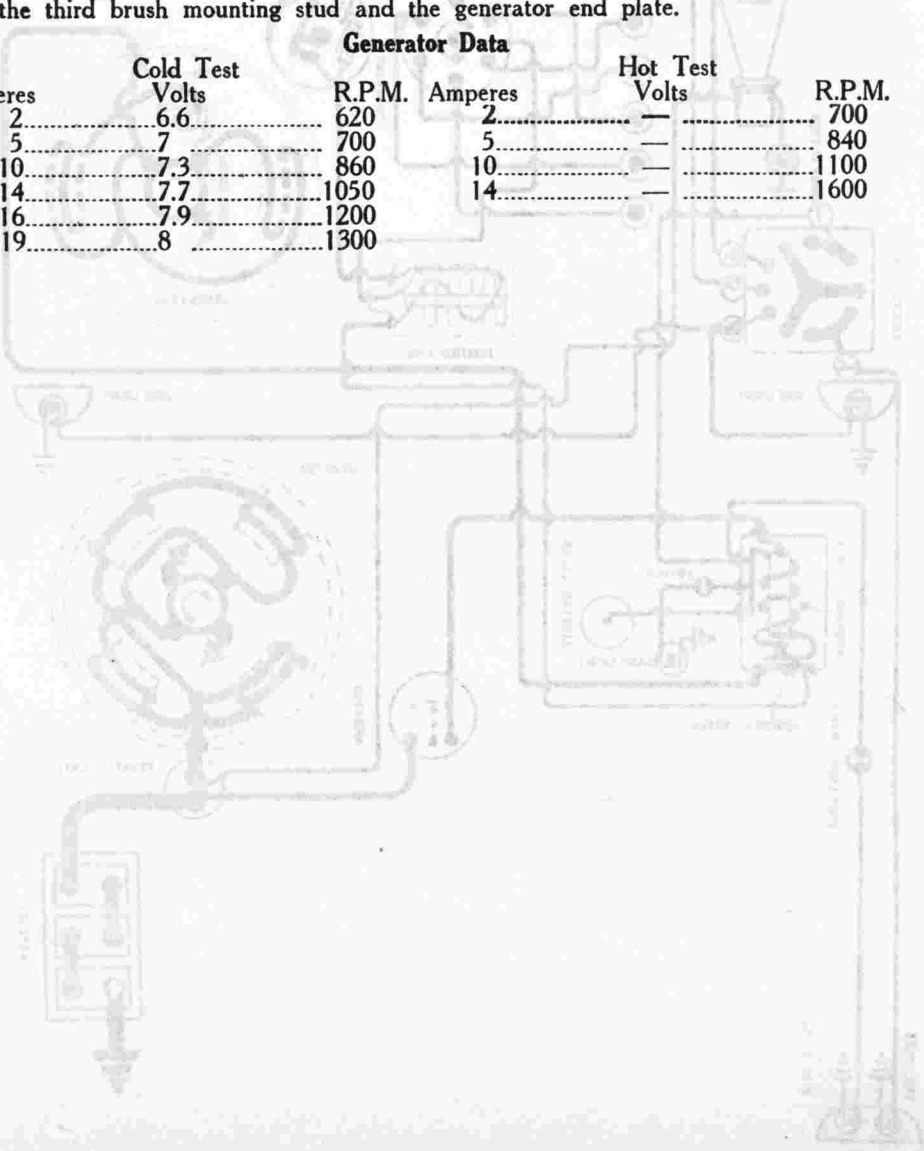
NASH

LIGHT SIX (1927)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

GENERATOR:—Model GYA-4201. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator ouput, remove the commutator cover band and shift the third brush mounting bracket by tapping the third brush mounting stud with a screwdriver. Shifting the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. The mounting bracket is held in any desired position by friction between the third brush mounting stud and the generator end plate.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
2	6.6	620	2	—	700
5	7	700	5	—	840
10	7.3	860	10	—	1100
14	7.7	1050	14	—	1600
16	7.9	1200			
19	8	1300			



Motoring freely, generator draws 5 amperes at 6 volts. Shunt field current is 3.8 amperes at 6.2 volts. Generator brush spring tension is 1¼-1½ pounds each.

Oiling:—Put 3 or 4 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Model CB-4007. Relay is mounted on top of the generator. Relay contacts close when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of .5-2.5 amperes. Contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING:—Switch B. & S. Type 39890. Head lamps are each 6-8 volt, 21 cp. Double filament using second 21 cp. filament for dimming. Dash lamp is 6-8 volt, 2 cp. S.C. Dome lamp is 6-8 volt, 4 cp. S.C. Side and tail lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Generator field fuse is 5 amperes.

NASH

ADVANCED SIX SERIES 360 (1927-28)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard Type SJWR-4, 6 volt. Starting capacity is 125 amperes for 20 minutes. Lighting capacity is 5 amperes for 22.5 hours. The positive (+) terminal is grounded. Battery is mounted on right frame member under the front floor boards.

IGNITION:—Coil Model 525-C. Distributor Model 636-M. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Manual advance is 33° (flywheel). Automatic advance begins at 500 R.P.M. and reaches a maximum of 22° (flywheel) at 1600 R.P.M. of the engine. Breaker arm spring tension is 17-21 ounces.

Mounting:—Distributor is mounted at left of engine. To remove distributor, disconnect manual advance rod and primary lead and remove head with cables attached. Then remove set screw on distributor shaft housing and lift distributor from place.

Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down two turns every month or each 1000 miles. Put a small bit of grease on the breaker cam under the fiber bumper of the contact arm.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control lever in the fully retarded position. With No. 1 piston in firing position the 'V' notch in the flywheel will be opposite the indicator in the flywheel case. To set timing, crank engine until piston No. 1 reaches this position. Make certain that the spark lever is fully retarded. Then loosen the advance arm clamp screw and rotate distributor housing until contacts begin to separate. Tighten the clamp screw.

Valve Timing:—INLET VALVES:—Head diameter, 1 19/32 inches; stem diameter, .3725 inch; stem length, 4⅜ inches; valve lift, .348 inch; tappet clearance, .010 inch (hot); spring pressure, 55 pounds main spring, 15 pounds auxiliary spring—total 70 pounds (valve open). Inlet valves open 15° after top dead center and close 38° after lower dead center.

EXHAUST VALVES:—Head diameter, 1 19/32 inches; stem diameter, .3725 inch; stem length, 4⅜ inches; valve lift, .348 inch; tappet clearance, .010 inch; spring pressure, 55 pounds main spring, 15 pounds auxiliary spring—total 70 pounds (valve open). Exhaust valves open 45° before lower dead center and close 10° after top dead center. Valve stem guides are removable. Oversize valve stems are not made. Top dead center for pistons Nos. 1 and 6 is marked on the flywheel by 'V' notch.

Firing Order:—The firing order is 1-5-3-6-2-4.

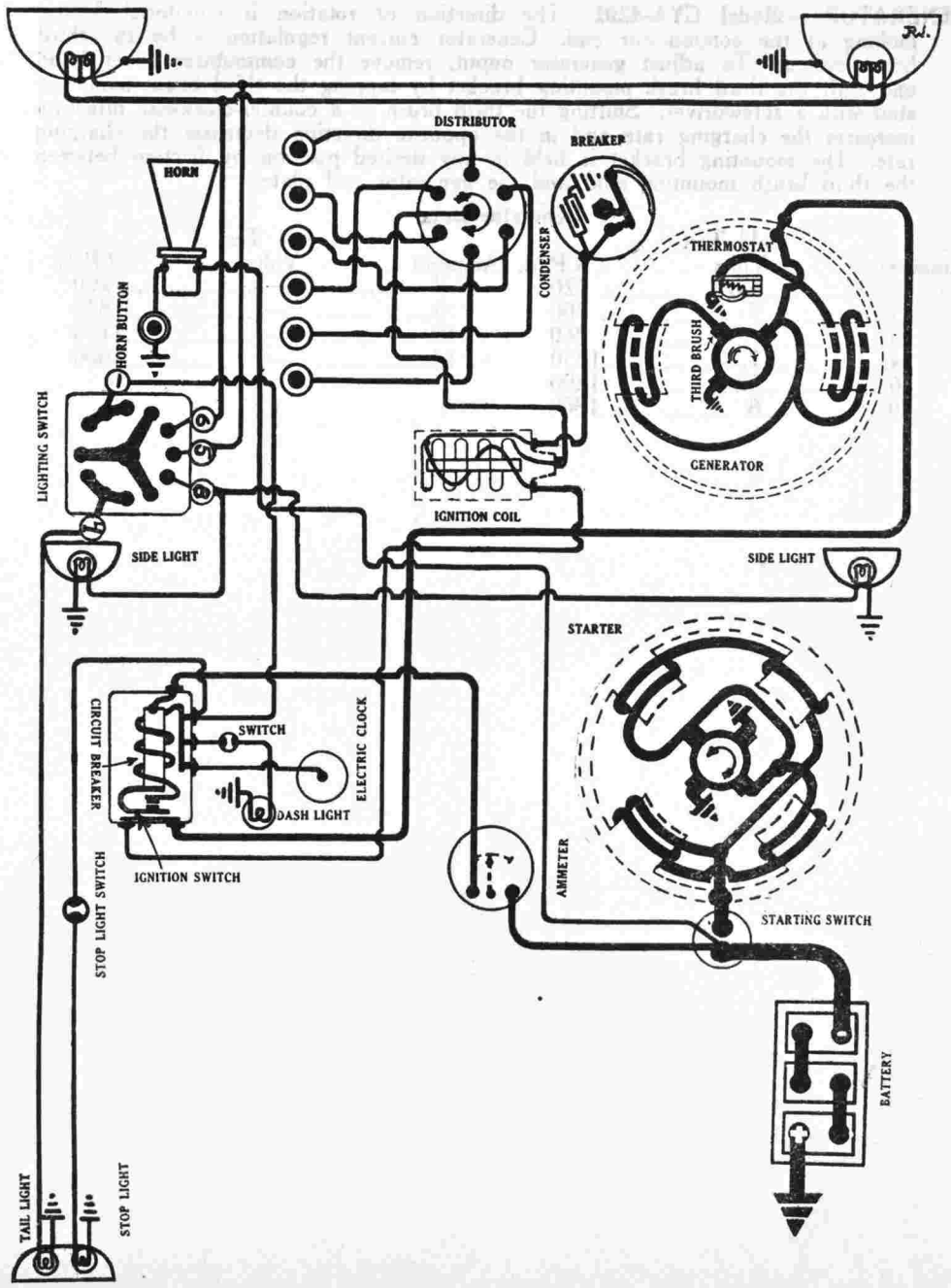
Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are .025-.030 inch.

STARTER:—Model 726-B. Starter is connected to the engine through a mechanical pinion shift connected to the starting switch. A disc clutch is provided to prevent the engine driving the starter. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 24-28 ounces. Starter cranks the engine at 160 R.P.M. drawing 215 amperes at 5 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Mounting:—Starter is mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect pedal rod and pedal return spring and remove pilot mounting screw directly above starter sleeve. Then pull starter forward and lift from place.



NASH

ADVANCED SIX SERIES 360 (1927-28)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model 373. The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by special straight shunt field and thermostat combined with third brush shunt field. The thermostat contacts open at 180-190°F. opening the straight shunt field circuit and allowing the generator to operate with the third brush shunt field only. Each field is wound on one field pole. To adjust generator output, remove commutator cover band and shift third brush. Shift the third brush in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush is held in any position by friction washers. The maximum charging rate is 22 amperes (cold) at 8.5 volts reached at 1500 R.P.M. or approximately 25 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
22	8.5	1500	17-19	7.6	2100

Generator motoring draws 8 amperes at 6 volts. Third brush shunt field current is 2.75-3 amperes at 6 volts. Straight shunt field current is .5 amperes at 6 volts. Brush spring tension is 20-28 ounces.

Mounting:—Generator is mounted at front of engine. To remove generator, remove two flange mounting screws and lower generator until belt can be removed.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—No relay is used. The generator is connected to the battery through the ignition switch. When the ignition is cut off, the generator is disconnected, preventing the battery discharging through the generator windings.

LIGHTING:—Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Stop lamp is 6-8 volt, 15 cp. S.C. Side lamps are 6-8 volt, 3 cp. S.C. Dash, dome, tonneau and tail lamps are each 6-8 volt, 3 cp. S.C.

Switches:—Delco-Remy Lighting Switch Model 1300 is mounted at the base of the steering column. Ignition Switch Model 1299 is mounted on the dash.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the back of the ignition switch. Circuit breaker cuts in at 25-30 amperes limiting the current flow to 10-15 amperes. The generator current and ignition current do not go through the circuit breaker.

NASH

SPECIAL SIX SERIES 330 (1927-28)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—U.S.L. Type 3-HVX-5X6, 6 volt. Starting capacity is 106 amperes for 20 minutes. Lighting capacity is 5 amperes for 18.4 hours. The positive (+) terminal is grounded. Battery is mounted on right frame member under the floor boards of the front compartment.

IGNITION:—Coil Model 525-C. Distributor Model 636-L. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 33° (flywheel). Automatic advance begins at 500 R.P.M. and reaches a maximum of 22° (flywheel) at 2200 R.P.M. of the crankshaft. Breaker arm spring tension is 17-21 ounces.

Mounting:—Distributor is mounted on left of engine. To remove distributor, disconnect manual advance rod and primary lead and remove head with cables attached. Then remove two mounting bolts and lift distributor from place.

Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down two turns every month or each 1000 miles. Put a small amount of heavy grease on the face of the breaker cam under the fiber bumper of the contact arm every month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control lever in the fully retarded position. With piston No. 1 in this position the 'V' notch on the flywheel will be opposite the indicator on the flywheel case. To set timing, crank engine until piston No. 1 reaches firing position. Make certain that the manual spark lever is fully retarded. Then loosen advance arm clamp screw and rotate distributor housing until contacts begin to separate. Tighten the clamp screw.

Valve Timing:—INLET VALVES:—Head diameter, 1 5/16 inches; stem diameter, .3725 inch; stem length, 4¼ inches straight; valve lift, .348 inch; tappet clearance, .010 inch; spring pressure, 55 pounds main spring, 15 pounds auxiliary spring—total 70 pounds. Inlet valves open 15° after top dead center and close 38° after lower dead center.

EXHAUST VALVES:—Head diameter, 1 5/16 inches; stem diameter, .3725 inch; stem length, 4¼ inches straight; valve lift, .348 inch; tappet clearance, .010 inch; spring pressure, 55 pounds main spring, 15 pounds auxiliary spring—total 70 pounds. Exhaust valves open 45° before lower dead center and close 10° after top dead center. Valve stem guides are removable. Oversize valve stems are not made. The top dead center position for pistons Nos. 1 and 6 is marked by 'V' notch on flywheel.

Firing Order:—The firing order is 1-5-3-6-2-4.

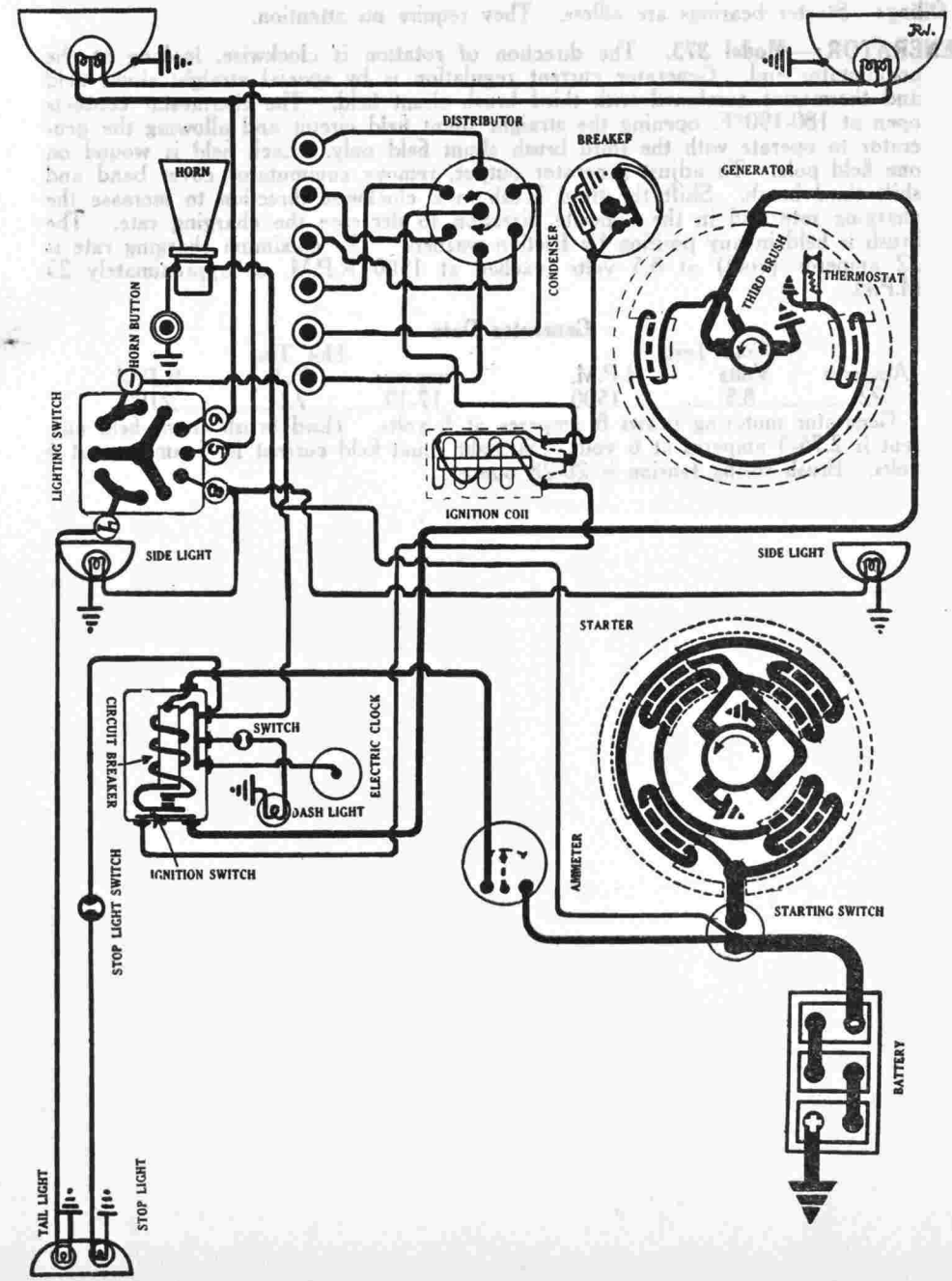
Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are .025-.030 inch.

STARTER:—Model 726-B. Starter is connected to the engine through a mechanical pinion shift connected to the starting switch. A disc clutch is provided to prevent the engine driving the starter. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 24-28 ounces. Starter cranks the engine at 160 R.P.M. drawing 215 amperes at 5 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Mounting:—Starter is mounted at left of engine on forward side of flywheel case. To remove starter, disconnect starting pedal rod and pedal return spring and re-



move pilot mounting screw directly above starter sleeve. Then pull starter forward and lift from place.

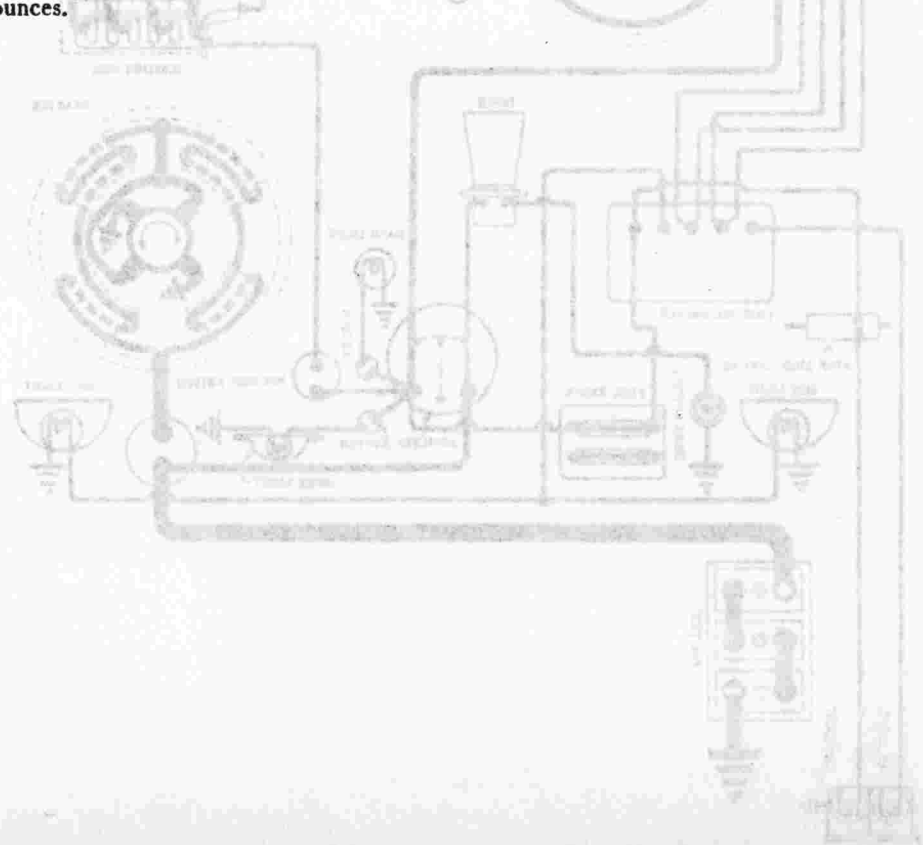
Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model 949-G. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field combined with a thermostat. Thermostat contacts open at 165°F. cutting a resistance in the shunt field circuit and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the commutator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Maximum charging rate is 21 amperes (cold) at 8.5 volts reached at 1450 R.P.M. or approximately 25 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
21	8.5	1450	9-12	7.6	2000

Generator motoring draws 5-6 amperes at 6 volts. Shunt field current is 5 amperes with 6 volts directly across field terminals. Brush spring tension is 14-18 ounces.



Mounting:—Generator is mounted at left of engine. To remove generator, remove two mounting bolts and disconnect drive coupling. Then lift generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—No relay is used. Generator is connected to battery through the ignition switch. When the ignition is cut off the generator is disconnected, preventing the battery discharging through the generator windings.

LIGHTING:—Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Side lamps are 6-8 volt, 3 cp. S.C. Stop lamp is 6-8 volt, 15 cp. S.C. Dash, dome, tonneau, corner and tail lamps are each 6-8 volt, 3 cp. S.C.

Switch:—Delco-Remy Lighting Switch Model 484-C is mounted at the base of the steering column. Ignition switch Model 1299 is mounted on the dash.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the back of the ignition switch. It cuts in at 25-30 amperes limiting the current to 10-15 amperes. The ignition current and generator charging current do not go through the circuit breaker.

NASH

STANDARD SIX (1927-28)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L., Type 3-HVX-5X6, 6 volt. Starting capacity (20 minute rate) is 105 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 18.4 hours. The negative (—) terminal is grounded. Battery is mounted under front floor board boards on left frame member.

IGNITION:—Coil Model IG-4065. Coil is mounted on the front of the dash. Ignition current is 1.2 amperes at 6.2 volts with engine running and 4.8 amperes (cold) or 4.4 amperes (hot) at 6.2 volts with engine stopped.

Distributor Model IGA-4016. Breaker contacts seprate .020-.024 inch. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is of full automatic type. Automatic advance begins at 400 R.P.M. (engine). Maximum automatic advance is 30° (engine) reached at 3380 R.P.M. Breaker arm spring tension is 18-20 ounces.

Mounting:—Distributor is mounted on top of the cylinder block. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Then remove set screw and lock nut on side of distributor shaft housing and lift distributor from place.

Oiling:—Fill the oiler on the side of the distributor housing with light engine oil every 500 miles. Put one drop of oil on the breaker arm pivot pin and put a small amount of vaseline on the face of the breaker cam every 1000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center. To set timing, crank engine until piston No. 1 reaches top dead center of compression stroke. This is the upstroke with both valves closed. At this point the notch in the front face of the flywheel will be in line with the point on the rear motor support. If breaker contacts are not separating, loosen clamp screw and rotate distributor until contacts begin to separate. Tighten the clamp screw.

VALVE TIMING:—INLET VALVES:—Head diameter, 1 13/32 inches; stem diameter, 5/16 inch; stem length, 4 23/32 inches. Valve lift, ¼ inch. Spring pressure, 45 pounds. Tappet clearance, .005 inch (hot). Inlet valves open 5° after top dead center and close 45° after lower dead center.

EXHAUST VALVES:—Head diameter, 1 13/32 inches; stem diameter, 5/16 inch; stem length, 4 23/32 inches. Valve lift, ¼ inch. Spring pressure, 45 pounds. Tappet clearance, .005 inch (hot). Exhaust valves open 45° before lower dead center and close 5° after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

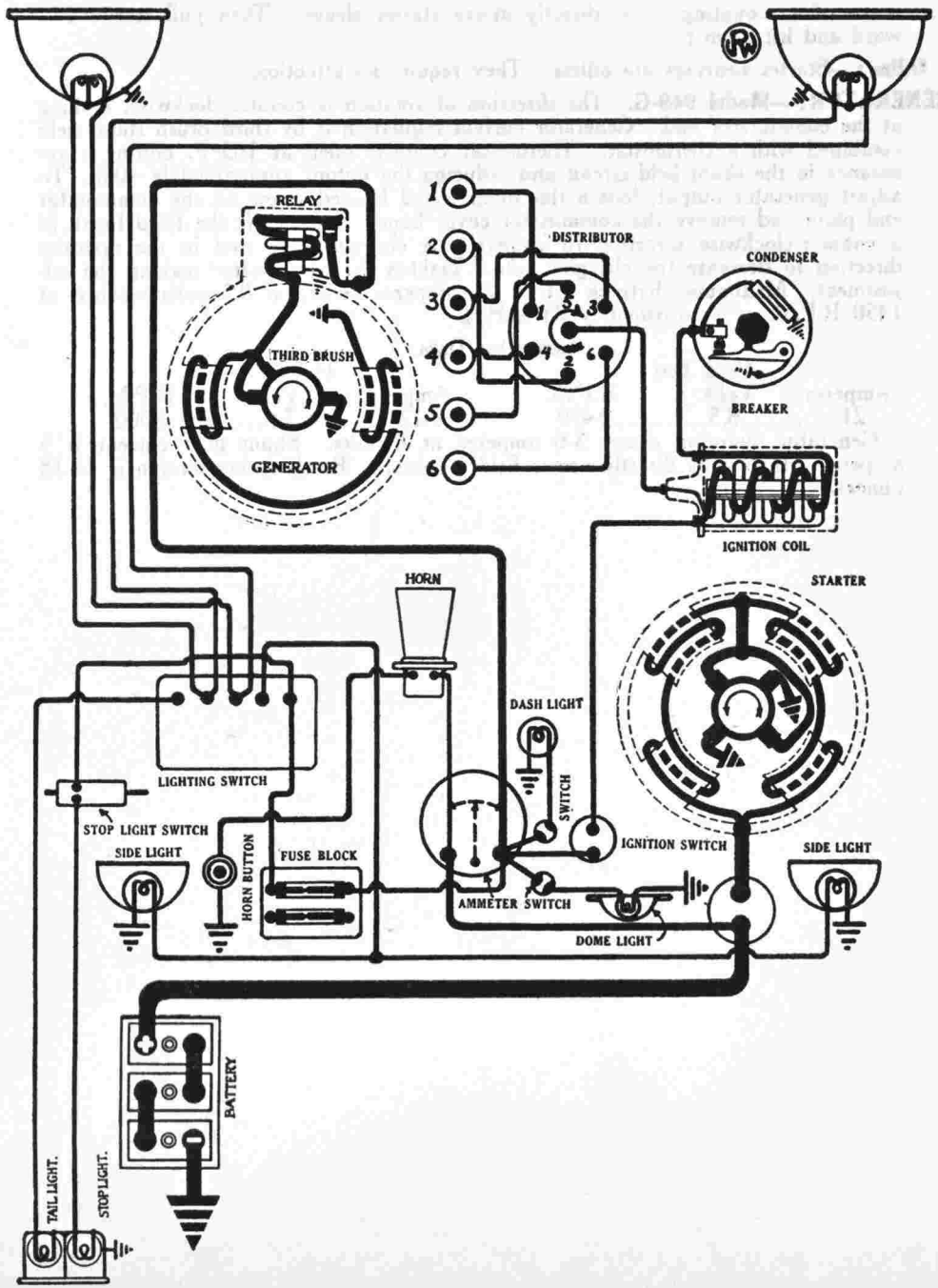
Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Gaps are .025-.030 inch.

STARTER:—Model MN-4108. Starter is connected to the engine throuhg a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 184 R.P.M. drawing 160 amperes at 4.7 volts. Starter brush spring tension is 1¼-1½ pounds.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	5.5	45 (No Bendix)
0 "	Free	5.5	50 (With Bendix)
.6 "	2700	5.5	100
2.5 "	1500	5.0	200
5 "	850	4.5	300
7.5 "	650	4.0	400
11.5 "	Lock	3.0	540



NASH

STANDARD SIX (1927-28)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

Mounting:—Starter is flange mounted on left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove 2 flange mounting bolts. Then pull starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light oil in the oiler on the drive end of the starter every 1000 miles. The commutator end bearing is oilless.

GENERATOR:—Model GYA-4205. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove cover band and shift third brush by applying pressure to third brush mounting bracket. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. With maximum setting the charging rate is 19 amperes at 8 volts. The third brush is held in position by friction between the mounting bracket and the end plate. With standard setting, charging rate is 16 amperes at 7.9 volts reached at 1200 R.P.M. or 30-35 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
2	6.6	620	2		700
5	7.0	700	5		840
10	7.3	860	10		1100
14	7.7	1050	14		1600
16	7.9	1200			

Running as a motor, generator draws 5 amperes at 6 volts. Shunt field current is 3.8 amperes at 6.2 volts. Brush spring tension is 1¼-1½ pounds each.

Mounting:—Generator is flange mounted at left of engine on rear of front engine cross member. Generator is belt drivn from crankshaft and fan is driven from generator pulley. To remove generator, remove 2 flange mounting bolts and slide generator toward engine block. Slip off belts and pull generator toward rear. Lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every 500 miles.

RELAY:—Model CB-4007. Relay is mounted on top of the generator. Contacts close at 620 R.P.M. when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of .5-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Soreng Manigold Switch, Model 17289A. Switch is mounted on steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact) Mazda No. 1110. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Side, dash, tail and dome lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Lighting fuse on switch is 20 amperes.

National

Series AB (1915)

Westinghouse Starting and Lighting System
Eisemann Magneto Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The two wire system is used.

Ignition.—Breaker contacts should separate about .020 inch. Clean them with gasoline frequently. If burned or pitted, resurface with a fine, flat jeweler's file, or a strip of worn No. 00 sand paper.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be .028 inch to .031 inch.

Oiling.—Put 5 or 6 drops of light engine oil in each of the magneto oilers every month. If car is driven more than 1000 miles in a month. the oiling must be done every 1000 miles.

Starter.—Starter is connected to engine through a Bendix drive.

STARTER DATA, MODEL No. 310

Torque	R. P. M.	Amperes
0 lb. ft		40-50
1 lb. ft	3200	120
2 lb. ft	2000	180
3 lb. ft	1500	220
4 lb. ft	900	250
5 lb. ft	600	290
6 lb. ft	400	310
7 lb. ft	250	350
10.5 lb. ft	Lock	425

Oiling.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

Generator.—Generator charging current regulation is by reverse series field.

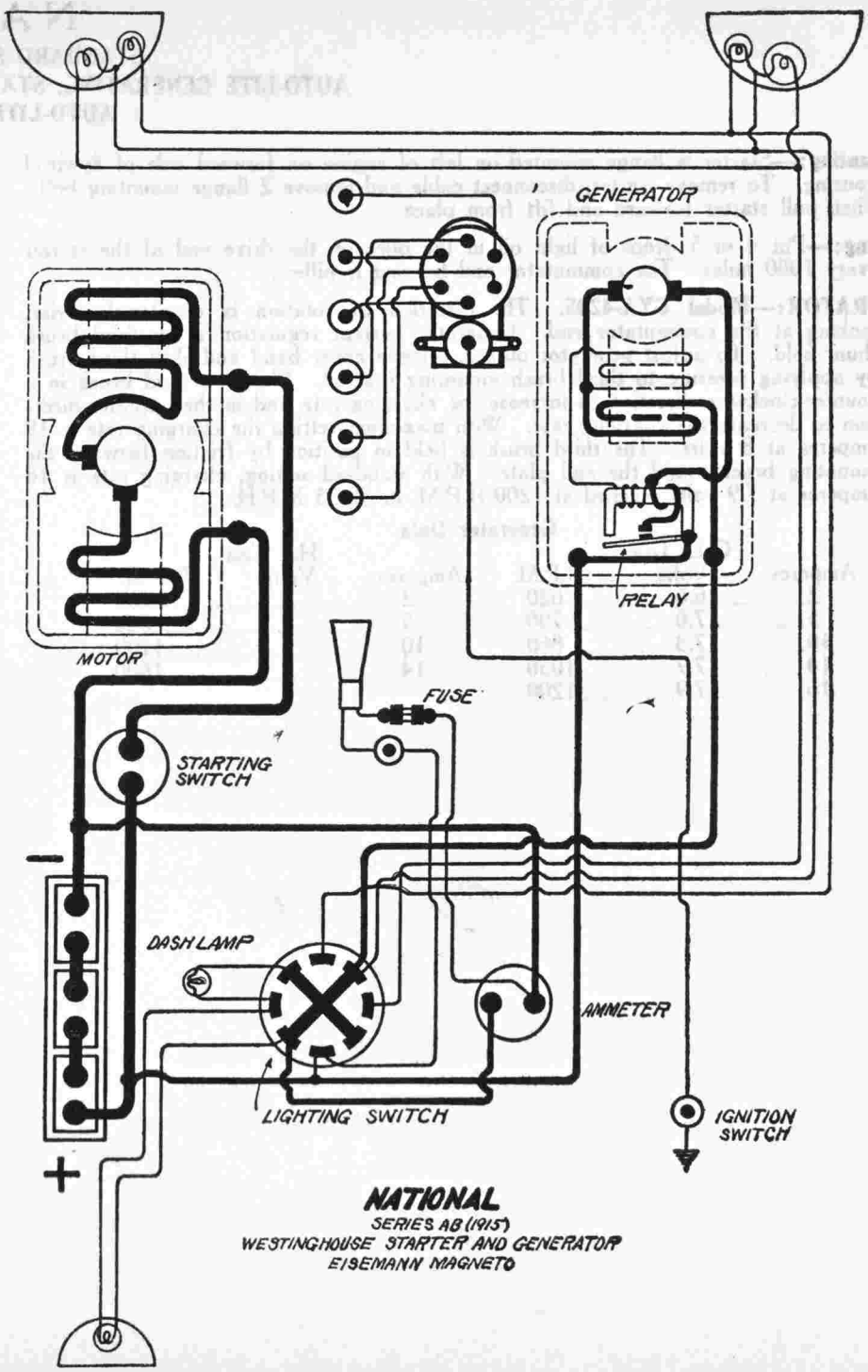
GENERATOR DATA, FRAME No. 202

Speed in R. P. M.	Total Output Lamps and Charging Current. Amperes.	Charging Current Lamps Out. Amperes.
400	3	1. - 1.5
500	5-6	2.5- 3
750	10	6. - 6.5
1000	13	8.5- 9
1250	15-16	9.5-10
1500	16-17	10.5-11
2000	18	11. -12
2500	18-19	12.
3000	19	12.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 15 cp. Dimmer lamps are 6-8 volts, 6 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 4 cp.

Fuses.—Fuses are 20 ampere.



National

Series AC (1916)

Westinghouse Starting and Lighting System
Eisemann Magneto Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The two wire system is used.

Ignition.—Magneto breaker contacts should open about .020 inch. Should they become badly burned or pitted, affecting the ignition, resurface them with a fine, flat jeweler's file or a strip of worn No. 00 sand paper.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be about .027 inch.

Oiling.—Put 3 or 4 drops of light machine oil in each of the magneto oilers every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

Starter.—Starter is connected to engine through a Bendix drive. When running free it should take 40-50 amperes. Excessive current indicates tight bearings, damp, grounded or short circuited armature windings or commutator bars.

STARTER DATA, FRAME NO. 310

Torque	R.P.M.	Amperes
1 lb. ft.	3200	120
2 lb. ft.	2000	180
3 lb. ft.	1500	220
4 lb. ft.	900	250
5 lb. ft.	600	290
6 lb. ft.	400	310
7 lb. ft.	250	350
10.5 lb. ft.	Lock	425

Oiling.—Put several drops of light engine oil in each of the starter oilers every month.

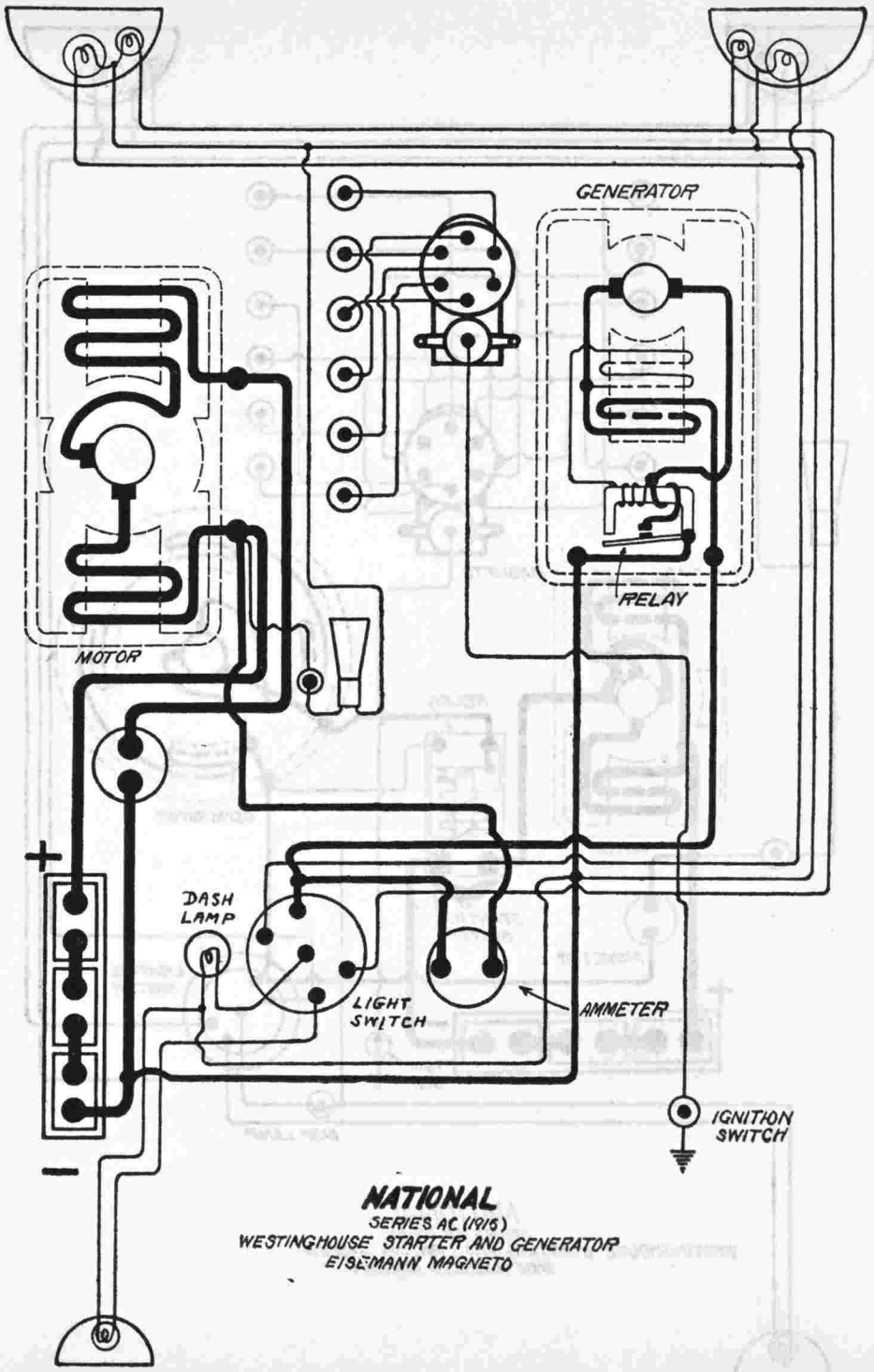
Generator.—Generator charging current regulation is by reverse series field. Current taken by the lamps does not flow through the series field, hence has but little effect on the charging rate.

GENERATOR DATA, FRAME NO. 202

Speed in R. P. M.	Total Output Charging and Lamp Current Amperes	Charging Current Lamps Out Amperes
400	2	1.0- 1.5
500	2-6	2.5- 3.0
750	10	6.0- 6.5
1000	13	8.5- 9.0
1250	15-16	9.5-10.0
1500	16-17	10.5-11.0
2000	18	11.0-12.0
2500	18-19	12.
3000	19	12.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 15 cp. Dimmer lamps are 6-8 volts, 6 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 4 cp.



NATIONAL
SERIES AC (1916)
WESTINGHOUSE STARTER AND GENERATOR
EISEMANN MAGNETO

NATIONAL

SERIES AD, 12 CYLINDER (1916)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM

SPLITDORF IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. The two-wire system is used.

IGNITION.—Magneto breaker contacts separate .020 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Fill the magneto oil cups every month. Apply one drop of oil to the breaker bar bearing. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark conrol lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1R, 6L, 5R, 2L, 3R, 4L, 6R, 1L, 2R, 5L, 4R, 3L.

SPARK PLUG GAPS.—Spark plug gaps are .020 to .025 inch.

STARTER.—Frame No. 310. Starter is connected to the engine through a Bendix drive. Lock torque is 6 pound-feet, current being 375 amperes. Torque at 2100-2425 R.P.M. is 2 pound-feet, current being 160 amperes at 5.25 volts. Running freely, starter takes 40 amperes at 5.25 volts, armature revolving at 8000 R.P.M. Pressure of brushes on the commutator is ¾ to 1¼ pounds.

OILING.—Put 4 or 5 drops of light engine oil in each of he starter oilers every month.

GENERATOR.—Frame No. 450. Generator current regulation is by the third brush method. Maximum charging rate is 14-15 amperes at 6.75 to 7 volts, reached at 1100-1300 R.P.M. of the armature or 20 miles per hour.

Amperes	Generator Data	R.P.M.
0		450
8		660
14-15		1100-1300
8		2000

Hot Test

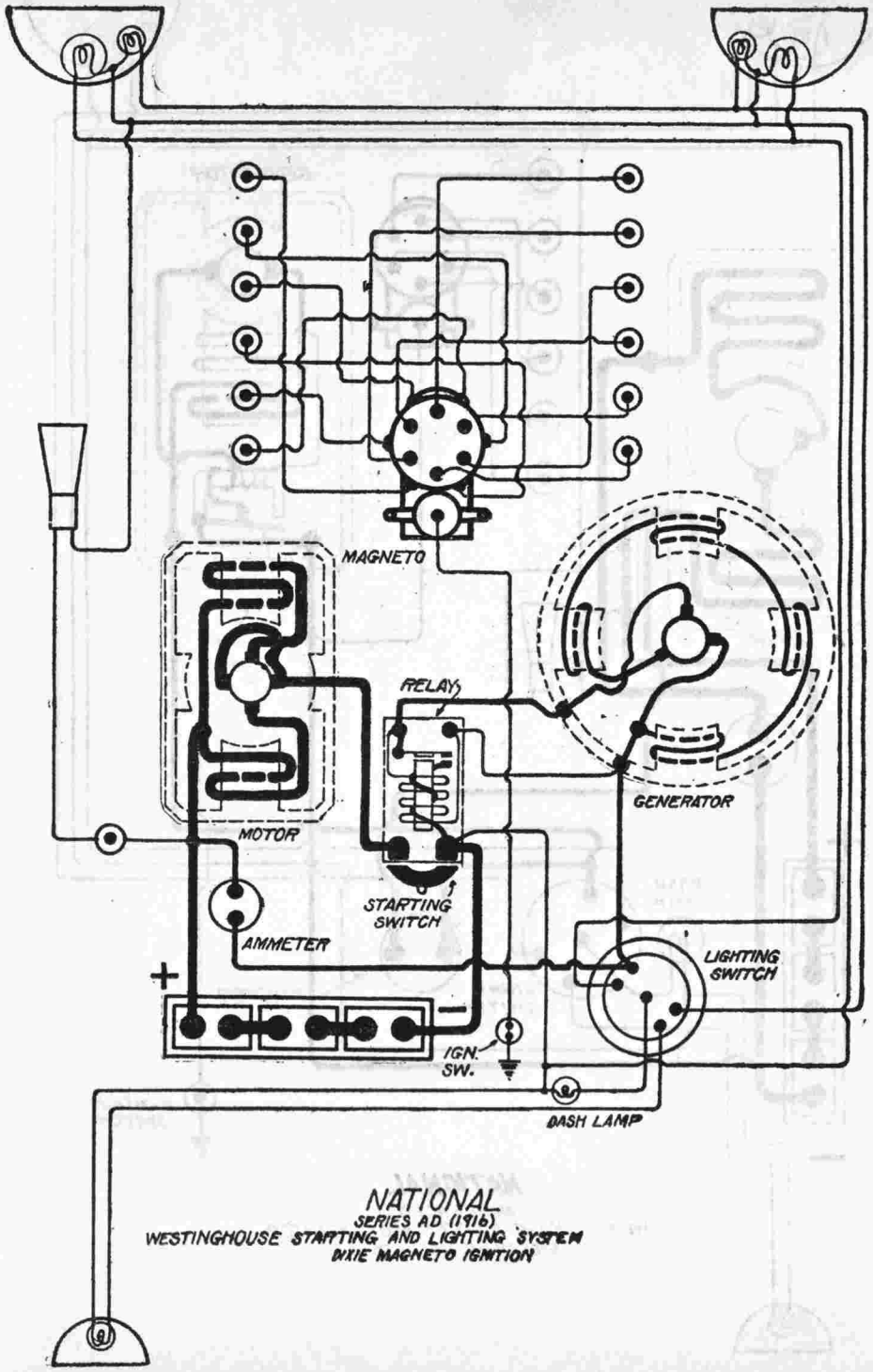
Amperes	R.P.M.	Volts
11-13.5	1100-1400	6.75-7.0

Charging rate is varied by adjustment of the third brush setting.

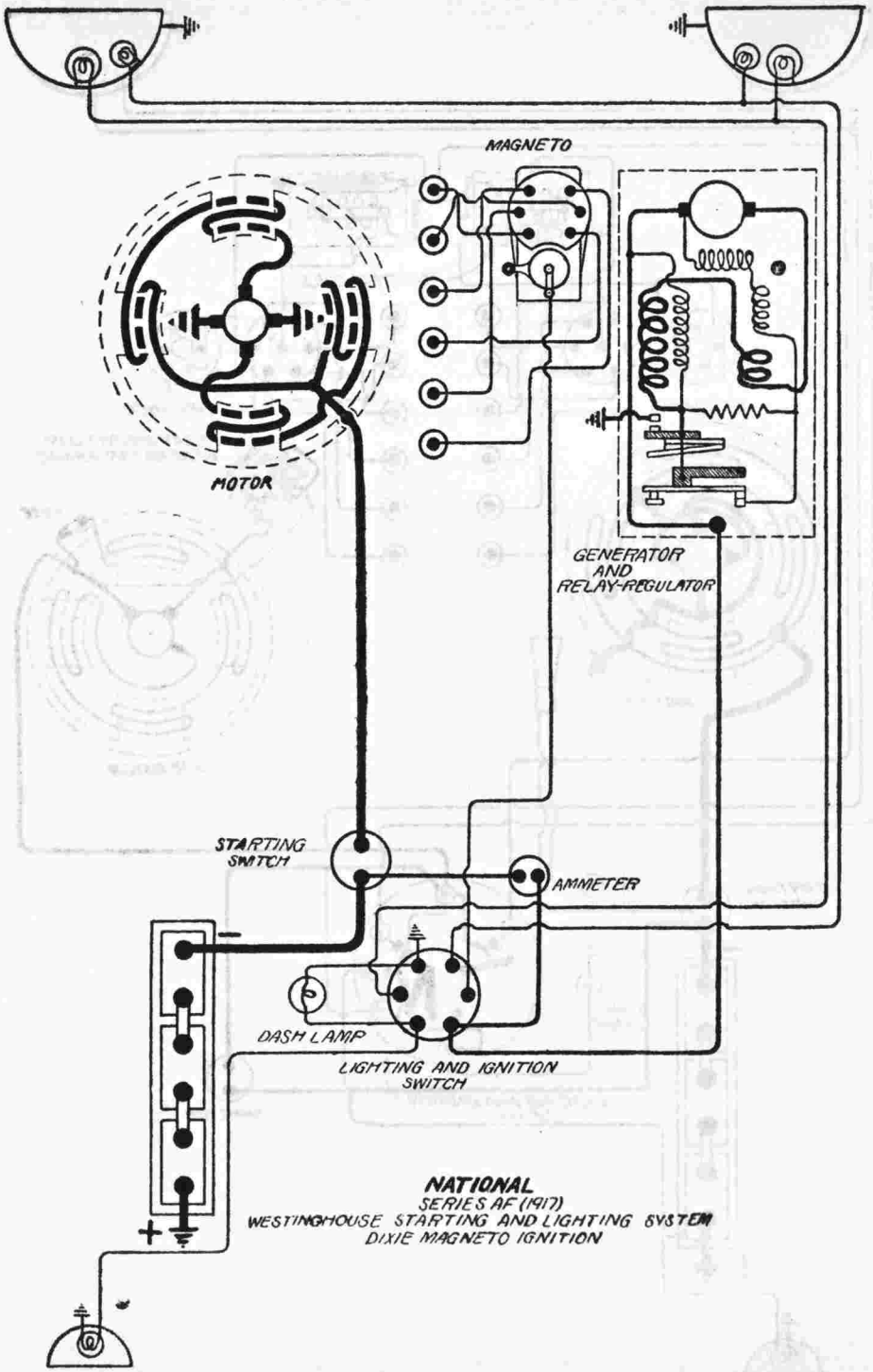
OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more thn 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is combined with the starting switch. Relay closes at 450-500 R.P.M. of armature or 8 miles per hour and opens at 400-450 R.P.M. of the armature or 6 miles per hour. To adjust relay regulate spring tension and air gap so that the contacts close when the voltage of the generaor reaches 7.8 to 8 volts, battery disconnected and opens with a discharge current of 0 to 1.75 amperes from the battery. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 6 cp. Dash and tail lamps are 6-8 volt, 4 c.p.



NATIONAL
SERIES AD (1916)
WESTINGHOUSE STARTING AND LIGHTING SYSTEM
DIXIE MAGNETO IGNITION



NATIONAL

SERIES AE (1916) AF-1, AF-2 (1917)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
DIXIE MAGNETO IGNITION

BATTERY.—Battery is 6 volt, 110 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .018 to .020 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn Nc. 00 sandpaper.

TIMING.—Breaker contacts begin to separate when the top dead center mark on flywheel is 1¼ inches before the indicator, spark control lever and breaker assembly in the fully advanced position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

OILING.—Refill magneto oil wells with light engine oil every month. If car is driven more than 1000 miles in a month, oiling must be done every 1000 miles.

STARTER.—Frame No. 700. Starter is connected to engine through a Bendix drive. Torque is 2.5 lb. ft. at 1200 R.P.M. Lock torque is 12.5 lb. ft., current being 400 amperes.

OILING.—Refill starter oil wells with light engine oil every three months.

GENERATING.—Frame 208-R. Generator voltage regulation is by vibrating regulator. Maximum current output is 14-16 amperes, decreasing to 4-6 amperes as battery becomes fully charged.

OILING.—Put 4 or 5 drops of light engine oil in each of generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY-REGULATOR.—Relay and regulator are mounted in generator frame. Relay closes at 8-10, and opens at 6-8 miles per hour. Relay contacts separate .005 to .010 inch. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 4 cp.

NATIONAL

SERIES AH (1917) AK (1918) AM (1919)

BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard stone.

OILING.—Remove top cover and put 5 or 6 drops of light engine oil in each of the two oil holes exposed, and 5 or 6 drops in the top vertical bearing every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles. Spiral gears and lower bearings are packed with soft cup or ball bearing grease. Repack every six months.

TIMING.—Contacts begin to separate when the piston entering power stroke is on top dead center, spark control one-third advanced.

FIRING ORDER.—The firing order is 1R, 6L, 5R, 2L, 3R, 4L, 6R, 1L, 2R, 5L, 4R, 3L.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Type E-68, M-727, or M-510. Clockwise rotation, commutator end. Starter is connected to the engine by a Bendix drive. When operating freely, starter takes 50 amperes, armature revolving at 2300 R.P.M. Lock torque is 36 pound-feet, current being 680 amperes at 3 volts. Pressure of motor brushes on commutator is 30 ounces.

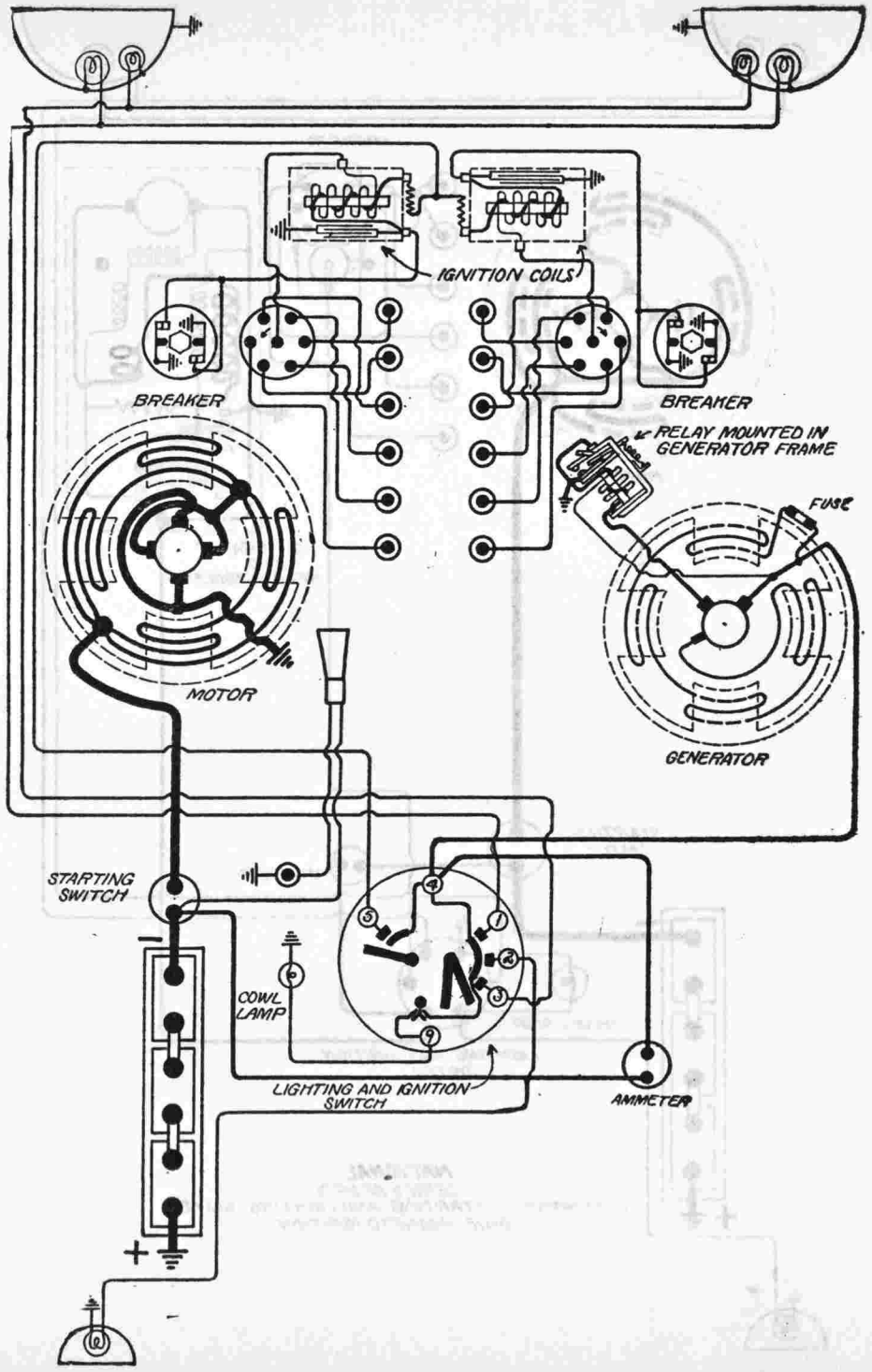
OILING.—Put several drops of light engine oil in each of starter bearings every month.

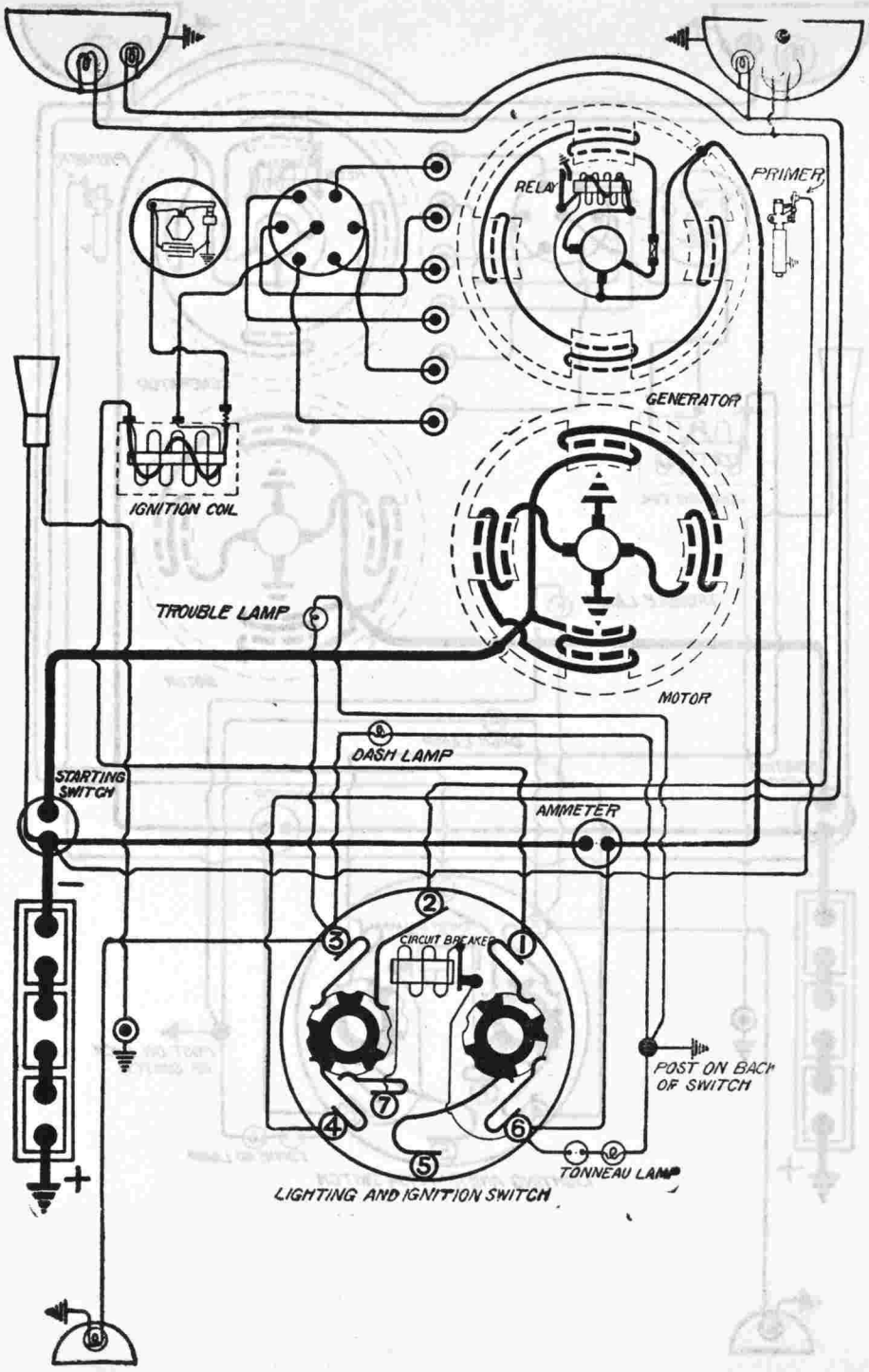
GENERATOR.—Type L-61, M-768. Rotation is counter-clockwise, looking at commutator end. Generator current regulation is by third brush system. Maximum charging rate is 15 amperes, reached at 15 to 20 miles per hour. Charging rate reduces to 12 amperes at 30-40 miles per hour. Shunt field current is 6-8 amperes at 7.8 volts. Pressure of brushes on commutator is 14 ounces. Charging rate is varied by inserting a special toothed wrench in the adjusting hole in the commutator end plate and moving the third brush assembly. Turn the wrench in a clockwise direction to increase the charging rate, and in a counter-clockwise direction to decrease the charging rate. The 1917-18 cars used an M-768 generator in which the maximum charging rate of 12-16 amperes was reached at 1200-1600 R.P.M. of armature or 20-25 miles per hour. Third brush was adjusted by loosening two studs holding the third brush arm and tapping the arm.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in generator frame. Relay closes at 8-9 miles per hour or 550-600 R.P.M. of the armature, and opens at 6-7 miles per hour or 500-550 R.P.M. of the armature. Relay contacts separate .045 inch. Air gap between the relay armature and coil core is .035 inch, contacts closed. To adjust relay, connect a voltmeter across the main brushes of the generator, and slowly speed up the engine. Insert the special socket wrench in the small adjusting hole in the commutator end plate and vary the spring tension on the relay armature until the contacts close when the voltmeter indicates 6.5 volts. Closing of relay will be indicated by the ammeter showing "Charge". Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.





NATIONAL

SERIES AF-3, AL, BB (1918-19-20)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

IGNITION.—Coil Model No. 2159. Distributor Model No. 5175 or 5211. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel.

OILING.—Put 4 or 5 drops of light engine oil in the distributor shaft bearings every two weeks. If the track of the rotor button is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is ¾ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER.—Frame 571. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes
2.5 lb. ft.	1450	140
7.5 lb. ft.	1150	200
12.5 lb. ft.	650	400
17.5 lb. ft.	500	530
21.0 lb. ft.	Lock	650

OILING.—Put 4 or 5 drops of light engine oil in each of starter oilers every month.

GENERATOR.—Frame 760. Generator current regulation is by third brush system. Maximum charging rate is 15-17 amperes, reached at 1250 R.P.M. of the armature or 16-20 miles per hour.

Generator Data

Cold Test Amperes	R.P.M.	Hot Test Amperes	R.P.M.
0	450	0	500
8	675	6	725
12	840	9	850
15-17	1250	11-13	1250
10	2000	7- 8	2000

The cold test readings are obtained with a generator temperature under 95°F. The hot test readings are obtained after the generator has been operated an hour at 1800 R.P.M., charging a half-charged battery. Shunt field current is 2.8 to 3.25 amperes, when 6 volts pressure is applied to its terminals. When generator is operating freely as a motor, current is 3.5 to 5 amperes at 6 to 6.6 volts.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in generator frame. Relay closes at 450-500 R.P.M. of the armature or 8 miles per hour, and opens at 400-450 R.P.M. of the armature or 6 miles per hour. Charging current is 1-2 amperes at closing, and the discharge current 0-2 amperes at opening of relay contacts. Contacts separate .013 to .018 inch. The air gap between the armature (moving member) and coil core is .031 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 20 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit-breaker takes the place of fuses. It requires a current of 25 amperes to start this device vibrating. While vibrating, the current is 3.5 amperes.

NATIONAL

SERIES BB (1921-22-23-24)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Prest-O-Lite, Type 615-RHN, 6 volt, 125 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model No. 2159. Distributor Model No. 5211. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone.

Oiling.—Put 4 or 5 drops of light engine oil in the distributor shaft bearings every two weeks. If the track of the rotor button is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when top dead center mark on the flywheel is ¾ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .025 to .030 inch.

STARTER.—Frame 751. The starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at commutator end. Motor running free at 4000 R.P.M., taking a current of 38-52 amperes at 5.5 volts. Cranking the engine at 100-150 R.P.M., taking a current of 175-275 amperes at 5-5.5 volts. Lock torque being 21 pound -feet, current being 650 amperes, at 4.8 volts.

Starter Test Data

Torque	R.P.M.	Amperes
2.5	1450	140
4.0	1150	200
8.5	650	310
10.0	500	350
21.0	Lock	650

Oiling.—Put 4 or 5 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Frame 760. Generator current regulation is by the third brush system. Maximum charging rate is 15-17 amperes, reached at 1250 R.P.M. of the armature or 16-20 miles per hour. The direction of rotation is counter-clockwise, looking at commutator end.

Generator Data

Amperes	Cold Test	R.P.M.	Amperes	Hot Test	R.P.M.
0		450	0		500
8		675	6		725
12		840	9		850
15-17		1250	11-13		1250
10		2000	7- 8		2000

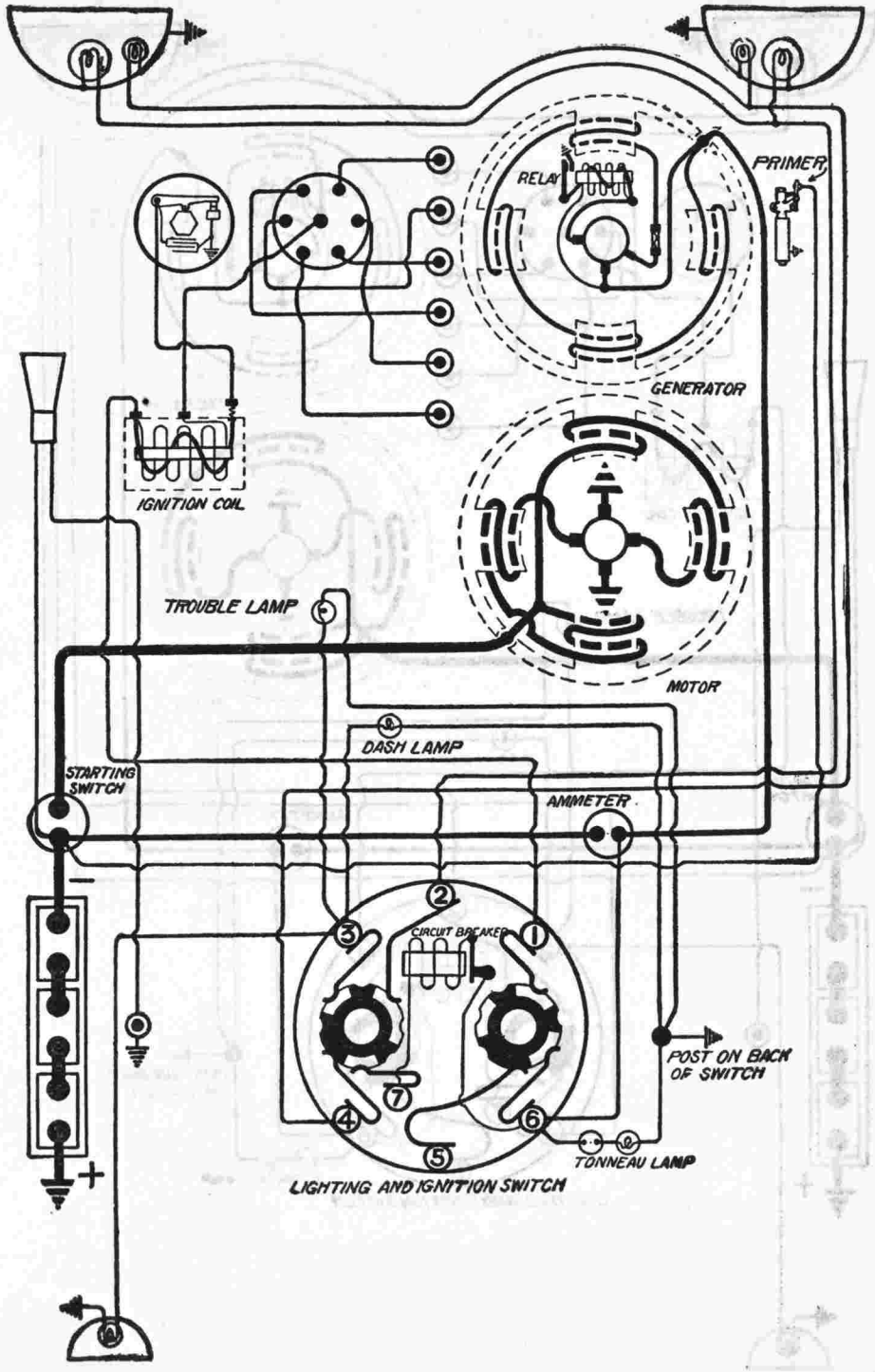
The cold test readings are obtained with a generator temperature under 95°F. The hot test readings are obtained after the generator has been operated an hour at 1800 R.P.M., charging a half-charged battery. Shunt field current is 2.8 to 3.25 amperes, when 6 volts pressure is applied to its terminal. When generator is operating freely as a motor, current is 3.5 to 5 amperes at 6 to 6.6 volts.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in generator frame. Relay closes at 450-500 R.P.M. of the armature or 8 miles per hour, and opens at 400-450 R.P.M. of the armature or 6 miles per hour. Charging current is 1-2 amperes at closing, and the discharge current 0-2 amperes at opening of relay contacts. Contacts separate .013 to .018 inch. The air gap between the armature (moving member) and coil core is .031 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volts, 21 cp. Dimmer lamps are 6-8 volts, 4 cp. Dash and tail lamps are 3-4 volts, 2 cp.

FUSES.—One fuse is used in the generator, and it is 5 amperes.



NATIONAL FOUR

MODEL H 1923-24-25) SERIAL NOS. 12001 UP
DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
EISEMANN MAGNETO IGNITION

BATTERY.—Willard, Type SJR-4, 6 volt, 80 ampere-hour. The two-wire system is used.

IGNITION.—Breaker contacts separate .015 inch. They are made of platinum. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or well worn No. 00 sandpaper.

Oiling.—Put 3 or 4 drops of light engine oil in each of the magneto oilers every month. Put a very small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

Timing.—Breaker contacts begin to separate when the piston entering the power stroke is on top dead center, spark control lever and magneto breaker assembly in a fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps are .030 inch.

STARTER.—Model No. D69-D284. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes	Volts
0.0 lb. ft.	5600	25	6.4
2.5 lb. ft.	1400	150	5.8
5.0 lb. ft.	850	250	5.3
10.0 lb. ft.	250	420	4.6
14.0 lb. ft.	Lock	530	4.0

Oiling.—Put several drops of light engine oil in starter oilers every month.

GENERATOR.—Model No. C69-C284. Generator current regulation is by the third brush system. Maximum current output of 14 amperes is reached at 16-18 miles per hour or 1500 R.P.M. of armature.

Generator Data

Amperes	M.P.H.	Volts
0	7- 9	6.4
5	9-10	6.6
10	12-14	6.8
12-14	16-18	7.8
8	40-45	6.7

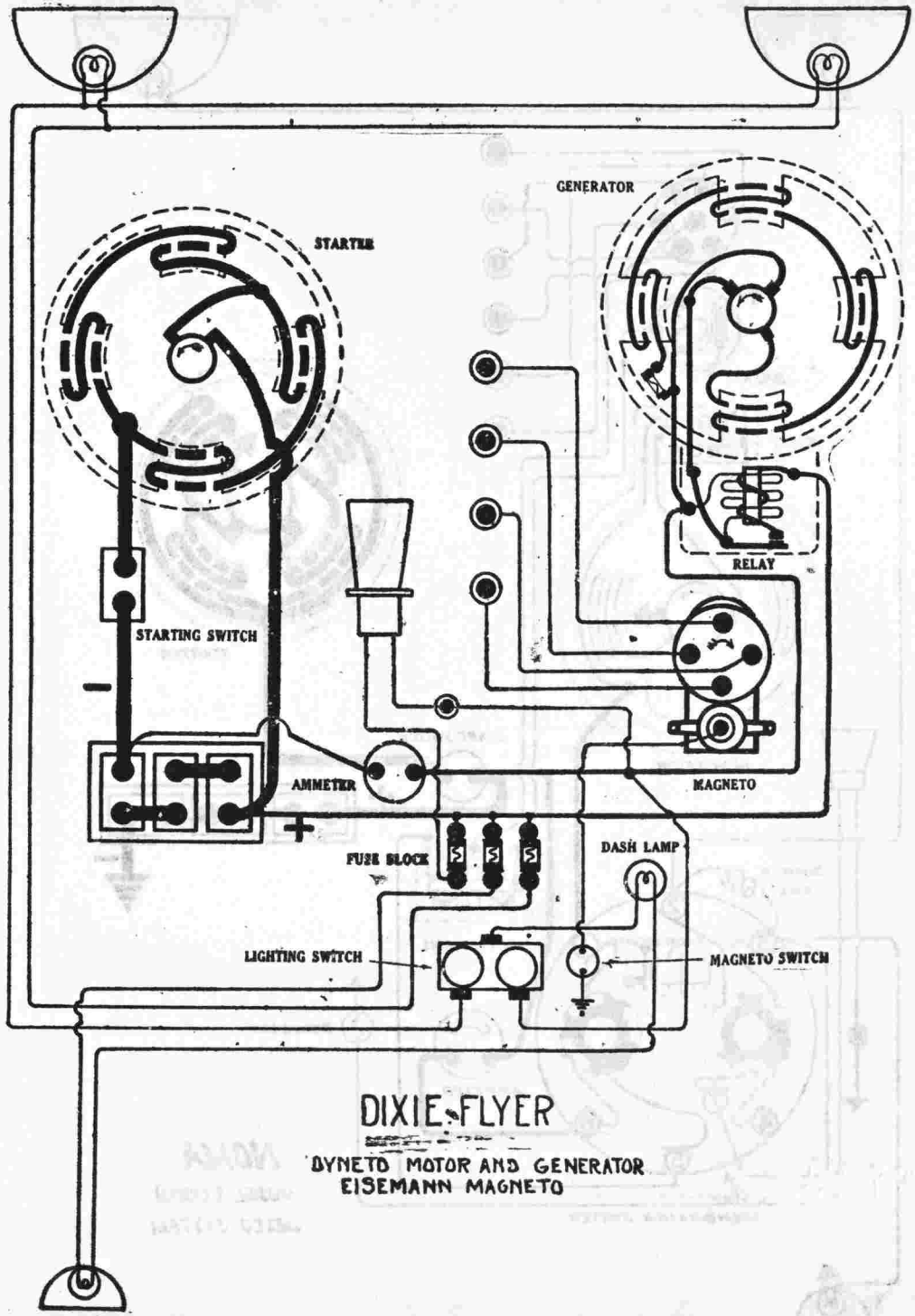
Charging rate may be varied by adjusting the third- brush setting. Shunt field current is 3.5 amperes at 6.5 volts.

Oiling.—Put 4 or 5 drops of light engine oil in the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 450-500 R.P.M. of armature, and opens at 6-8 miles per hour or 400-450 R.P.M. of armature. Relay contacts separate 3/32 inch. Air gap between relay armature and coil core is 1/8 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust befor again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 or 32 cp. Dash and tail lamps are in series. They are 3-4 volt, 2 cp.

FUSES.—Generator fuse is 5 ampere. Lighting fuses are 10 ampere.



NOMA

MODEL 1, SERIES G (1920-21) C (1922)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SJW-3, 6 volt, 104 ampere-hour, The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 3 or 4 drops of light engine oil in the ignition unit oilers every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control one-third advanced.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS. —Spark plug gaps are .030 inch.

STARTER.—Model No. 181. Starter is connected to the engine through a Bendix drive. Lock torque is 27 pound-feet, current being 450 amperes at 2.75 volts.

OILING.—Put 3 or 4 drops of light engine oil in the ignition unit oilers every two weeks.

GENERATOR.—Model No. 165. Rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Maximum charging rate is 11-15 amperes, reached at 1200 R.P.M. of the armature, or 16-20 miles per hour.

Amperes	Generator Data	R.P.M.
Neutral		550
4		800
8		1000
11-15		1200
11-14		2000

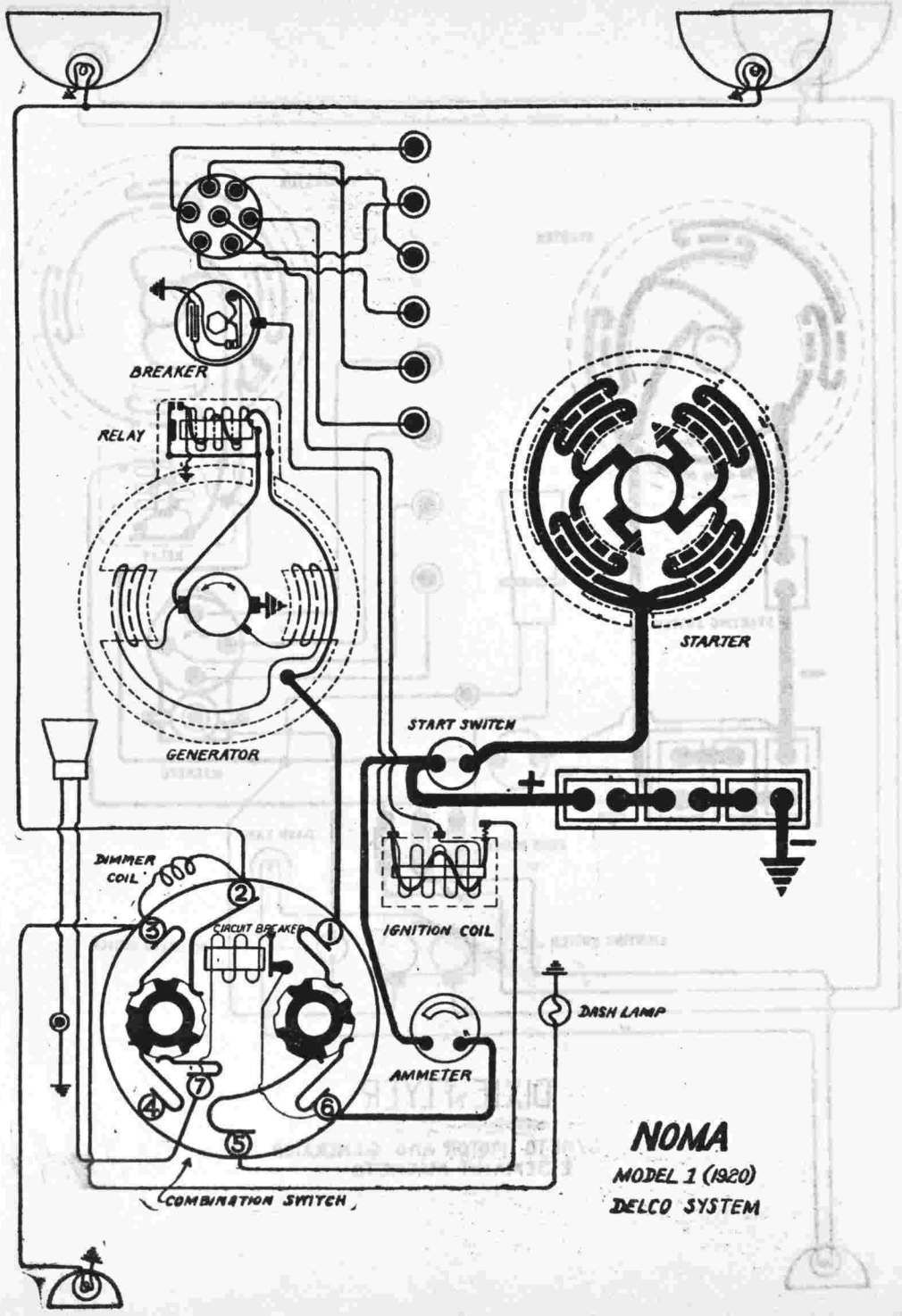
Charging rate is varied by adjustment of the third brush setting. To move the third brush, loosen the three screws holding the bearing retainer plate on the commutator end and shift the plate. Move in a counter-clockwise direction to increase the charging rate, or in the opposite direction to decrease the charging rate. Tighten the adjusting screws and reseat the brush after making the adjustment. Maximum charging rate must not exceed 16 amperes.

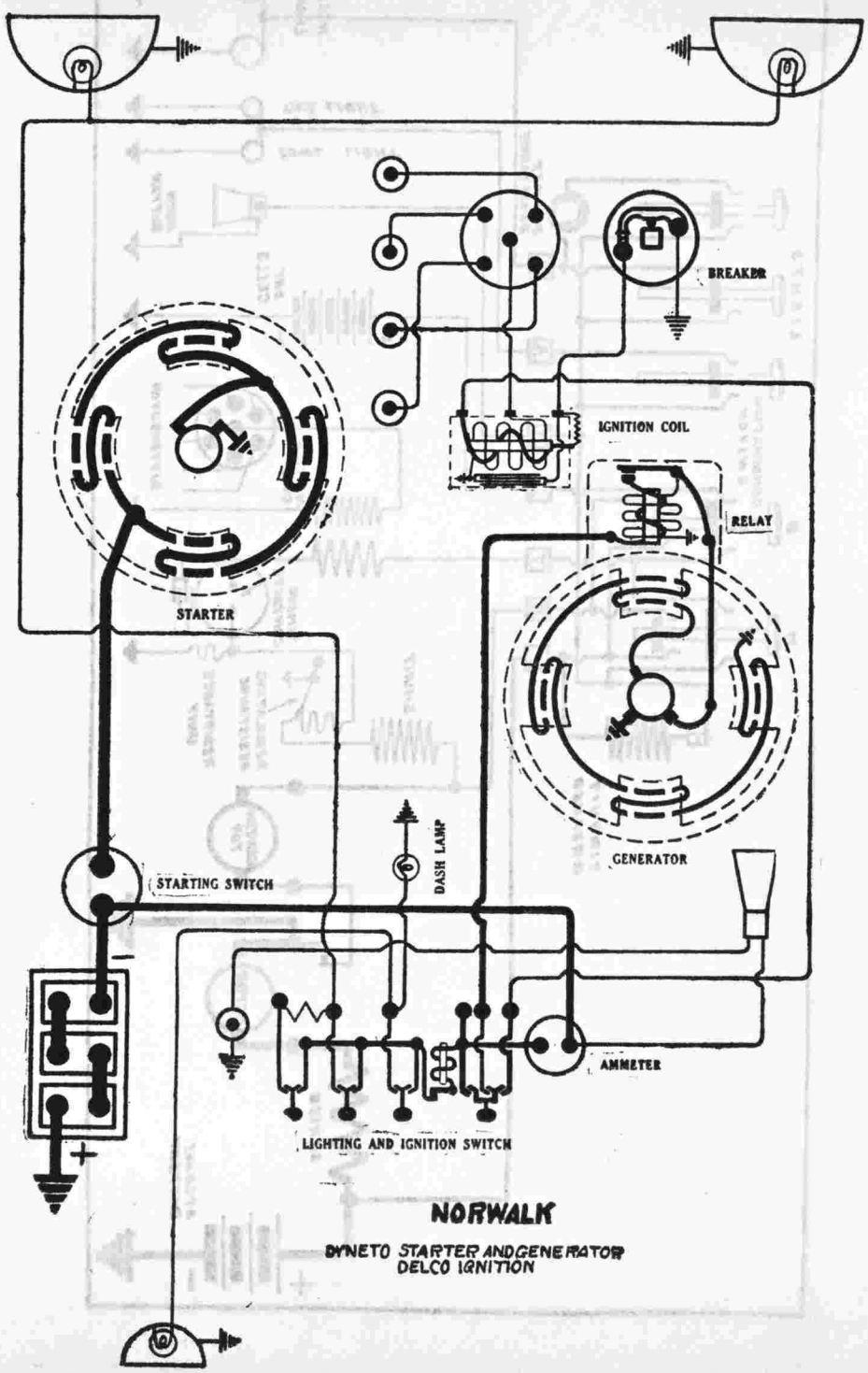
OILING.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes at 550-600 R.P.M. of the armature or 7-8 miles per hour, and opens at 500-550 R.P.M. of the armature or 5-6 miles per hour. Relay contacts separate .046 to .062 inch. Air gap between relay armature and coil core is .020 to .035 inch, contacts closed. To adjust relay, connect a voltmeter between the positive (+) generator brush and the ground. Then slowly speed up the generator and adjust the relay spring tension by turning the thumb nut, until the contacts close when the voltmeter indicates 7.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start the vibrator but 3-5 ampres will cause it to continue.





NORWALK

MODEL 30 (1916-17)
MODEL 30, A-30-K (1918-19-20-21)
DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT OR DELCO IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 4 or 5 drops of light engine oil in the distributor shaft bearing oiler every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model No. D-204. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes	Volts
0.0 lb. ft.	5600	25	6.4
2.5 lb. ft.	1400	150	5.8
5.0 lb. ft.	850	250	5.3
10.0 lb. ft.	250	420	4.6
14.0 lb. ft.	Lock	530	4.0

OILING.—Put several drops of light engine oil in the starter oilers every month.

GENERATOR.—Model No. C-204. Generator current regulation is by the third brush system. Maximum current output of 14 amperes is reached at 16-18 miles per hour or 1500 R.P.M. of armature.

Generator Data

Amperes	M.P.H.	Volts
0	7- 9	6.4
5	9-10	6.6
10	12-14	6.8
12-14	16-18	7.8
8	40-45	6.7

Charging rate may be varied by adjusting the third brush setting. Shunt field current is 3.5 amperes at 6.5 volts.

OILING.—Put 4 or 5 drops of light engine oil in the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 450-500 R.P.M. of armature, and opens at 6-8 miles per hour or 400-450 R.P.M. of armature. Relay contacts separate 3/32 inch. Air gap between relay armature and coil core is 1/8 inch. Clean relay contacts by drawing unglazed paper beween them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are 6-8 volt, 2 cp.

Oakland

Model 37 (1915) (Serial Nos. 370000 to 373599)
Model 49 (1915) (Serial Nos. 490000 to 490500)
Delco Generating, Starting and Lighting System
Delco Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts separate .010 inch. Whey contacts are closed, contact blade and clip separate .015 inch. See that pigtail conducting current to the contact blade is not disconnected. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper.

Oiling.—Put 4 or 5 drops of light engine oil in distributor bearing every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Timing.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order of Model 37 is 1, 3, 4, 2 and of Model 49 is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .025 to .030 inch.

Starter-Generator.—Starter and generator are combined into one unit, but are electrically separate. Starter is connected to the engine through a set of reduction gears meshed by the operator. Two overrunning clutches are provided. In connection with the ignition switch, a circuit is closed allowing current to flow through the generator windings, causing the armature to revolve slowly, aiding the meshing of the reduction gears. One clutch permits this rotation, and also permits a relatively high speed of the armature, necessary when operating as a starter. The second overrunning clutch prevents the engine from driving the armature through the reduction gears. Depressing the starting pedal meshes the reduction gears, opens the generator circuit, and allows the motor brushes to come in contact with the commutator, closing the starter circuit and cranking the engine. When the pedal is released, a spring reverses these operations.

Generator.—Generator voltage regulation is by automatic field rheostat operated from a governor on the distributor shaft.

GENERATOR DATA, MOTOR-GENERATOR NOS. 49 AND 50

Amperes	R. P. M.
Neutral	350
6-11	500
16-20	900-1050
9-14.5	1500

Charging rate is varied by changing the regulating resistance spool. There are six different spools available, namely Nos. 633, 703, 702, 701, 817 and 955. No. 633 is wound with the largest wire, the sizes reducing in the order named. Installing a spool of larger wire increases the output. The spools have a wide brass cap at one end and a narrow cap at the other end. Minimum output with each spool is obtained when installed with the narrow cap at the bottom. The contact arm must bear on the resistance spool with a pressure of 6 ounces. A poor contact between the arm and spool will cause the generator to motor at excessive speed when the ignition switch is closed.

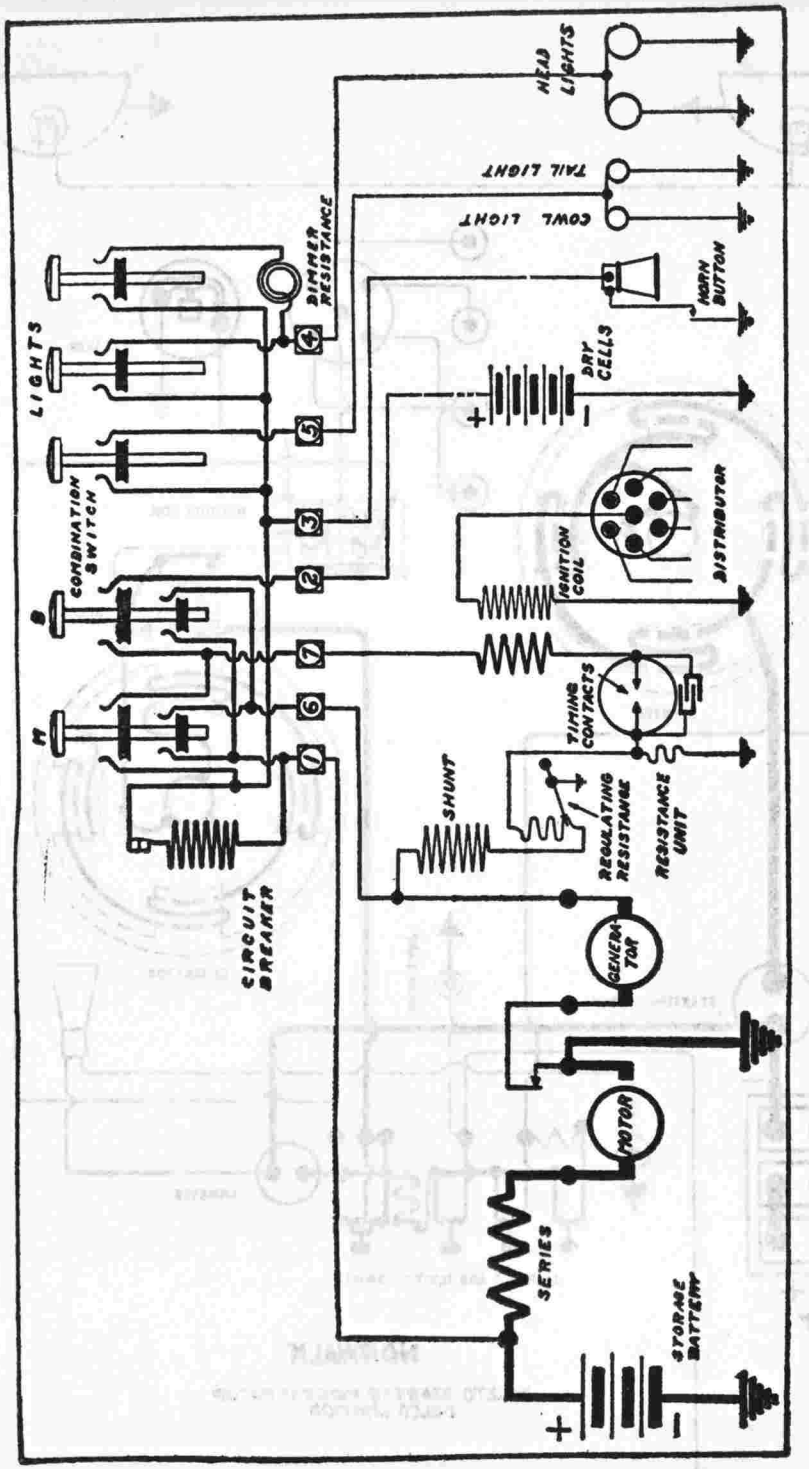
Oiling.—Put 5 or 6 drops of light engine oil in each of starter-generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done very 500 miles. Once a year remove the name plate and lubricate the spiral gears with soft cup grease. Limit the amount of grease so that none can work through to the regulating resistance, interfering with its operation.

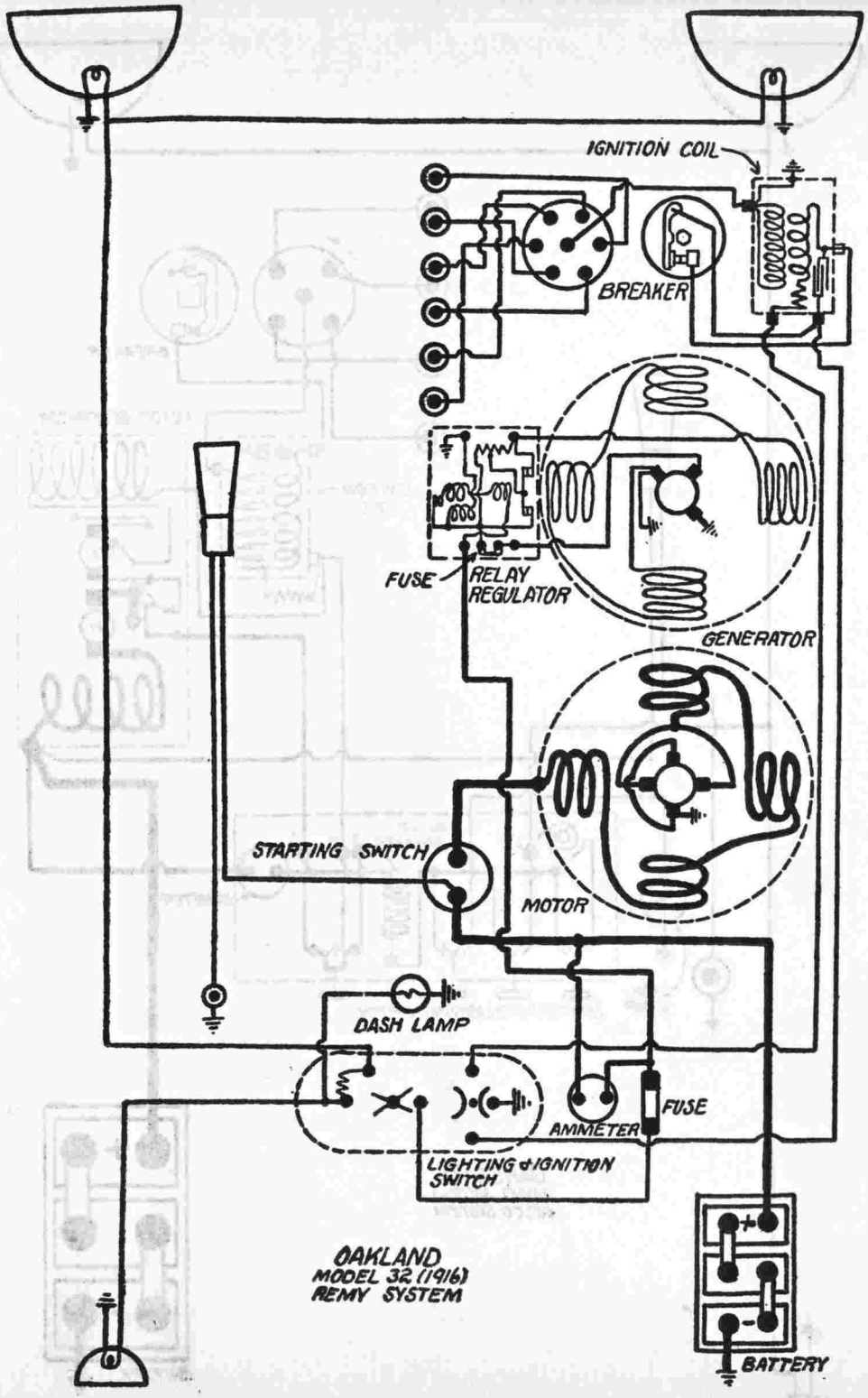
Relay.—There is no relay. The circuits between the generator and the battery is controlled by the ignition switch. The overrunning clutch at driving end allows generator to operate as a motor when battery's pressure is above that of generator. If the engine is killed when stopping the noise made by the clutch serves to attract the operator's attention to open the ignition switch. The opening and closing of the generator-battery circuit by the operator, takes the place of the relay.

Lamps.—Head lamps are 6-8 volt, 17 cp. Dash and tail lamps are 6-8 volt, 2 cp.

Circuit Breaker.—There is a vibrating circuit breaker on the back of the lighting switch which takes the place of fuses in the lighting circuits. It requires a current of 25 amperes to start this device vibrating, but when vibrating, 3 to 5 amperes will cause it to continue.

Model Numbers.—Motor-generator is Nos. 49 or 50. Ignition coil is No. 2111.





Oakland

Model 32 (1916)

Remy Generating, Starting and Lighting System

Remy Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts should separate .020 to .025 inch. If burned or pitted, affecting the ignition, resurface them with a very fine, flat jeweler's file or a strip of worn No. 00 sand paper.

Timing.—Breaker contacts should separate when the flywheel marking "UDC 1-6" is in alignment with the indicator, with spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be .025 to .030 inch.

Oiling.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, theses attentions should be given every 500 miles.

Starter.—Starter is connected to the engine through a Bendix drive.

STARTER DATA, MODEL NO. 114-A

Torque	R. P. M.	Amperes
0 lb. ft.	3500-6000	35- 50
4 lb. ft.	1100-1450	190-220
6 lb. ft.	850-1050	280-300
10 lb. ft.	200- 350	320-475
14 lb. ft.	Lock	520-600

Oiling.—Put 5 or 6 drops of light engine oil in the starter bearings every month.

Generator.—Generator current regulation is by vibrating regulator.

GENERATOR DATA, MODEL NO. 166

Amperes	R. P. M.	Volts
0	600- 650	6.0
7	780- 850	6.4
14.5	2500-3000	7.2

Operating freely as a motor, generator runs at 470 R. P. M., drawing 5.5 amperes at 5.8 volts.

Oiling.—Put 5 or 6 drops of light engine oil in the oiler on commutator end bearing every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

Relay-Regulator.—Relay is combined with regulator. Relay should close at 6-8 miles per hour, and open at 5-7 miles per hour. The air gap between relay armature (moving member) and coil core should be .012 to .015 inch, contacts closed. Contacts should separate .012 to .015 inch. Clean relay and regulator contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a strip of well worn No. 00 sand paper, drawing a piece of unglazed paper between them to remove all grit, and adjust before again putting into service. Increasing spring tension on regulator armature will increase the output. Decreasing the spring tension will decrease the output.

Lamps.—Head lamps are 6-8 volt, 14 cp. Dash and tail lamps are 6-8 volt, 2 cp.

Fuse.—There is a 15 ampere fuse on relay-regulator base.

Model 38 (1916) (Serial Nos. 380,000 to 384,001)
Delco Generating, Starting and Lighting System
Delco Ignition

Battery.—Battery is 6 volt, 85 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Timing.—Breaker contacts separate when flywheel marking "U. D. C. 1-4" is at indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—The spark plug gaps are .028 to .030 inch.

Oiling.—Put 5 or 6 drops of light engine oil in oiler on side of distributor housing every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Starter-Generator—Starter and generator are combined into one unit, but are electrically separate. Starter is connected to the engine through a set of reduction gears and a pinion shifted by the operator. Two overrunning clutches are provided. In connection with the ignition switch, a circuit is closed allowing a current flow through the generator windings, causing the armature to revolve slowly, facilitating the meshing of the reduction gears. One clutch permits this rotation, and also permits a relatively high speed of the armature, necessary when operating as a starter. The second overrunning clutch prevents the engine from driving the armature through the reduction gears. Depressing the starting pedal meshes the reduction gears, opens the generator circuit, and allows the motor brushes to come in contact with the commutator, closing the starter circuit and cranking the engine. When the pedal is released, a spring reverses these operations.

Generator.—Generator current regulation is by third brush system.

GENERATOR DATA. MOTOR-GENERATOR No. 68

Amperes	R. P. M.
Neutral	375
4-10	505
16-20	1000
10-15	1500
9-13	1800

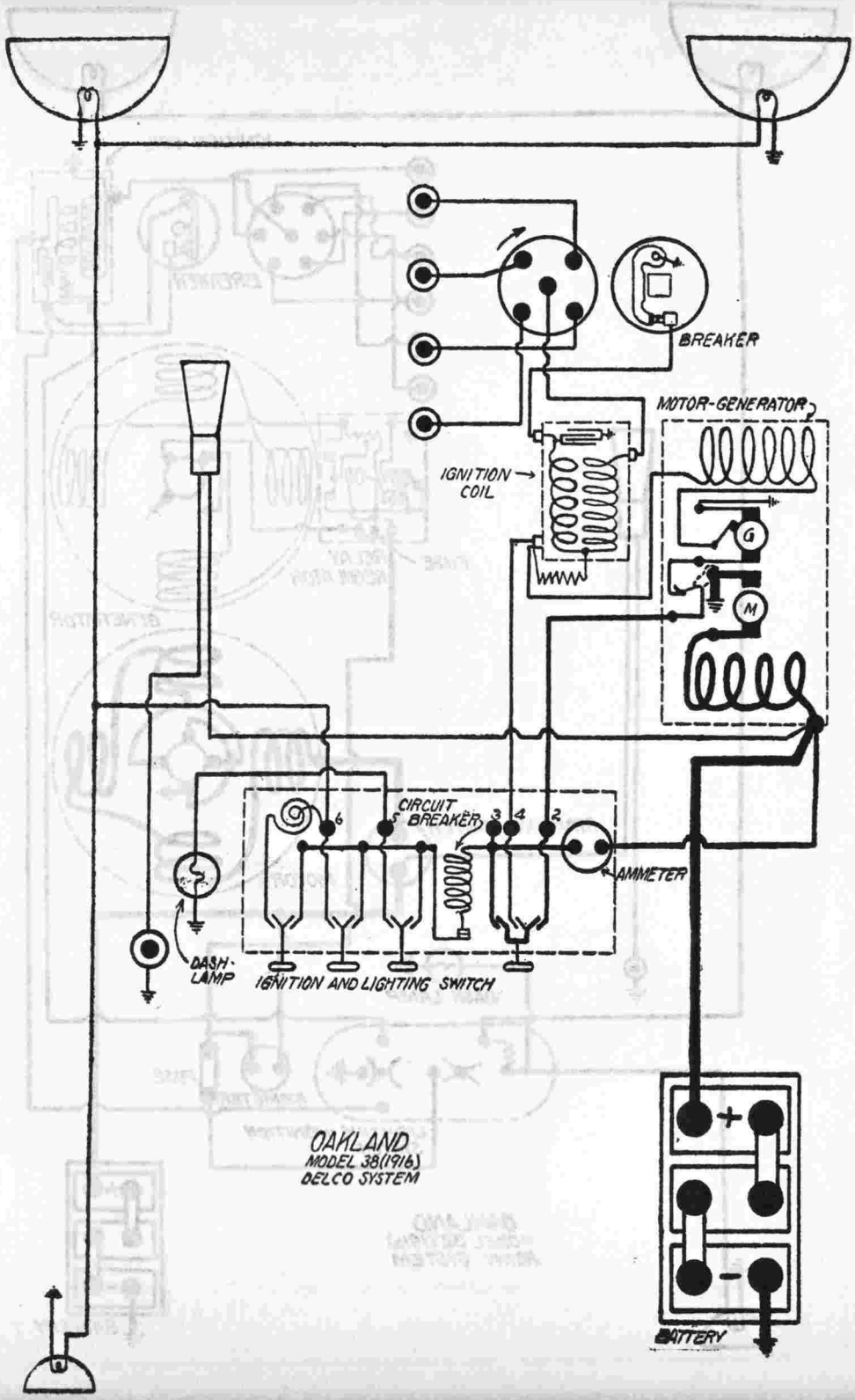
Operating as a motor with the overrunning clutch as the only retarding force, generator draws 4.5 amperes.

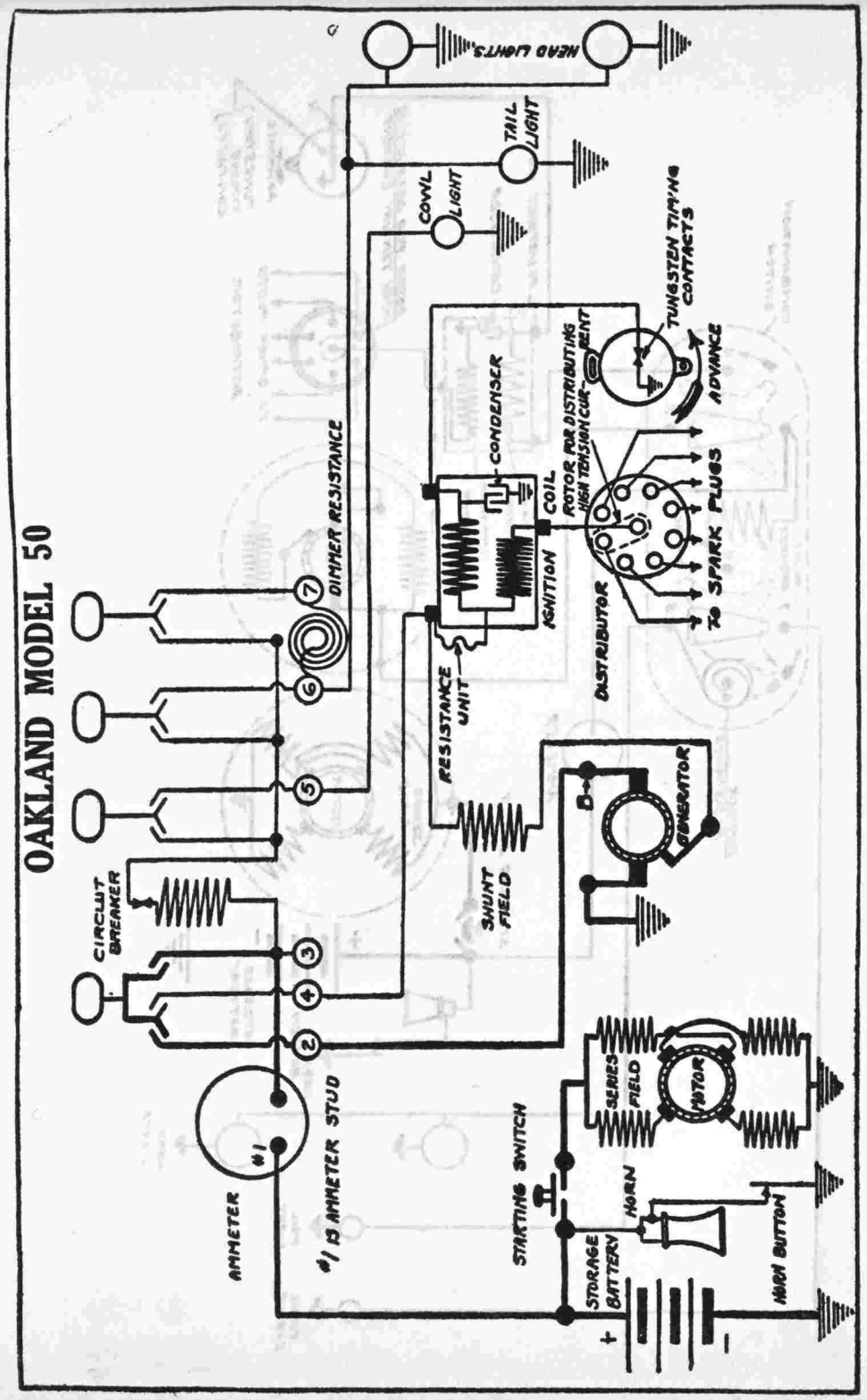
Oiling.—Put 5 or 6 drops of light engine oil in generator oiler every two weeks. At the same time turn down the grease cup on the rear end two turns. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles. The distributor driving gear housing is packed with soft cup grease which should be renewed every six months.

Relay.—There is no relay. The circuit between generator and battery is controlled by the ignition switch. An overrunning clutch at driving end allows generator to operate as a motor when battery's pressure is greater than that of generator, thereby reducing the discharge current from the battery. The noise of the overrunning clutch is intended to attract the operator's attention to open the ignition switch. The opening and closing of the generator-battery circuit by the operator takes the place of the relay.

Lamps.—Head lamps are 6-8 volt, 14 cp. Dash and tail lamps are each 6-8 volt, 2 cp.

Circuit-Breaker.—There is a vibrating circuit breaker on the back of the combination switch to take the place of fuses in the lighting circuits. It requires a current of 25 amperes to start this devise vibrating, but once vibrating, 3 to 5 amperes will cause it to continue.





Oakland

Model 50 (1916-17) (Serial Nos. 500000 to 502000)
Delco Generating, Starting and Lighting System
Delco Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel.

Timing.—Breaker contacts separate when flywheel marking "1 and 4" is under the center of the hole in top of flywheel case, spark control lever and breaker assembly in the fully retarded position. The hole through which flywheel may be viewed is covered by a removable plate.

Firing Order.—The firing order is 1, 8, 3, 6, 4, 5, 2, 7.

Spark Plug Gaps.—Spark plug gaps are .032 inch.

Oiling.—Put 5 or 6 drops of light engine oil in the oil hole on the side of the distributor housing every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Starter.—Starting motor is No. 72. Starter is connected to the engine through a Bendix drive. Lock torque is 17.5 pound-feet. Operating without load motor takes 40 amperes.

Oiling.—Starter bearings are of the oilless type and require no lubrication

Generator.—Generator current regulation is by third brush system.

GENERATOR DATA, NO. 91

Cold—Amperes	R. P. M.	Warm—Amperes	R. P. M.
Neutral	625 or less	Neutral	650
5.0- 7	800	4.0- 6	800
9.5-13	1000	8.5-11	1000
15.0-19	1600	14.0-18	1600
17.0-21	1800	14.0-20	1800
16.0-21	2000	16.0-20	2000

Generator begins to supply current at 6-8 miles per hour, and reaches its maximum output at 18-20 miles per hour.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Relay.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch.

Lamps.—Head lamps are 6-8 volt, 14 cp. Tail lamp is 6-8 volt, 2 cp. Dash lamp is 6-8 volt, 2 cp.

Circuit Breaker.—There is a vibrating circuit breaker on the back of the combination switch which take the place of fuses in the lighting circuits. It requires a current of 25 amperes to start this device vibrating, but once vibrating 3 to 5 amperes will cause it to continue.

Model Numbers.—Starter is No. 72. Generator is No. 91. Combination switch is No. 1067. Ignition coil is No. 2123.

Oakland

Model 32-B (1917) (Serial Nos. 330000 to 347000)
Model 34 (1917) (Serial Nos. 134 to 3000034)
Delco Generating, Starting and Lighting System
Delco Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts should separate .018 inch. They are made of tungsten. They will operate properly even though very irregular, due to the fact that the rough surfaces fit each other perfectly. Their natural color is dark gray, not silver. Should they become badly burned or pitted, affecting the ignition, remove and resurface them by drawing across a piece of fine emery cloth laid on a flat surface, as on the bed of a drill press, finishing on a very hard oil stone. Clean all oil from contacts before again putting into service.

Timing.—Breaker contacts should separate when piston entering power stroke is on top dead center, spark control lever two inches from the bottom of the sector. (First see that breaker assembly is fully retarded when the control lever is in the fully retarded position.)

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be .028 to .030 inch.

Oiling.—Distributor shaft bearings are of the oilless type. If the track of the rotor button inside distributor head is not well polished, apply a small amount of vaseline with a soft cloth.

Starter.—Starting motor No. 100 is used on both models. It is connected to the engine through a Bendix drive. Running freely, starter should draw 40 amperes. It should deliver 16 pound-feet lock torque, with a line voltage of 3.5-3.8 volts.

Oiling.—Starter bearings are of the oilless type and require no lubrication.

Generator.—Generator No. 99 is used on the Model 32-B cars, and generator No. 111 is used on the Model 34 cars. Current regulation is by third brush method.

GENERATOR DATA, NO. 99 AND NO. 111

Cold-Amperes	R. P. M.	Warm-Amperes	R. P. M.
Neutral	500	Neutral	500
10.5-12.5	900	10-12	900
15.5-18	1400	14-16	1400
13.0-17	2000	11-13	2000

To adjust charging rate loosen the screws holding third brush arm and move to the right (looking at commutator end of generator) to increase charging rate, and to the left to decrease it. Generator should begin to supply current at 8 miles per hour, and reaches its maximum output at 20-25 miles per hour.

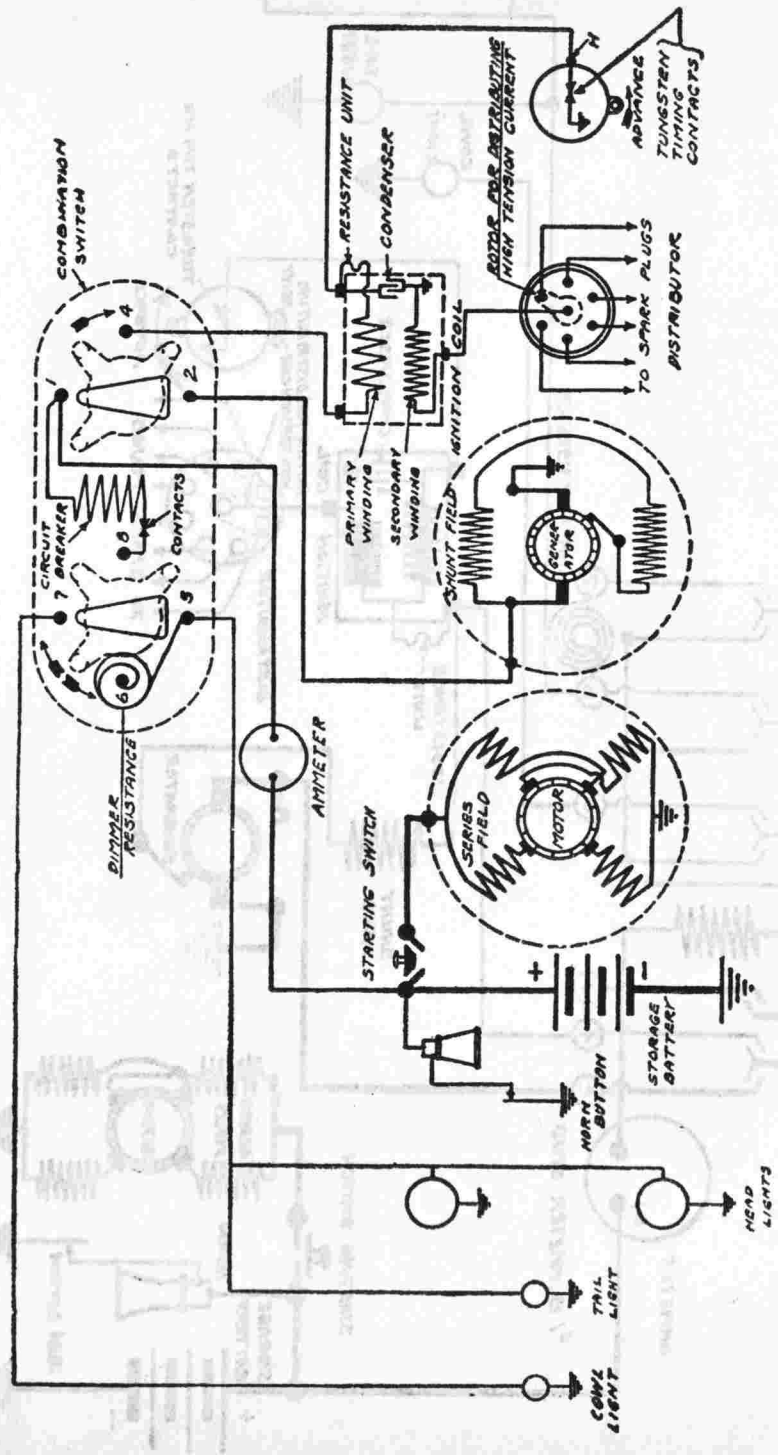
Oiling.—Put 4 or 5 drops of light engine oil in the rear bearing oiler every week. If car is driven more than 250 miles in a week, the oiling must be done every 250 miles.

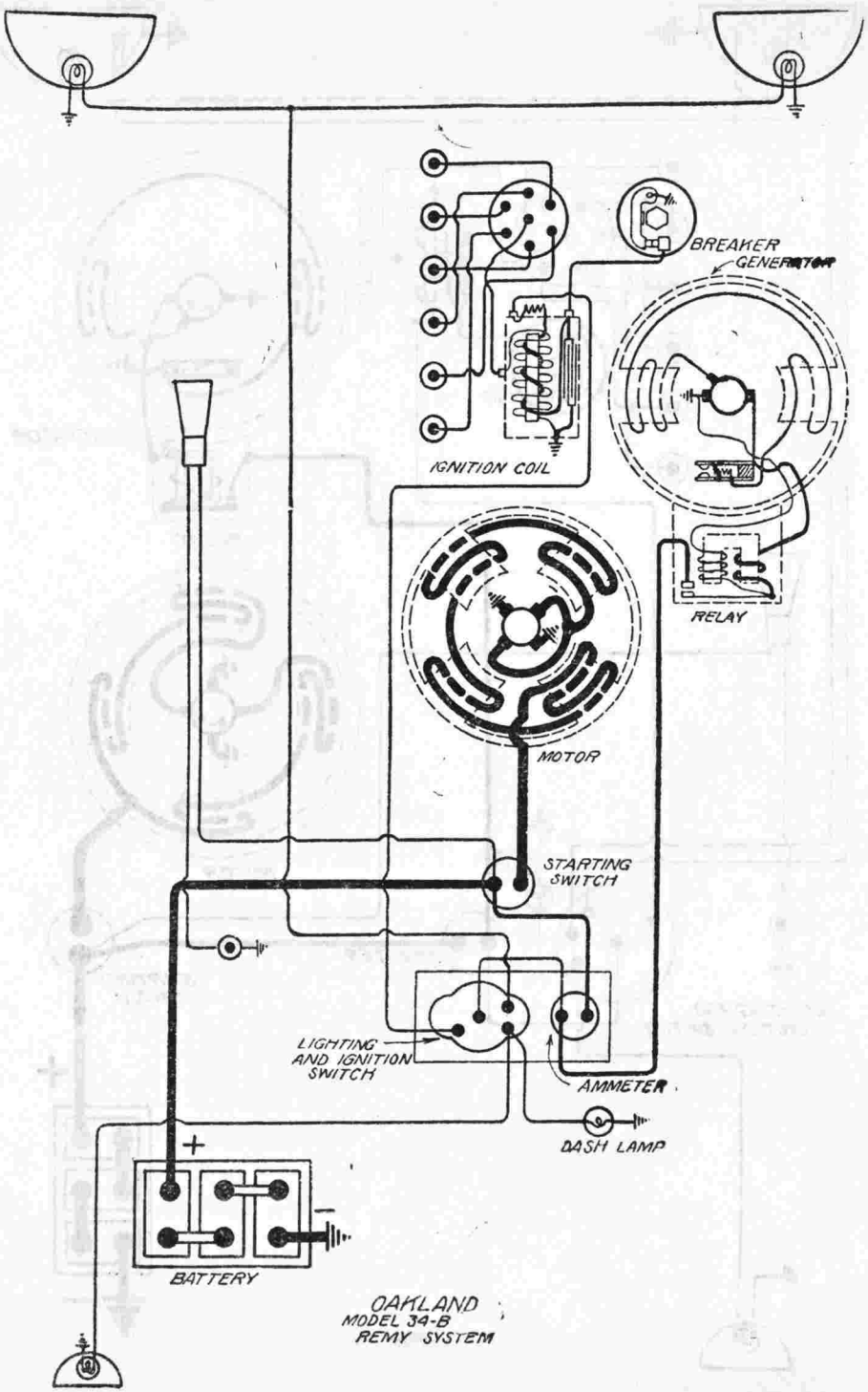
Relay.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch.

Lamps.—Head lamps are 6-8 volt, 14 cp. Tail lamp is 6-8 volt, 2 cp. Dash lamp is 6-8 volt, 2 cp.

Circuit Breaker.—There is a vibrating type circuit breaker in the lighting circuits to take the place of fuses. It requires a current of 25 amperes to start this device vibrating, but when vibrating, a current of 3 to 5 amperes will cause it to continue.

Model Numbers.—Both models use starter No. 100, starting switch No. 1965, ignition coil No. 2137 and combination switch No. 1078. Generator No. 99 is used on the 32-B models and No. 111 on the 34 models.





OAKLAND

MODELS 34, 34-B (1917-18-19) SERIAL NOS. 3,000,134 UP
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Prest-O-Lite, Type 611-RH., 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 284-C. Distributor Model No. 256-AC. Breaker contacts separate .020 to .025 inch. If burned or pitted, affecting the ignition, resurface them with a very fine, flat jeweler's file or a strip of worn No. 00 sandpaper.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions should be given every 500 miles.

TIMING.—Contacts begin to separate when the top dead center mark on flywheel is ½ inch before the indicator on the 1919 cars and at the indicator on the 1918 cars with the spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER.—Model 307-A. Starter is connected to engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes	Volts
1.00 lb. ft.	2150	140-150	5.5-5.7
2.00 lb. ft.	1650	180-190	5.2-5.4
3.00 lb. ft.	1300	220-230	4.8-4.9
4.00 lb. ft.	1050	258-268	4.3-4.5
5.00 lb. ft.	750	300-310	4.1-4.3
12.75 lb. ft.	Lock	570-590	3.4-3.6

GENERATOR.—Model 234-A. Generator current regulation is by third brush system. A thermostat located in the brush rigging of the generator cuts in a resistance at a temperature of 175°F., reducing the maximum charging rate 6 amperes. Resistance also acts as a shunt field fuse. The thermostat is intended to change the charging rate as demand of seasons or car operation requires. Never touch the thermostat points.

Generator Data

Amperes	R.P.M.	Volts
0	525	6.4
7	780	7.1-7.2
14	1100	7.8
19-20	1680	8.6
19-20	2000	8.6
13-15	3000	8.0

Above tests should be made with relay in circuit and thermostat contacts closed. Field current is 5 amperes at 6.4 volts. Pressure of main brushes on commutator is 17 to 20 ounces. The pressure of third brush on commutator is 13 to 17 ounces.

OILING.—Fill generator bearing oilers with light engine oil every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

RELAY.—Relay closes at 7-10 miles per hour or 525-575 R.P.M. of armature and opens at 5-8 miles per hour or 475-525 R.P.M. of armature. Contacts separate .012 to .015 inch. Air gap between armature coil and core is .012 to .015 inch, with contacts closed. Clean relay contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp. On the 1918 cars head lamps are 6-8 volt 17 cp.

OAKLAND
MODELS 34-C, 34-D (1920-21)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Prest-O-Lite, 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 284-C. Distributor Model No. 356-C. Breaker contacts separate .022 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the grease cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is ½ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUGS.—Diameter, ⅞ inch. Spark gaps are .025 to .030 inch.

STARTER.—Model No. 701-A. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes	Volts
0 lb. ft.	10,000	65	5.7
2 lb. ft.	2250	175	5.1
6 lb. ft.	750	365	4.2
10 lb. ft.	225	500	3.5
12 lb. ft.	Lock	575	3.2

Above tests are made without gear reduction. Pressure of brushes on the commutator is 20-24 ounces

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Model 911-A. Generator current regulation is by the third brush system. A thermostat, located in the brush rigging of the generator, cuts a resistance into the shunt field circuit of the generator at a temperature of 175°F., reducing the maximum charging rate 8 amperes. Never touch the thermostat points. Maximum charging rate is 20 amperes with the thermostat closed, reached at 1800 R.P.M. of the armature or 25 miles per hour.

Generator Data

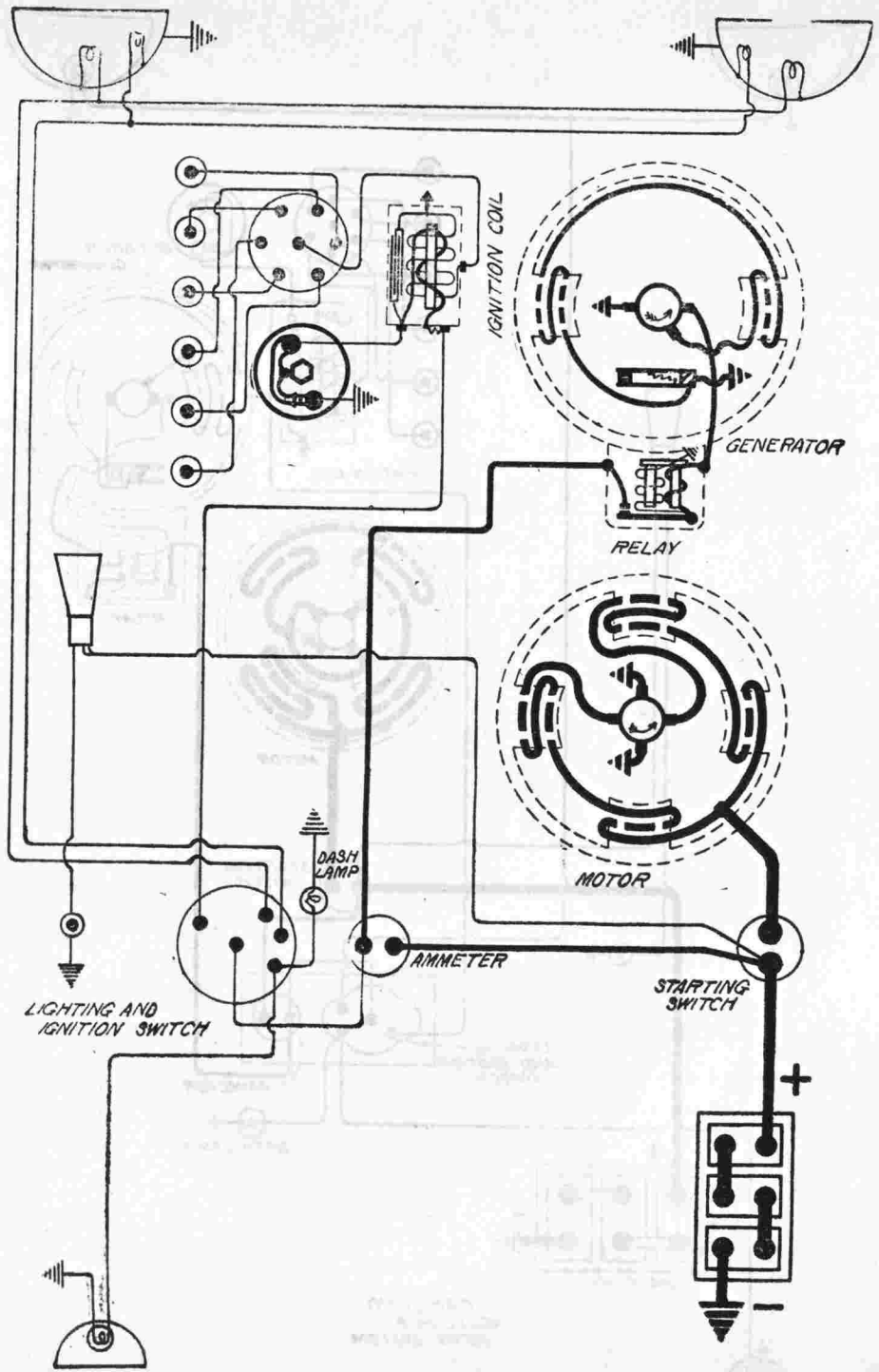
Cold Test. Thermostat Closed		Hot Test. Thermostat Open	
Amperes	R.P.M.	Amperes	R.P.M.
0	600	0	800
5	750	4	1100
10	950	6	1250
15	1200	8	1450
20	1800	11	2000
14	3200	9	3200

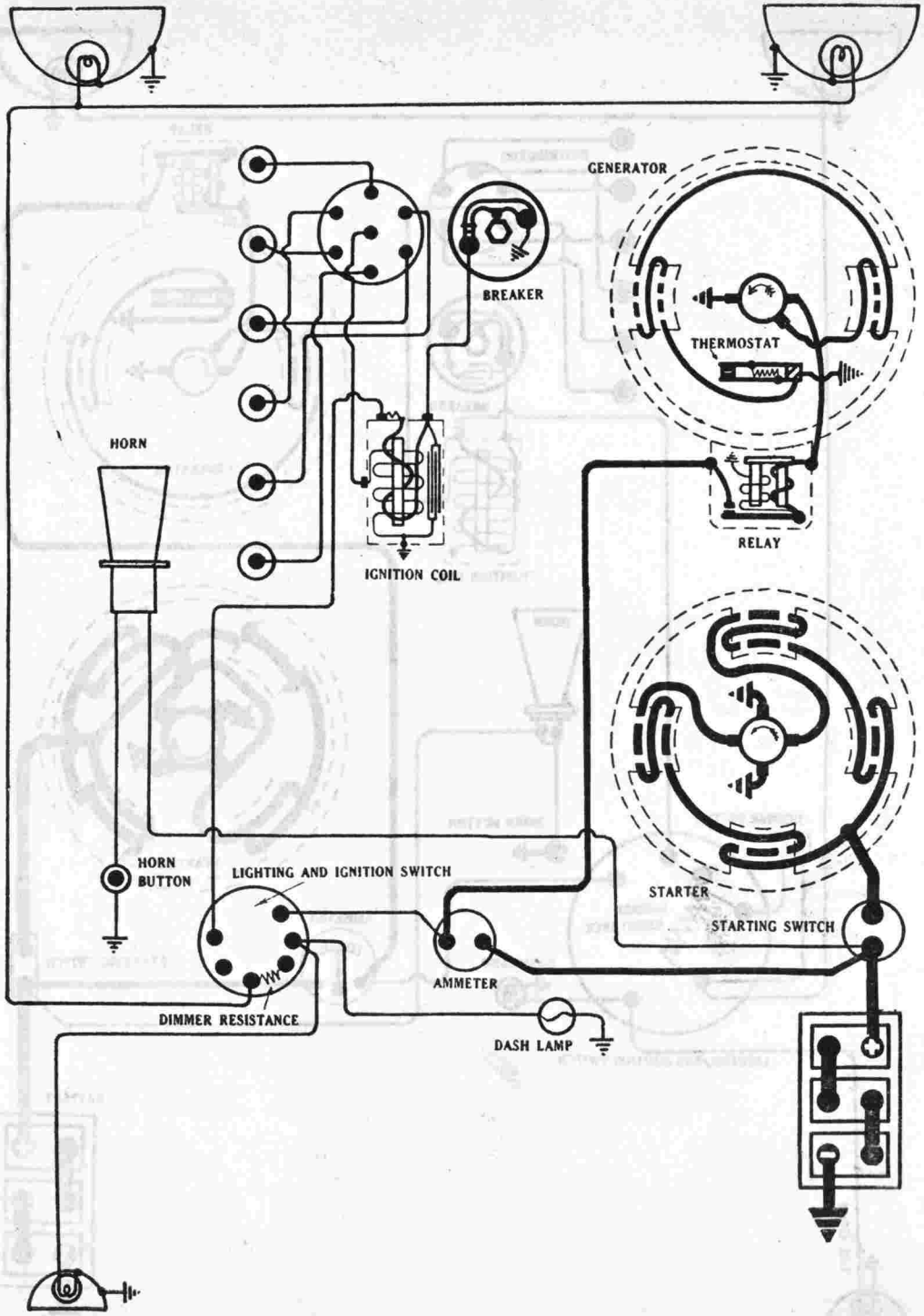
Charging rate is varied by adjustment of the third brush setting. Third brush assembly is moved by turning a screw exposed in the commutator end plate. Pressure of main brushes on the commutator is 17-20 ounces. Pressure of the third brush is 13-17 ounces.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 600-650 R.P.M. of the armature and opens at 6-8 miles per hour or 550-600 R.P.M. of the armature. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .020 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are 6-8 volt, 2 cp.





OAKLAND

MODEL 6-44 (1922)

REMY GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY:—Prest-O-Lite, 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 284-M. Distributor Model No. 606-D or 616-C. Breaker contacts separate .023 to .025 inch. When the condition of the contacts affect the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

Oiling.—Refill the grease cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper on the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when the top dead center mark on the flywheel is ½ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plugs.—Diameter, ⅞ inch. Spark gaps are .025 to .030 inch.

STARTER.—Model 701-A. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes	Volts
0 lb. ft.	10,000	65	5.7
2 lb. ft.	2250	175	5.1
6 lb. ft.	750	365	4.2
10 lb. ft.	225	500	3.5
12 lb. ft.	Lock	575	3.2

Above tests are made without gear reduction. Pressure of brushes on the commutator is 16 to 20 ounces.

Oiling.—Put 5 or 6 drops of light engine oil in each of the starter oilers every week or 500 miles.

GENERATOR.—Model No. 917-F. Generator current regulation is by the third brush system. A thermostat, located in the brush rigging of the generator, cuts a resistance into the shunt field circuit of the generator at a temperature of 175° F., reducing the maximum charging rate 8 amperes. Never touch the thermostat points. Maximum charging rate is 18 to 20 amperes, reached at 1900 R.P.M. of the armature.

Hot Test		Generator Data	Cold Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
Cut in		820	Cut in		600
7.0	7.20	1400	7	7.20	840
10.0	7.50	2000	14	7.90	1170
9.8	7.48	2200	18	8.35	1560
8.8	7.39	2600	18	8.35	2180

Charging rate is varied by adjustment of the third brush setting. Third brush assembly is moved by turning a screw exposed in the commutator end plate. Pressure of main brushes on the commutator is 17-20 ounces. Pressure of the third brush is 13-17 ounces.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Model No. 264-B. Relay closes at 8-10 miles per hour or 600-650 R.P.M. of the armature and opens at 6-8 miles per hour or 550-600 R.P.M. of the armature. Relay contacts separate .012 to .015 inch. The air gap between the relay armature and the coil core is .012 to .015 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Dash and tail lamps are 6-8 volt, 2 cp.

OAKLAND

MODEL 6-44 (1922)

REMY GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY.—Prest-O-Lite, Type 613-RHN, 6 volts, 100-ampere-hour capacity, The starting capacity is 115 amperes for 20 minutes, and the lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 284-M. Distributor Model No. 606-D or 616-C. Breaker contacts separate .023 to .025 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

Oiling.—Refill the grease cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the breaker cam, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when piston No. 1 is at top dead center mark on flywheel "UDC 1 & 6" is opposite the indicator on flywheel housing, spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plugs.—Diameter ⅞ inch. Spark gaps are .025 to .030 inch.

STARTER:—Model No. 721-C. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at commutator end.

Starter Data

Torque	R.P.M.	Amperes	Volts
0 lb. ft.	10,000	65	5.7
2 lb. ft.	2250	175	5.1
6 lb. ft.	750	365	4.2
10 lb. ft.	225	500	3.5
12 lb. ft.	Lock	575	3.2

Above tests are made without gear reduction. Pressure of brushes on the commutator is 16-20 ounces.

Oiling.—Put 5 or 6 drops of light engine oil in the starter oiler and fill grease cup every month or 1000 miles.

GENERATOR.—Model No. 917-F. Generator current regulation is by the third brush system. A thermostat, located in the brush rigging of the generator, cuts a resistance into the shunt field circuit of the generator at a temperature of 175° F., reducing the maximum charging rate 8 amperes. Never touch the thermostat points. Maximum charging rate is 16-18 amperes, cold, reached at 1875 R.P.M. of the armature.

Generator Data

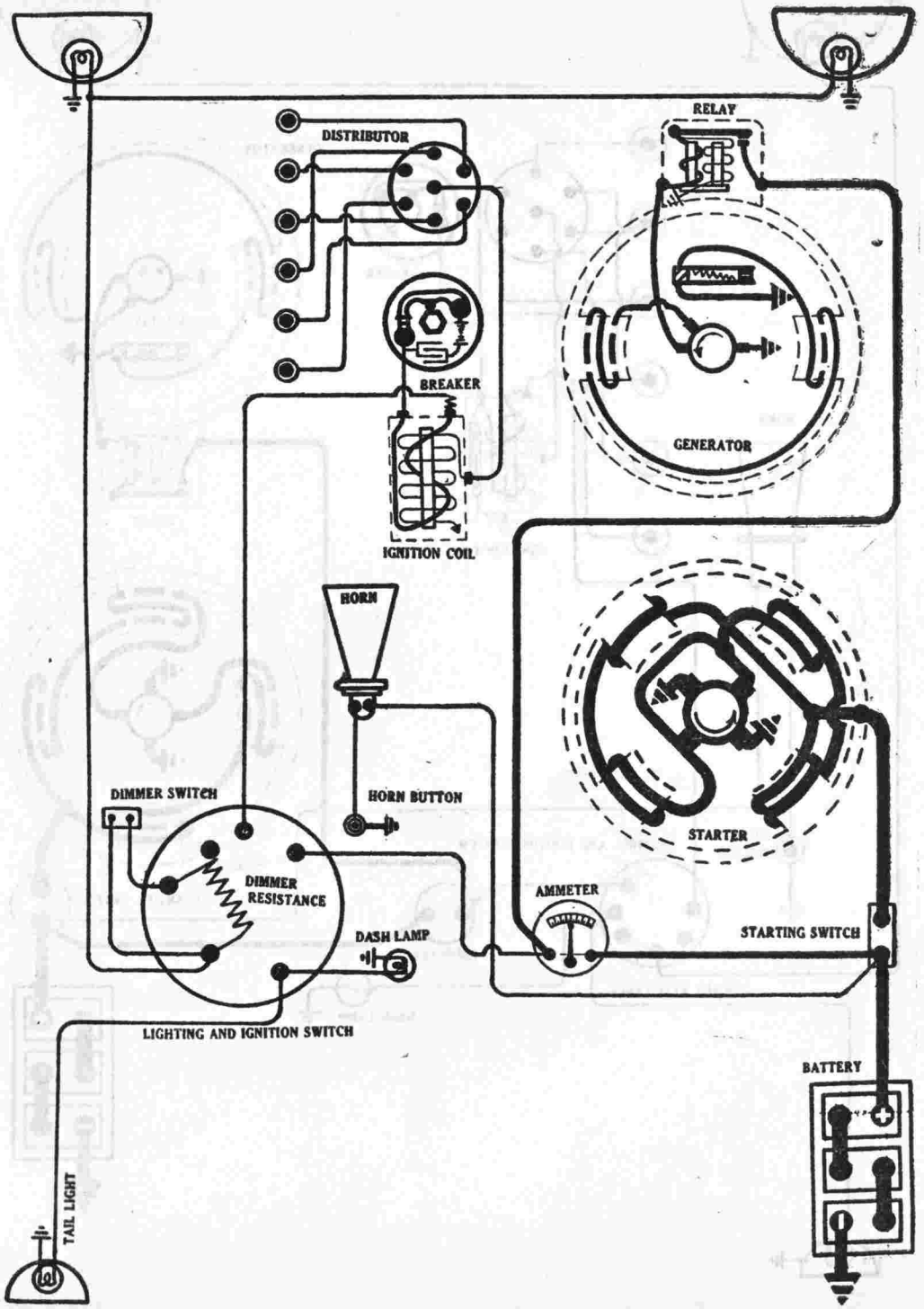
Hot Test			Cold Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
Cut in		820	Cut in		600
10.0	7.50	2000	14	7.90	1170
9.8	7.48	2200	18	8.35	1560
8.8	7.30	2600	18	8.35	2180
7.0	7.20	1400	7	7.20	840

Charging rate is varied by adjustment of the third brush setting. Third brush assembly is moved by turning a screw exposed in the commutator end plate. Pressure of main brushes on the commutator is 17-20 ounces. Pressure of the third brush is 13-17 ounces.

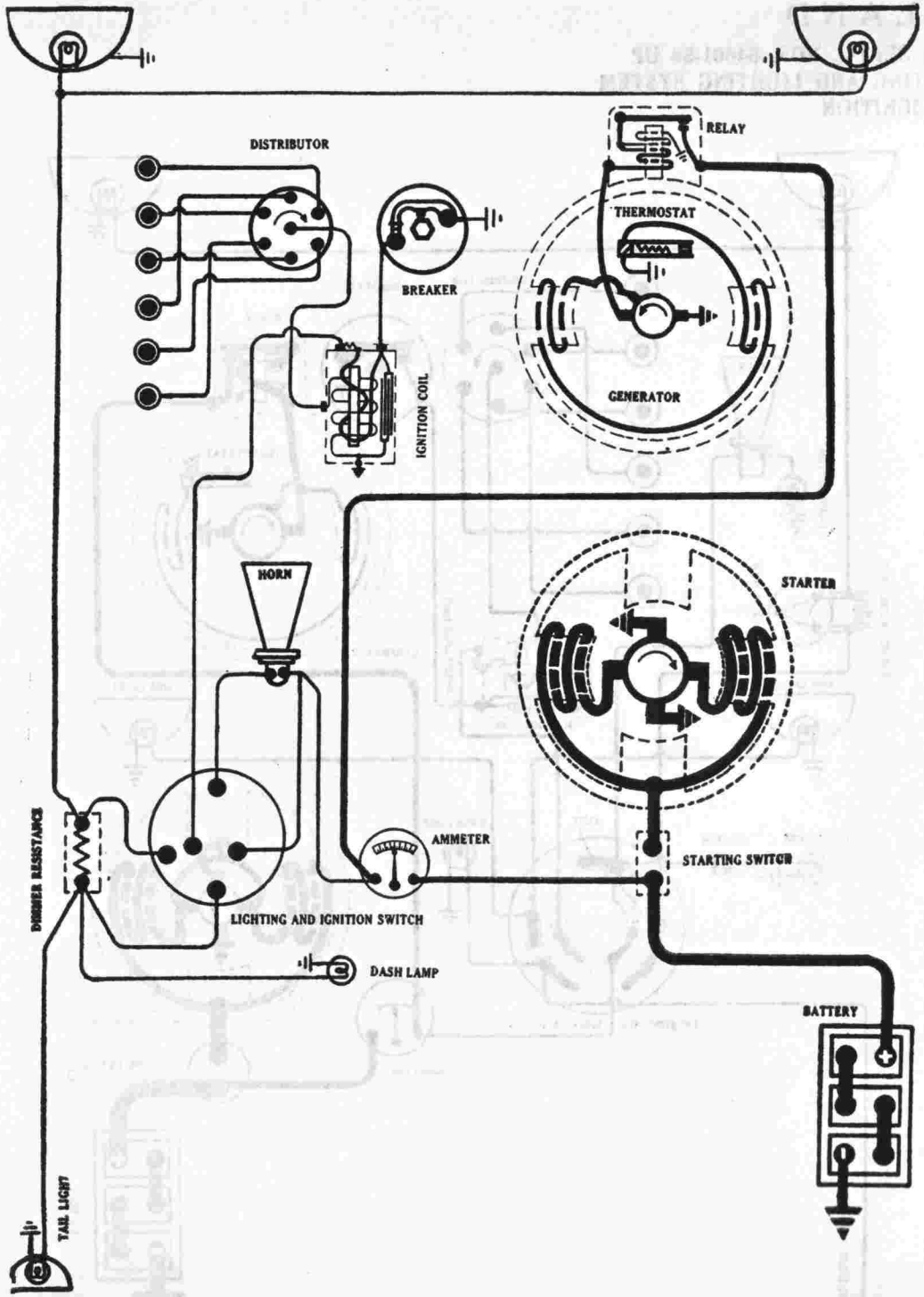
Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Model No. 264-B. Relay closes at 8-10 miles per hour or 600-650 R.P.M. of the armature, and opens at 6-8 miles per hour or 550-600 R.P.M. of the armature. Relay contacts separate .012 to .015 inch. The air gap between the relay armature and the coil core is .012 to .015 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LIGHTING.—Head lights are each 6-8 volts, 21 cp. Dash and tail lights are each 6-8 volts, 2 cp. Side lights (if used) are each 6-8 volts, 4 cp. All lights are of the single contact base.



MODELS 6-54 (1923-24-25) 6-64 (1925)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION



BATTERY: — Prest-O-Lite, Type 613-RHN, 6 volt, 100 ampere hours. The starting capacity is 115 amperes for 20 minutes. The lighting capacity is 5 amperes for 20 hours. The negative (-) terminal is grounded.

IGNITION: — Coil Model No. 284-L. Distributor Model No. 616-G. Breaker contacts separate .020 to .028 inch. They are made of tungsten. When the condition of the points affected the ignition, resurface with a fine contact file.

OILING: — Refill the grease cup under the distributor head and turn down two turns every two weeks or each 500 miles. Remove the rotor and saturate the wick in the oiler on the distributor shaft with light engine oil every 1000 miles or each month. Place a small amount of vaseline on the face of the breaker cam, applying with a toothpick.

TIMING: — Breaker contacts begin to separate 5° before top dead center. The spark control is of the fully antomatic type, no manual advance being provided. To set timing, crank engine until piston No. 1 reaches top dead center on compression stroke. Then mount the distributor so that with the indicator pointing to the center of the scale (0 position) the breaker contacts are just beginning to separate. Then rotate the housing 5°, or one half of one division on the clamp scale, in a counter-clockwise direction (opposite to direction of rotation). When this position is reached, clamp the distributor in the mounting.

FIRING ORDER: — The firing order is 1,5,3,6,2,4.

SPARK PLUG GAPS: — The spark plug gaps are .025 to .030 inch.

STARTER: — Model No. 713-B. The starter is connected to the engine by means of a Bendix drive. The direction of rotation is clockwise, looking at the commutator end.

Starter Test Data.

Torque.	R. P. M.	Volts.	Amperes.
0	5000	65	5.
12	Lock.	475	3.6

The tension of the starter brushes should be from 20 to 28 ounces each. The starting switch model is 406-A.

OILING: — Put 5 or 6 drops of light engine oil in the oiler at the commutator end of the motor every 1000 miles or each month. At the same time fill the connection on the drive end by means of a pressure oil gun.

GENERATOR: — Model Nos. 917-K & 917-S. Generator current regulation is by means of the third brush system. A thermostat located in the field circuit of the generator inserts a resistance in the shunt field at a temperature of 195°-200°F. which reduces the charging rate by approximately one half. The direction of rotation is counter-clockwise, looking at the commutator end. The maximum charging rate is 18-20 amperes at 8.3-8.5 volts reached at 1900 R. P. M. of the generator.

Hot Test.			Generator Test Data.		Cold Test.
Amperes	Volts.	R. P. M.	Amperes.	Volts.	R. P. M.
			0		675
			7	7-7.3	850
9-12	8-8.5	1900	18-20	8.3-8.5	1900

To adjust the generator output, loosen the screw exposed in the commutator end plate and shift the third brush mounting plate. Move the third brush in the direction of armature rotation (counter-clockwise) to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. The field draws 4 to 5.9 amperes at 6 volts. The brush tention should be 14-18 ounces on 917-K generator and 22-24 ounces on the 917-S model.

OILING: — Put 5 or 6 drops of light engine oil in the oiler at the commutator end of the generator every 1000 miles or each month.

RELAY: — Model 265-A and 265-B. The relay is mounted on top of the generator. Relay contacts close at 675 R. P. M. of the generator with a voltage of 6.75 to 7.5 volts and open with a discharge current of 0 to 3 amperes on the model 265-A and 0 to 2.5 amperes on the model 265-B relay. Relay contacts separate .010 to .016 inch on the model 265-A and .015 to .025 inch on the model 265-B. Clean relay contacts by drawing unglazed paper between them. If they are badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit and adjust before again putting into service.

LAMPS: — Combination Switch Model Nos. 481-A and 481-B. Head lamps are 6-8 volt, 21 cp. Dash and tail lamps are each 6-8 volt, 2 cp.

OAKLAND

MODEL 6-54-C (1925-26) SERIAL NOS. 64601-54 UP
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Willard, Type CWR-15. 6 volt, 105 ampere hour. Starting capacity is 115 amperes for 20 minutes. The lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model 284-A. Distributor Model 636-B. Breaker contacts separate .020-.028 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file or on a medium hard oilstone. Distributor is of the full automatic type, no manual advance is provided.

Oiling.—Refill the grease cup under the distributor head and turn down two turns every two weeks or each 500 miles. Remove the rotor and saturate the wick in the oiler on the distributor shaft with light engine oil every 1000 miles or each month. Place a small bit of vaseline on the face of the breaker cam applying with a toothpick.

Timing.—Breaker contacts begin to separate when piston entering power stroke reaches a position 5° before top dead center (measured on flywheel). To set timing, crank engine until piston No. 1 reaches top dead center on compression stroke. At this point the flywheel marking "UDC-1:6" will be opposite the indicator on the flywheel case. Place distributor indicator on breaker plate opposite the "0" of the scale and mount the distributor so that the contacts are just separating. Then loosen the clamp screws and rotate the distributor housing 5° or one half a division on the breaker plate scale in a counter-clockwise direction (opposite to direction of rotation). Tighten the screws. This will give a breaker opening 5° before top dead center.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .022 inch.

STARTER.—Model 713-G. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, looking at the commutator end. Starter brush tension should be 20-24 ounces each. Starter switch is Model 406-A.

Starter Data

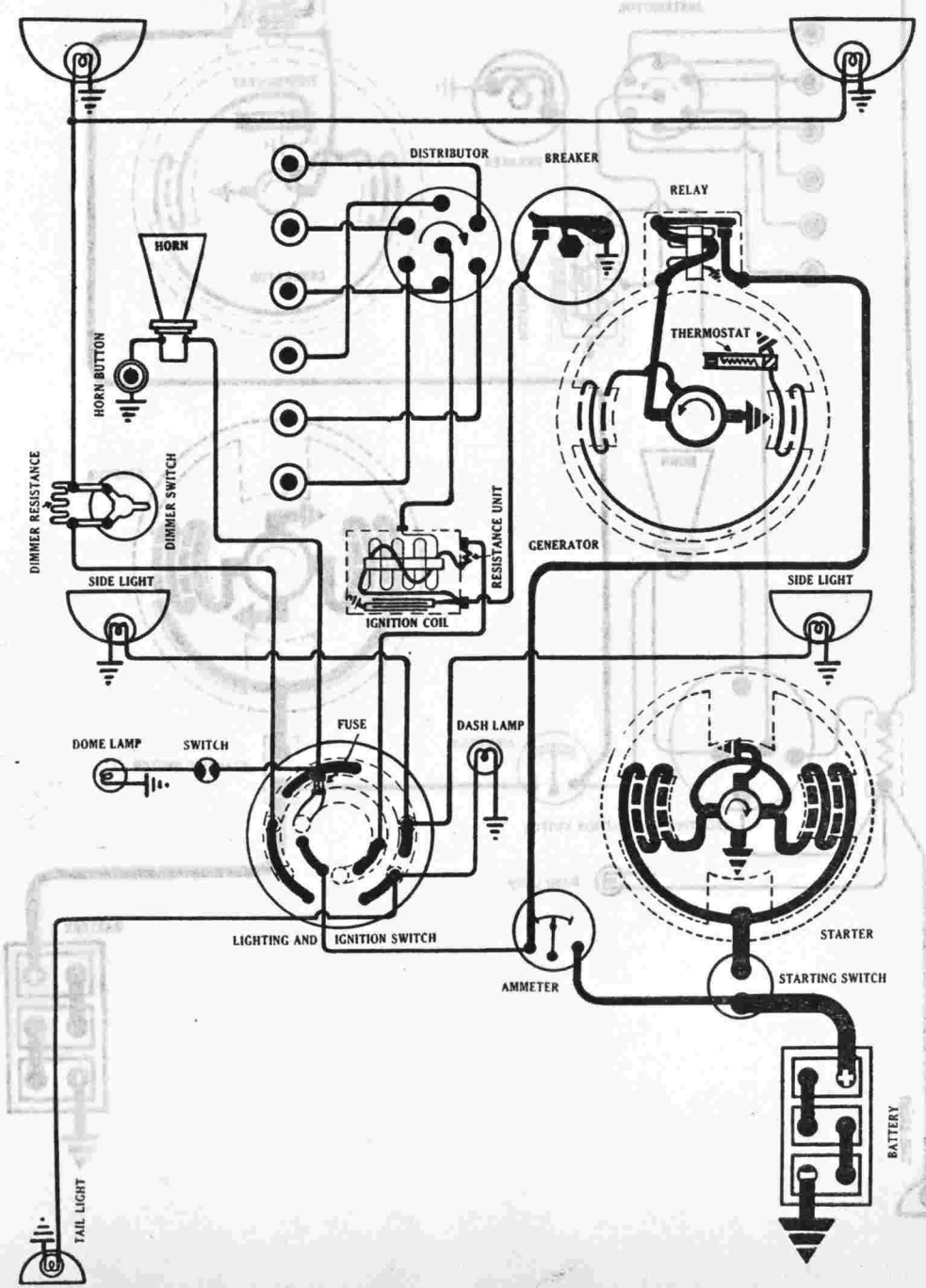
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
12 lb. ft.	Lock	3.63	475

Oiling.—Put 4 or 5 drops of light engine oil in the oiler at the commutator end of the starter every 1000 miles or each month. At the same time fill the oiler on the drive end of the starter with a pressure oil gun.

GENERATOR.—Model 917-S. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system in conjunction with a thermostat. Thermostat contacts open at 195-200° F. and cut a resistance into the shunt field circuit decreasing the output approximately 50%. To adjust the generator output, loosen the screw on the generator end plate and shift the third brush mounting plate. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. Tighten the screw after making the adjustment. The maximum charging rate is 18-20 amperes at 8.3-8.5 volts reached at 1900 R.P.M. of the generator.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0		675			
7	7 -7.3	850	9-12	8-8.5	1900
18-20	8.3-8.5	1900			



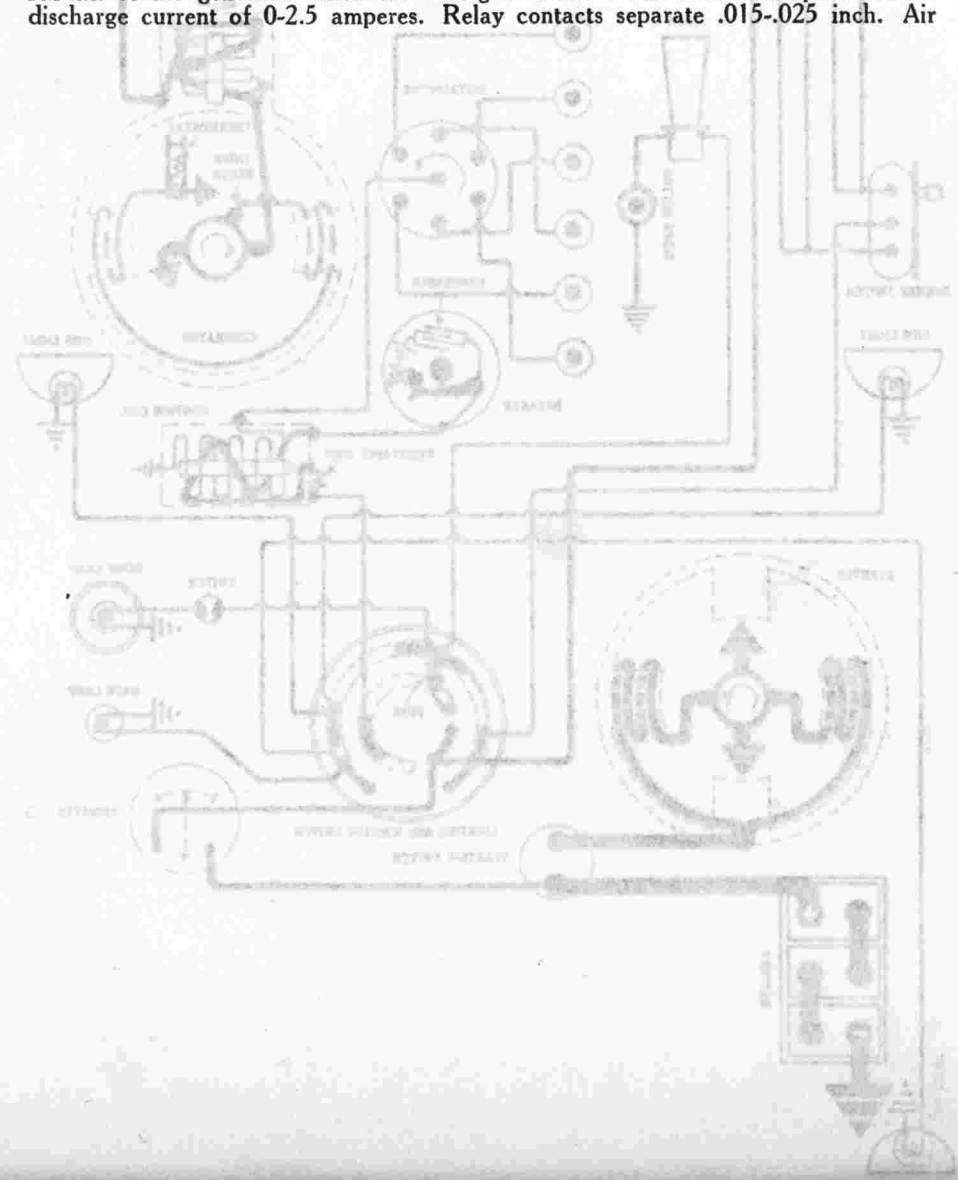
OAKLAND

MODEL 6-54-C (1925-26) SERIAL NOS. 64601-54 UP
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

The shunt field current is 4-5.9 amperes at 6 volts. The generator brush tension should be 22-28 ounces each. Motoring freely at 850 R.P.M. generator draws 7 amperes at 7.3 volts.

Oiling.—Put 5 or 6 drops of light engine oil in the oiler at the commutator end of the generator every 1000 miles or each month.

RELAY.—Model 265-B. Relay is mounted on top of the generator. Relay closes at 675 R.P.M. of the generator when the voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .016 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well-worn No. 00 sandpaper. Remove all grit and adjust before again putting into service.



LIGHTING.—Head lamps are 6-8 volt, 21 cp. S.C. Dome lamp is 6-8 volt, 3 cp. Dash and tail lamps are each 6-8 volt, 2 cp. S.C.

Switches.—Lighting switch is Model 475-L. Dimmer switch is Model 482-C.

FUSES.—Lighting fuses are 15 amperes.

OAKLAND

MODEL O.S. (1926), SERIAL NOS. 64523-54 UP
MODEL O.S. (1927), SERIAL NOS. 120800-54 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY.—Willard, Type CWR-15. 6 volt. Starting capacity is 115 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model 284-A. Distributor Model 636-J. Breaker contacts separate .020-.028 inch. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Distributor is of the full automatic type, no manual advance being provided. Rotation is clockwise, viewed from the top.

Mounting.—Distributor is mounted on top of engine block.

Oiling.—Refill the grease cup under the distributor head and turn down one turn every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Put a small bit of vaseline on the face of the breaker cam under the fiber bumper every month.

Timing.—Breaker contacts begin to separate when piston No. 1 on compression stroke reaches a position when the flywheel marking "IGN" 1&6 UDC is opposite the indicator on the flywheel housing. To check timing, crank engine until piston No. 1 reaches this position. Then loosen distributor clamp screw and rotate distributor housing until contacts begin to separate. Tighten the clamp screw.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .022 inch.

Valve Timing:—INLET VALVES:—Head diameter, 1 9/32 inches; stem diameter, 5/16 inch; stem length, 4 7/8 inches; tappet clearance, .007-.009 inch; spring pressure, 30-40 pounds; valve lift, 9/32 inch; intake opens at 5° after top dead center and closes 40° after lower dead center.
EXHAUST VALVES:—Head diameter, 1 9/32 inches; stem diameter, 5/16 inch; stem length 4 7/8 inches; tappet clearance, .007-.009 inch; spring pressure, 30-40 pounds; valve lift, 9/32 inch; exhaust opens at 45° before lower dead center and closes at 5° after top dead center. Stem guides are removable. No oversize valve stems are made.

STARTER.—Model 713-G. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, looking at the commutator end. Starter brush tension is 24-28 ounces each. Starter switch is Model 406-A.

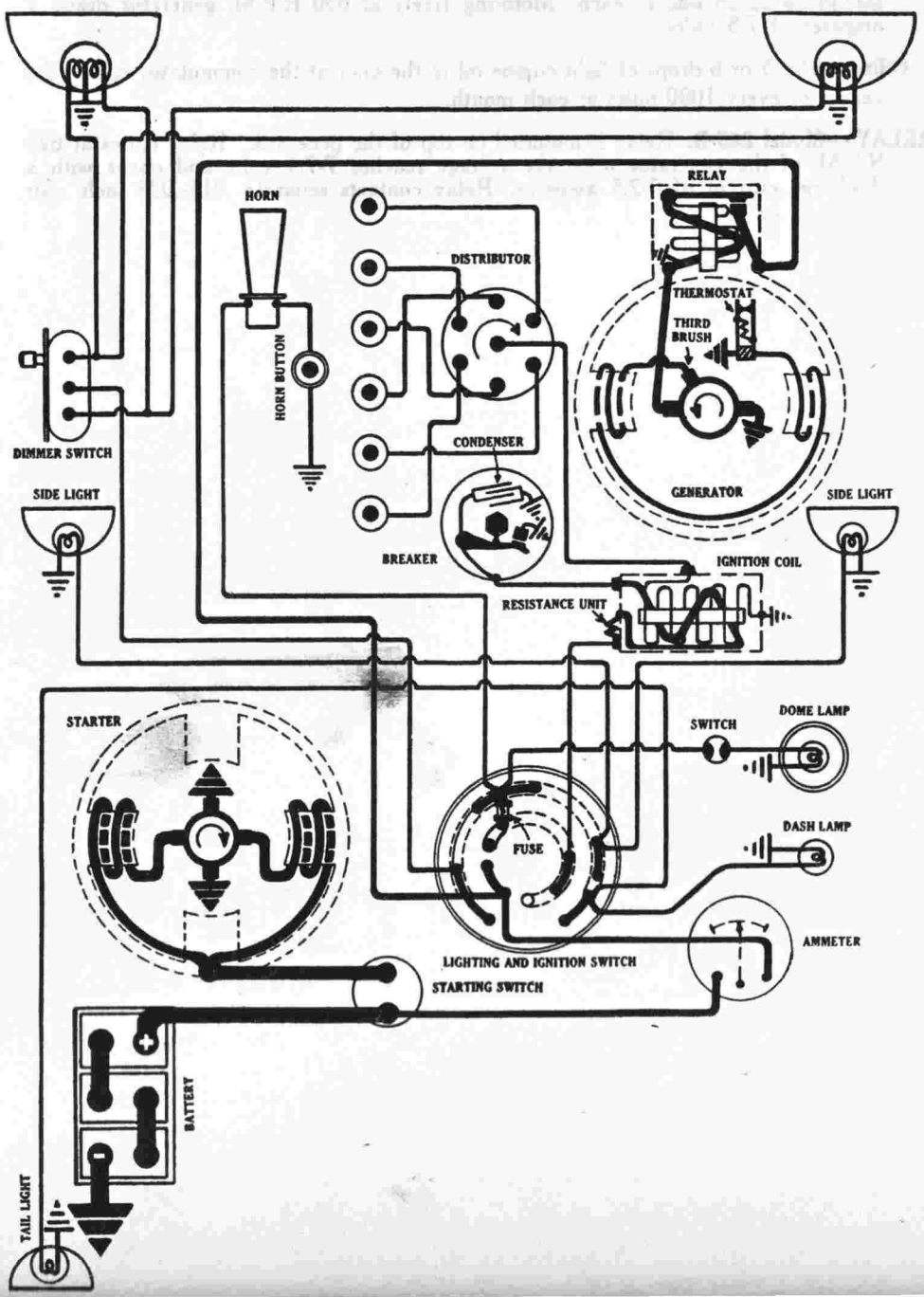
Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
12 "	Lock	3.63	475

Mounting.—Starter is mounted by special sleeve mounting at right of engine

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month. At the same time fill the oiler on the drive end of the starter with a pressure oil gun.

GENERATOR.—Model 941-M. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system combined with a thermostat. Thermostat contacts open at 195-200° F. cutting a resistance into the shunt field and reducing the output approximately 50%. To adjust the generator output, loosen the small round headed screw on the gener-



ator end plate holding the third brush mounting bracket. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate.

Generator Data

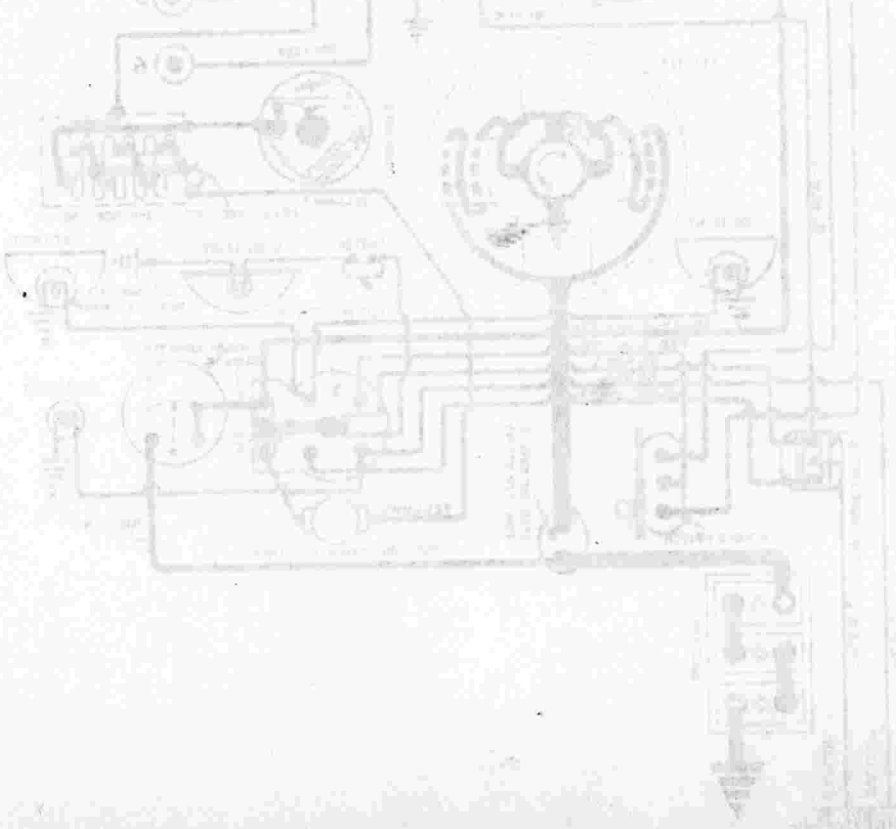
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7-7.3	775			
17	8.15	1400	14	7.85	1800

Shunt field current is 5 amperes at 6 volts. Generator brush tension is 24-28 ounces.

Mounting.—Generator is flange mounted at right of engine.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY.—Model 265-B. Relay is mounted on top of the generator. Relay contacts close at approximately 575 R.P.M. when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.



LIGHTING.—Head lamps are 6-8 volt, 21 cp., double filament, using Tilt-Ray system for dimming. Dash, tail, dome and side lamps are each 6-8 volt, 3 cp. S. C.

Switches.—Lighting and Ignition switch is Model 475-L. Dimmer switch (mounted on foot board) is Model 465-A. Choke control is Model 495-C.

Circuits.—Switch is of special type controlling both lights and ignition with single lever. Switch positions are 1-2-3-4 right and 5-6 left. Circuits are as follows:

1 Vertical—All lights and ignition off.
2 Right—All lights off. Ignition on.
3 Right—Side and tail lamps on. Ignition on.
4 Right—Head lamps on. Tail lamp on. Ignition on. Operation of dimmer switch on toe board dims head lamps.
5 Left—Side and tail lamps on. Ignition off.
6 Left—Head and tail lamps on. Ignition off.

FUSES.—Lighting fuse on switch is 15 amperes. A spare fuse is mounted on the switch.

OAKLAND

'ALL-AMERICAN' MODEL 6-212 (1928)
SERIAL NUMBERS 170,000 UP
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type CWR-15, 6 volt, 15 plates. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 115 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Plates are 5¾ inches wide, 4¾ inches high, 3/32 inch thick. Battery is mounted under front floor boards on left frame member.

IGNITION: Coil Model 284-A. Coil is mounted on the engine block. Ignition current is 2 amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped.

Distributor Model 640-B. Breaker contacts separate .018-.024 inch. Adjust contact opening by loosening lock screw on end of stationary contact mounting plate and turning eccentric adjusting screw to secure proper adjustment. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is full automatic. Maximum automatic advance is 21° (engine).

Mounting:—Distributor is mounted at left of engine block. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Then loosen clamp screw and lift distributor from place.

Oiling:—Fill the grease cup with medium cup grease and turn down one turn every 800 miles. Every 1000 miles remove the distributor head and rotor and put 4 or 5 drops of oil in the wick oiler in the center of the shaft.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the breaker assembly fully retarded. To set timing, crank engine until piston No. 1 reaches top dead center on compression stroke (the upstroke with both valves closed). Loosen clamp screw on side of mounting and turn distributor until contacts begin to separate. Tighten the clamp screw. Connect the segment opposite the rotor to the spark plug in cylinder No. 1 and connect the remaining plugs in order 5-3-6-2-4 around the distributor in a counter-clockwise direction.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are ⅞ inch pipe threaded. Gaps are .022 inch.

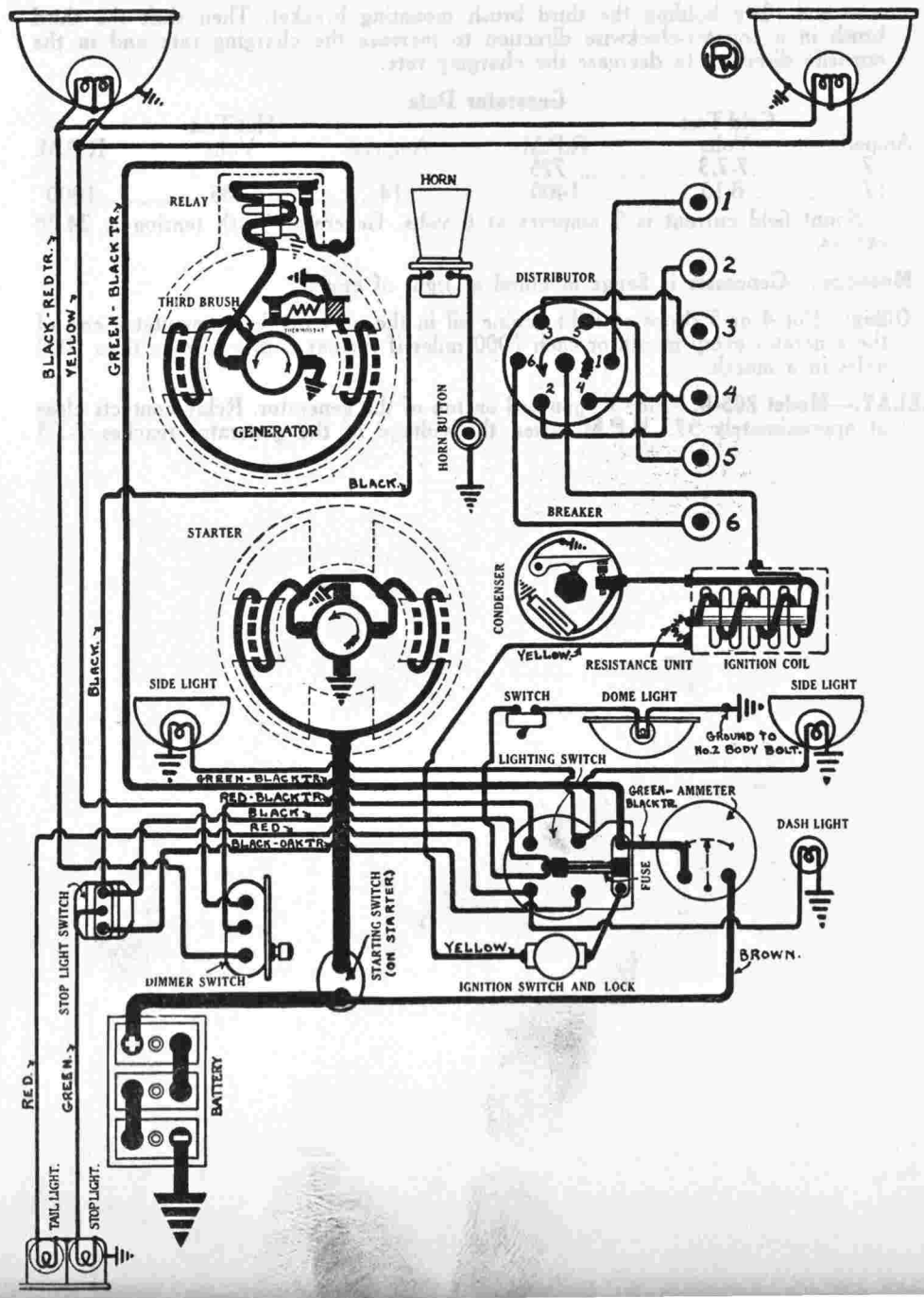
VALVE TIMING:—INLET VALVES:—Head diameter, 1⅝ inches; stem diameter, .31 inch; stem length, 5 1/16 inches. Valve lift, 9/32 inch. Spring pressure, 40-50 pounds. Tappet clearance, .007-.009 inch. Inlet valves open 5° after top dead center and close 40° after lower dead center.

EXHAUST VALVES:—Head diameter, 1½ inches; stem diameter, .31 inch; stem length, 5 1/16 inches. Valve lift, 9/32 inch. Spring pressure, 40-50 pounds. Tappet clearance, .007-.009 inch. Exhaust valves open 45° before lower dead center and close 5° after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

STARTER:—Model 714-F. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 100-175 R.P.M. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
12 "	Lock	3.63	475



OAKLAND

'ALL-AMERICAN MODEL 6-212 (1928)
SERIAL NOS. 170,000 UP
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove flange mounting cap screws. Then pull starter forward and lift from place.

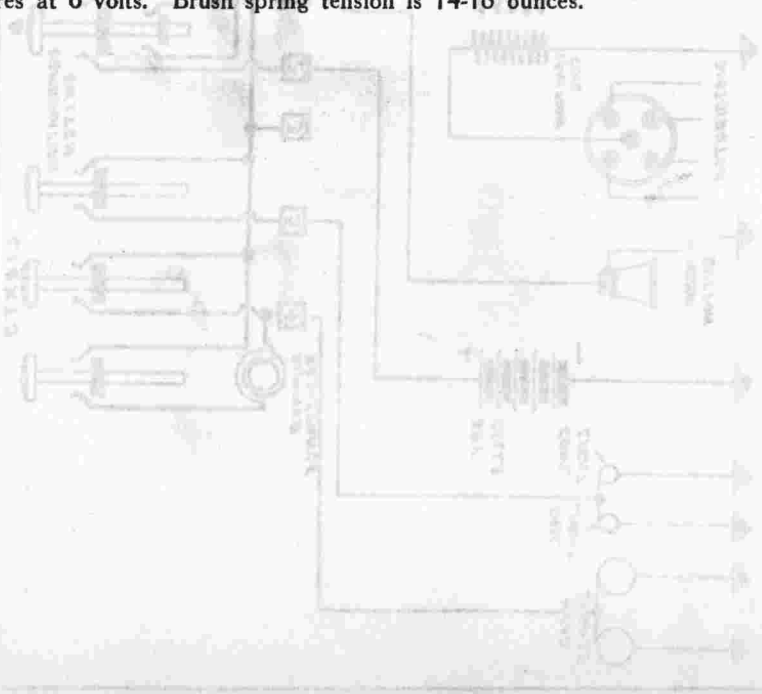
Oiling:—Put 4 or 5 drops of light oil in the commutator end oiler every 1000 miles. The drive end bearing is oilless.

GENERATOR:—Model 949-N. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. and the resistance across the thermostat contacts is inserted in the shunt field circuit cutting the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, charging rate is 14 amperes (hot) or 17 amperes (cold) reached at 1400 R.P.M. or approximately 20 miles per hour.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
17-21	8.5	1450	12	7.5	2000

Motoring generator draws 5.5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 14-18 ounces.



Mounting:—Generator is mounted at left front of engine by special swinging bracket and is driven by fan belt. To remove generator, disconnect lead and loosen nut on special adjustment bracket and swing generator toward engine block. Slip off belt. Then remove two bolts in bracket under gnerator and lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay closes at 7-10 M.P.H. or 575 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Switch is mounted on the instrument board. Dimming is by double filament head light bulbs controlled by Dimmer Switch Model 465-B mounted on the toeboard. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base) Mazda No. 1110. Parking lights (in head lamps) are 6-8 volt, 3 cp. S.C. Mazda No. 63. Dash, tail, side, stop, backing, dome and tonneau lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

Switches:—Lighting switch is Clum Model 10708 or 10712. Stop light and back light switch is Model 8665. Choke and throttle control (to match switch) is Model 8593, 8716 or 8736.

FUSES:—Lighting fuse on back of switch is 20 amperes. A spare fuse is also mounted on the switch.

Oldsmobile

Model 42 (1915)

Delco Generating, Starting and Lighting System

Delco Ignition

Battery.—Battery is 6 volt, 120 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts separate .010 inch. When contacts are closed, contact blade and clip separate .015 inch. See that pigtail conducting current to the contact blade is not disconnected. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper.

Oiling.—Put several drops of light engine oil in timer bearing oiler every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Timing.—Breaker contacts begin to separate when the top dead center mark on flywheel is at indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps are .027 to .030 inch.

Starter-Generator.—Model No. 49. Starter and generator are combined into one unit but are electrically separate. Starter is connected to the engine through a set of reduction gears meshed by the operator. Two overrunning clutches are provided. In connection with the ignition switch, a circuit is closed allowing current to flow through the generator windings, causing the armature to revolve slowly, aiding the meshing of the reduction gears. One clutch permits this rotation and also permits a relatively high speed of the armature, necessary when operating as a starter. The second overrunning clutch prevents the engine from driving the armature through the reduction gears. Depressing the starting pedal meshes the reduction gears, opens the generator circuit and allows the motor brush to come in contact with the commutator, closing the starter circuit and cranking the engine. When the pedal is released, a spring reverses these operations.

Generator.—Generator voltage regulation is by automatic field rheostat operated from a governor on the distributor shaft. Generator begins to supply current at 7-9 miles per hour or 350-400 R. P. M. of armature. Maximum charging rate of 16-18 amperes is reached at 20-25 M. P. H. or 900-1050 R. P. M. of armature.

GENERATOR DATA, MOTOR-GENERATOR MODEL NO. 49

Amperes	R. P. M.
Neutral	350
6-11	500
16-20	900-1050
9-14	1500

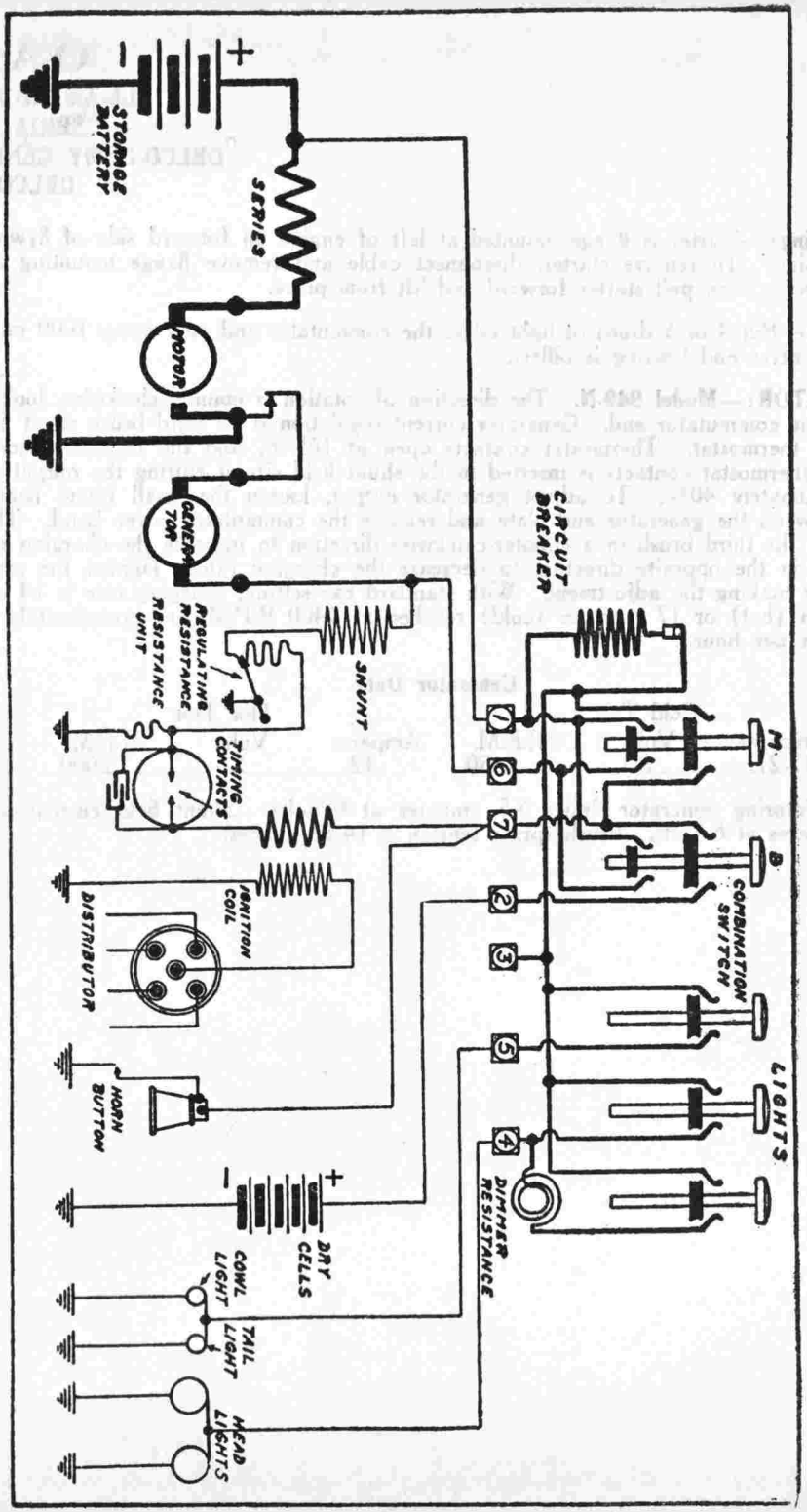
Charging rate is varied by changing the regulating resistance spool. There are six different spools available namely, Nos. 633, 703, 702, 701, 817 and 955. No. 633 is wound with the largest wire, the sizes reducing in the order named. Installing a spool of larger wire increases the output. The spools have a wide brass cap at one end and a narrow cap at the other end. Minimum output with each spool is obtained when installed with the narrow cap at the bottom. The contact arm must bear on the resistance spool with a pressure of 6 ounces. A poor contact between the arm and spool will cause the generator to motor at excessive speed when the ignition switch is closed. Operating freely as a motor, clutch at driving end as the only retarding force, current is 4.5 amperes.

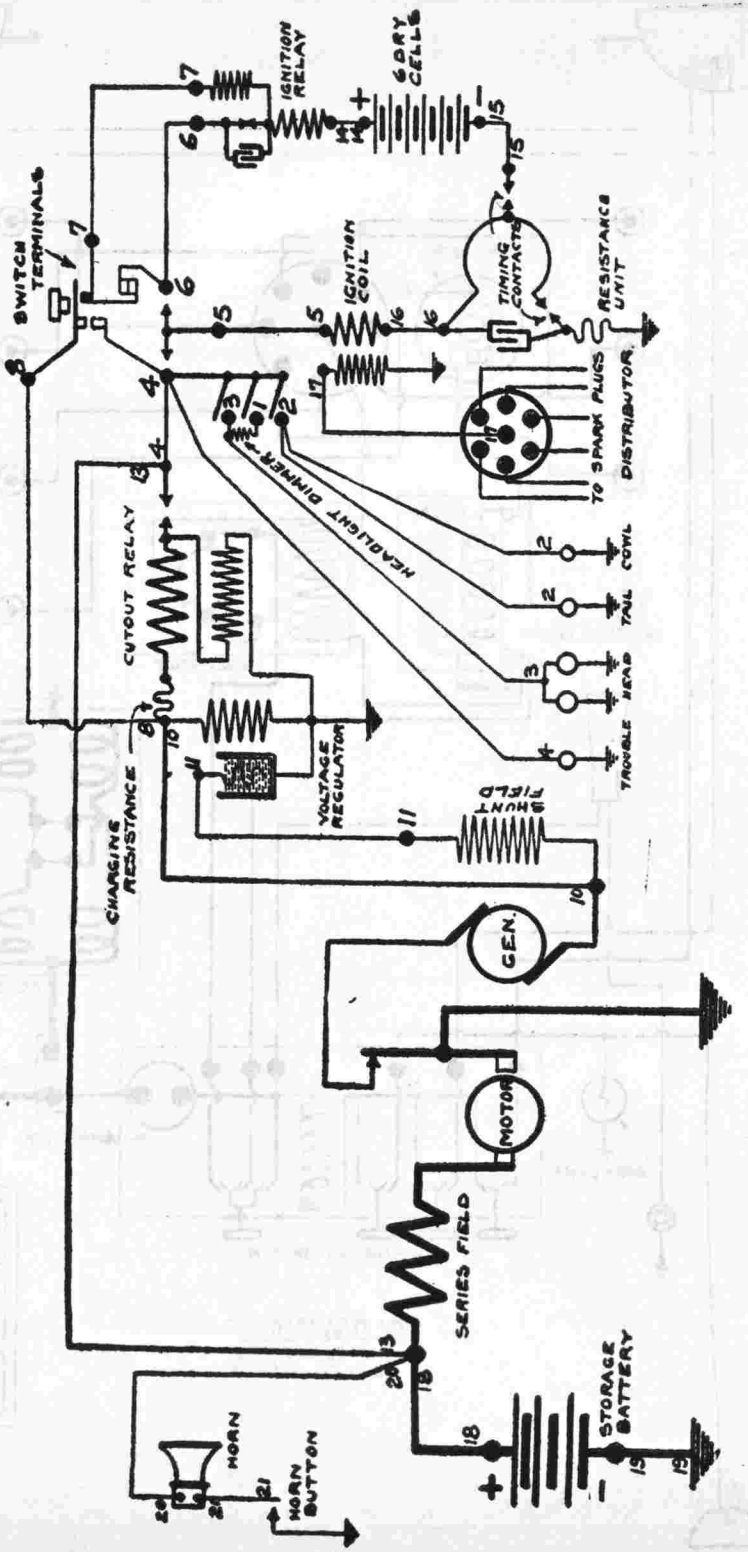
Oiling.—Put several drops of light engine oil in each of starter-generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles. Refill grease cup at end of idler gear shaft with soft cup grease and turn down every month.

Relay.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch. The overrunning clutch at driving end allows generator to operate as a motor when battery's pressure is above that of generator. If engine is killed when stopping the noise made by the clutch serves to attract the operator's attention to open the ignition switch. The opening and closing of the generator-battey circuit by the operator, takes the place of the relay.

Lamps.—Head lamps are 6-8 volt, 18 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

Circuit-Breaker.—A vibrating circuit breaker takes the place of fuses. It requires a current of 25 amperes to start this device vibrating. While vibrating, the current flow is 3-5





Oldsmobile

Model 55 (1915)

Delco Generating, Starting and Lighting System
Delco Ignition

Battery.—Battery is 6 volt, 120 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts separate .010 inch. When contacts are closed, contact blade and clip separate .015 inch. See that pigtail conducting current to the contact blade is not disconnected. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper

Oiling.—Put several drops of light engine oil in distributor shaft bearing oiler every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Timing.—Breaker contacts begin to separate when the top dead center mark on flywheel is 1½ inches before indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .027 to .030 inch.

Starter-Generator.—Model No. 54. Starter and generator are combined into one unit, but are electrically separate. Starter is connected to the engine through a set of reduction gears meshed by the operator. Depressing starter pedal mechanically closes the relay, allowing current to flow through the generator windings, causing the armature to revolve slowly, aiding the meshing of the reduction gears. An overrunning clutch permits this rotation, and also permits a relatively high speed of the armature, necessary when operating as a starter. Depressing starter pedal further meshes the gears, raises the generator brush and allows the motor brush to come into contact with the commutator, closing the starter circuit and cranking the engine. A second overrunning clutch prevents the engine from driving the armature through the reduction gears. Generator brush must be lifted during the cranking operation.

Generator.—Generator voltage regulation is by mercury regulator. Charging current will vary with state of charge of battery, being 18-20 amperes when battery is badly discharged, but reducing to 10-12 amperes as battery becomes charged. Maximum charging rate is reached at 20-25 miles per hour.

R. P. M.	Generator Data, Model 54	Amperes
475		0
750		7
1000		10
1500		14-22

Oiling.—Put several drops of light engine oil in each of starter-generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles. Refill grease cup at end of idler gear shaft with soft cup grease and turn down every month.

Relay.—Relay closes at 7-9 miles per hour or 475 R. P. M. of armature, and opens at 5-7 miles per hour or 400 R. P. M. of armature. Charging current is 1 to 3 amperes at closing and the discharge current 0 to 1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 20 cp. Dash lamp is 6-8 volt, 2 cp. Trouble lamp is 6-8 volt, 4 cp. Tail lamp is 6-8 volt, 2 cp.

Model Numbers.—Generator is Model No. 54. Ignition coil is No. 2111. Combination switch is No. 1035. Battery is Exide Type 3-MH-155-A.

Oldsmobile

Model 44 (1916) (Serial Nos. 93000 to 118782)
Delco Generating, Starting and Lighting System
Delco Ignition

Battery.—Battery is 6 volt, 85 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the points affects the ignition remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Timing.—Breaker contacts separate when the upper dead center mark on flywheel is 1½ inches before the indicator, spark control lever and breaker assembly in the fully advanced position.

Firing Order.—The firing order is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

Spark Plug Gaps.—Spark plug gaps are .027 inch to .030 inch.

Oiling.—Put 5 or 6 drops of light engine oil in the oil hole on the side of distributor housing every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Starter.—Starting motor is No. 72. It is connected to the engine through a Bendix drive The lock torque is 17.5 pound-feet. Running freely, starter takes 40 amperes.

Oiling.—Starter bearings are of the oilless type and require no lubrication.

Generator.—Generator current regulation is by third brush system.

GENERATOR DATA, No. 91

Cold-Amperes	R. P. M.	Warm-Amperes	R. P. M.
Neutral	625	Neutral	650
5.0-7	800	4.0-6	800
9.5-13	1000	8.5-11	1000
15.0-19	1600	14.0-18	1600
17.0-21	1800	16.0-20	1800
16.0-21	2000	14.0-20	2000

To change charging rate loosen the two screws which hold third brush arm. Move the brush in a clockwise direction (looking at commutator end) to increase the charging rate, and in a counter-clockwise direction to decrease the charging rate. Tighten the adjusting screws and reseat brush after adjusting position. Generator begins to supply current at 7-8 miles per hour, and reaches its maximum output at 20-25 miles per hour.

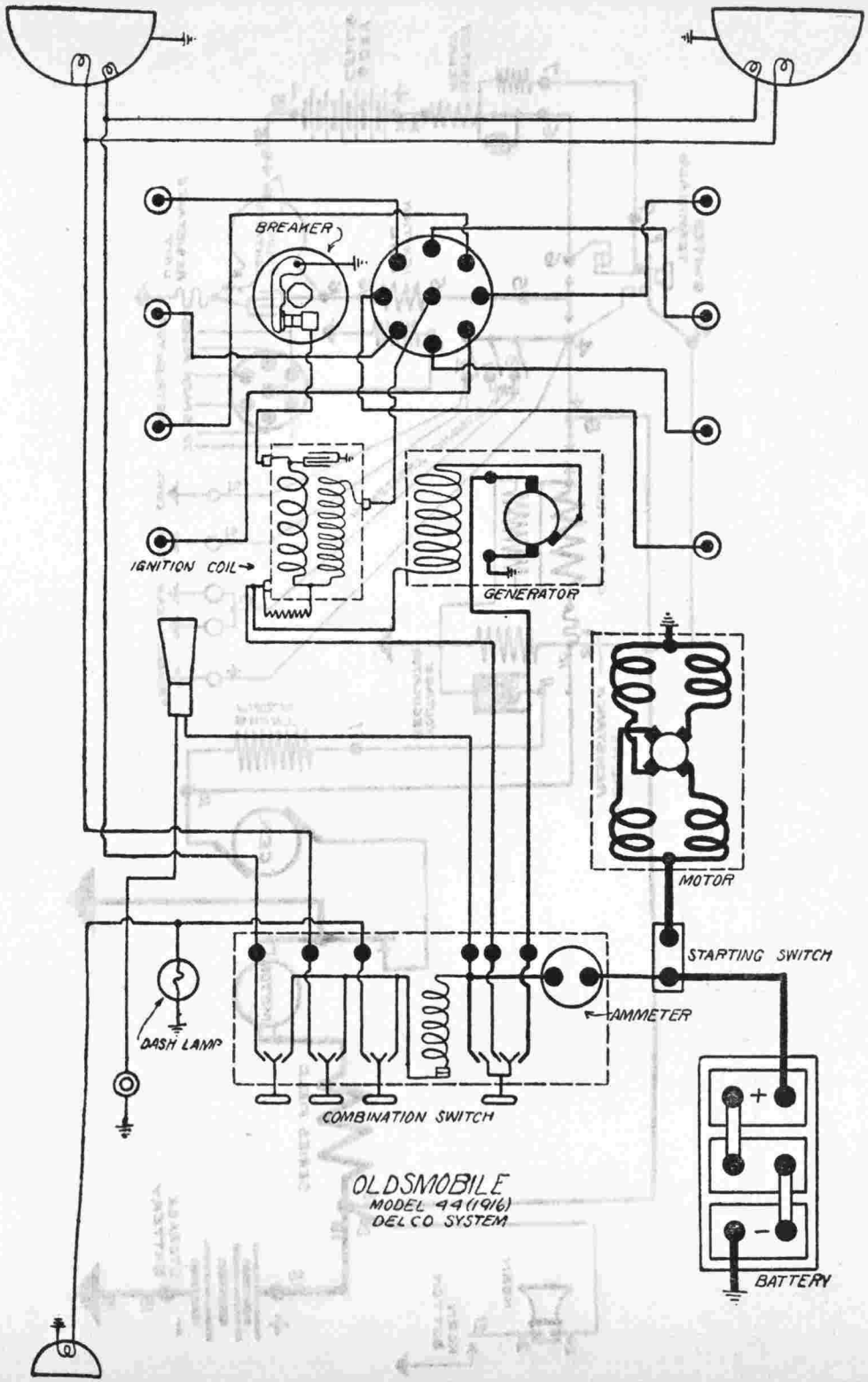
Oiling.—Put 6 or 8 drops of light engine oil in each of the generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

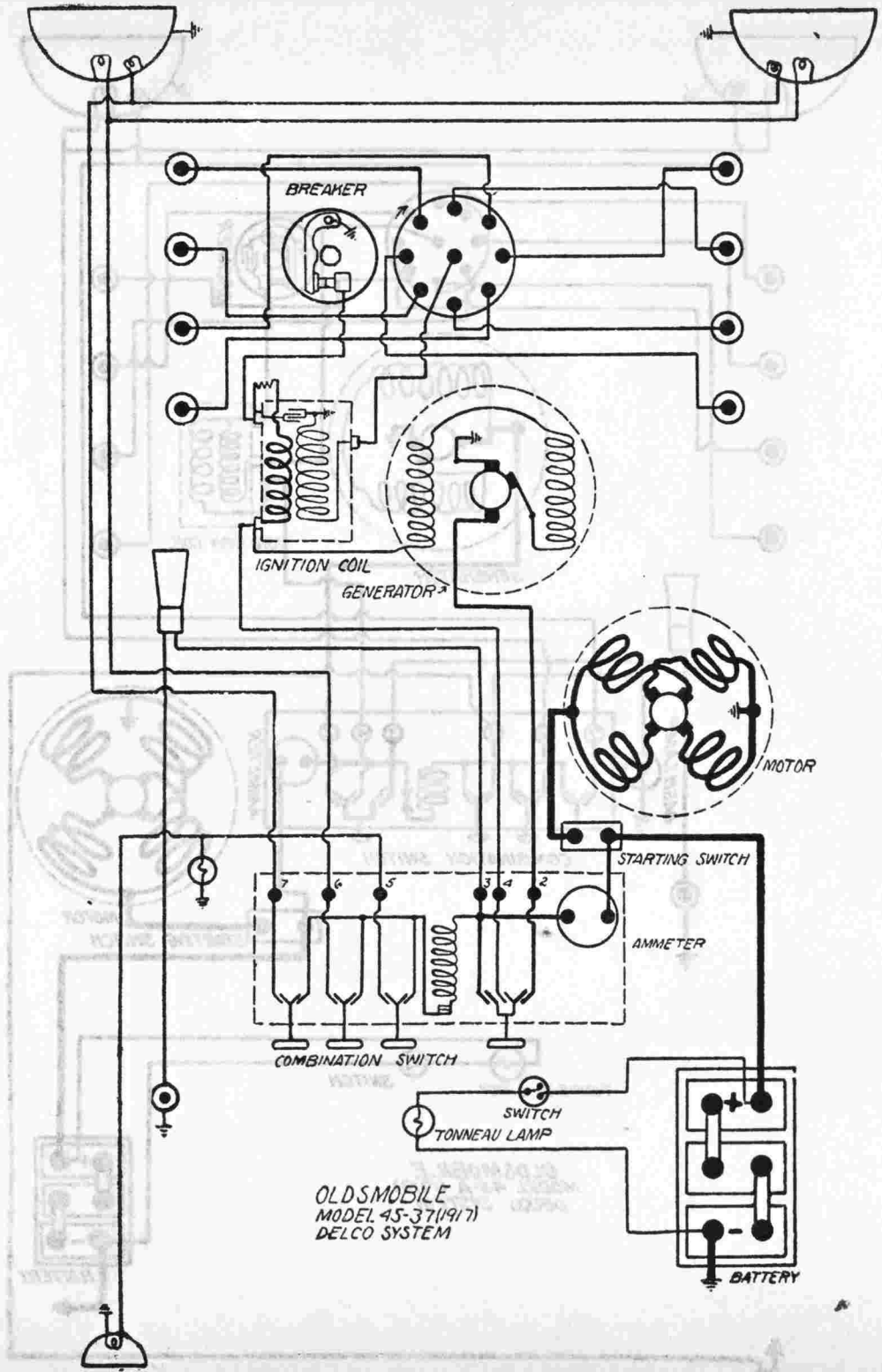
Relay.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are 6-8 volt, 2 cp.

Circuit Breaker.—There is a vibrating circuit breaker on the back of the lighting switch which takes the place of fuses in the lighting circuits. It requires a current of 25 amperes to start this device vibrating, but when vibrating, 3 to 5 amperes will cause it to continue.

Model Numbers.—Generator is No. 91. Starter is No. 72. Combination switch is No. 1066 or No. 1067. Ignition coil is No. 2123.





Oldsmobile

Models 45 and 37 (1917) (Serial Nos. 119000 to 200000)
Delco Generating, Starting and Lighting System
Delco Ignition

Battery.—Battery is 6 volt, 85 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Timing.—Breaker contacts separate when the upper dead center mark on the flywheel is 1½ inches before the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

Spark Plug Gaps.—Spark plug gaps are .027 to .030 inch.

Oiling.—Put 5 or 6 drop of light engine oil in the oil hole on the side of the distributor housing every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Starter.—Starting Motor No. 72 is used on the the Model 45 cars, and Motor No. 100 is used on the Model 37 cars. The lock torque of Motor No. 72 is 17.5 pound-feet, and of No. 100 is 16 pound-feet. Both motors when running freely, take 40 amperes.

Oiling.—Starter bearings are of the oilless type and require no lubrication.

Generator.—Generator current regulation is by third brush system. Generator No. 113 is used on the Model 45 cars, and No. 111 is used on the Model 37 cars.

GENERATOR DATA

No. 113 Amperes	R. P. M.	No. 111 Amperes	R. P. M.
Neutral	500	Neutral	500
11-13	900	10-12	900
16-18	1400	14-16	1400
15-18	1800	11-13	2000
14-16	2000		

To adjust the charging rate, loosen the two screws on the third brush arm. Move the brush to the right to increase the charging rate and to the left to decrease it. Tighten the adjusting screws and reseat the brush after adjusting position. Generator begins to supply current at 7-8 miles per hour aud reaches its maximum output at 20-25 miles per hour.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4-6 cp. Dash and tail lamps are each 6-8 volt, 2 cp.

Circuit-Breaker.—There is a vibrating circuit breaker on the back of the lighting switch which takes the place of fuses in the lighting circuits. It requires a current of 25 amperes to start this device vibrating, but when vibraiing 3 to 5 amperes will cause it to continue.

Model Numbers.—On the Model 45 cars the generator is No. 113. Starter is No. 72. Ignition coil is No. 2153, and combination switch is No. 1066. On the Model 37 cars the starter is No. 100. Generator is No. 100. Ignition coil is No. 2137 and combination switch is No. 1066.

OLDSMOBILE

MODEL 45 (1917) SERIAL NOS. 190,000 UP
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Battery is 6 volt, 84 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every two weeks. If the track of the distributor rotor button is not well polished apply a small amount of vaseline with a soft cloth. If car is driven more than 500 mies in two weeks these attentions must be given every 500 miles.

TIMING.—Breaker contacts separate when piston entering power stroke is on top dead center, spark control lever 2 inches from the top on the 1919 cars, and in the fully retarded position on the 1918 cars.

FIRING ORDER.—The firing order is 1 R, 4 L, 3 R, 2 L, 4 R, 1 L, 2 R, 3 L.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Starter is connected to the engine by a Bendix drive. Operating without load, starter takes 40 amperes. The lock torque is 17.5 pound-feet with a voltage of 3.5 to 3.8 volts.

OILING.—Starter bearings are of the oilless type.

GENERATOR.—Generator current regulation in by third brush system.

Generator Data.—Nos. 134 and 137

Cold.—Amperes	R.P.M.	**Warm.**—Amperes	R.P.M.
Neutral	500	Neutral	500
10.5-12.5	900	10-12	900
15.5-18.0	1400	14-16	1400
13.0-17.0	2000	11-16	2000

Generator begins to supply current at 7-8 miles per hour and reaches its maximum output of 16-18 amperes at 20-25 miles per hour. Charging rate is changed by adjusting the position of the third brush. Move third brush in a clockwise direction (looking at commutator end), to decrease charging rate, and in a counter-clockwise direction to increase the charging rate.

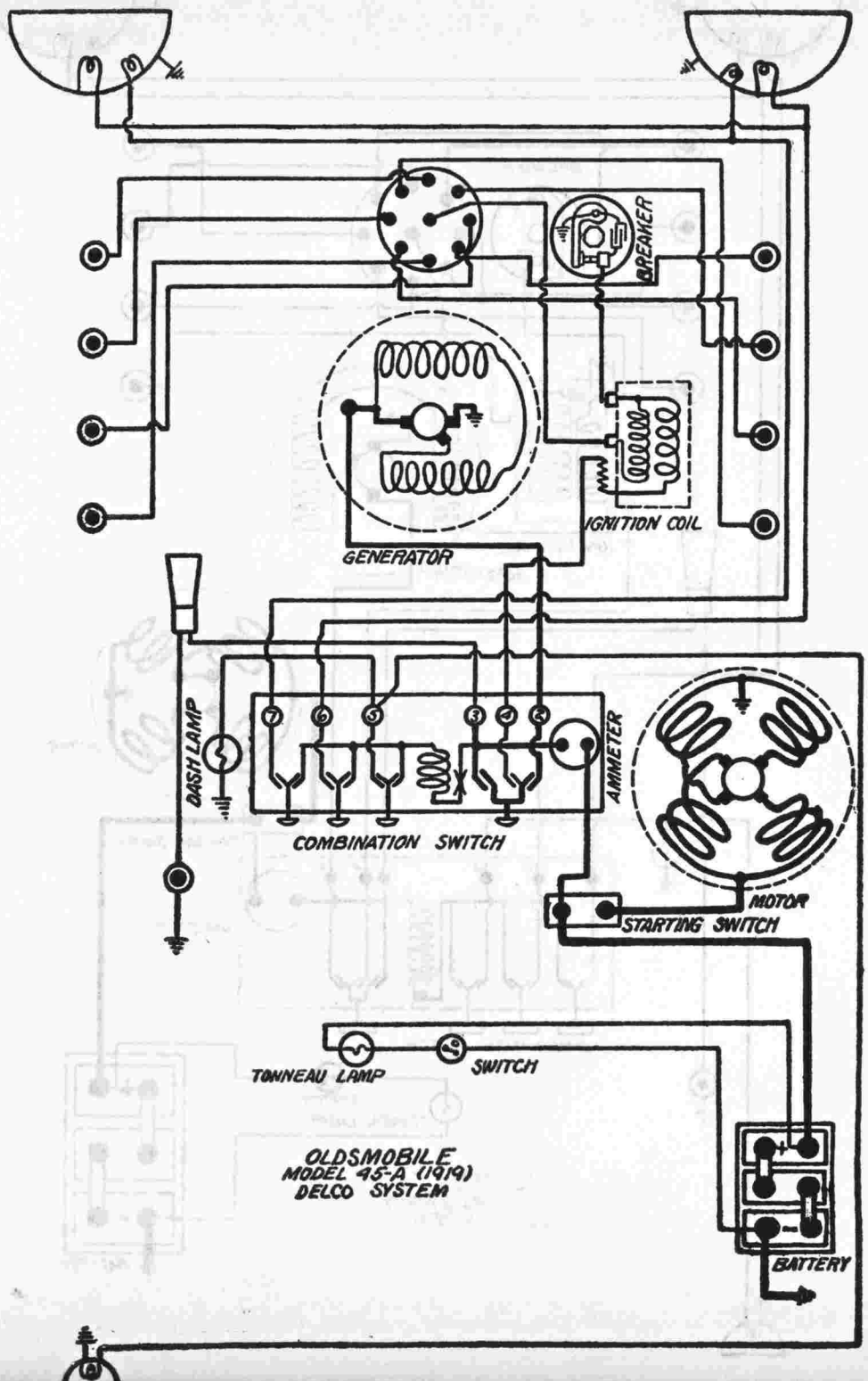
OILING.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

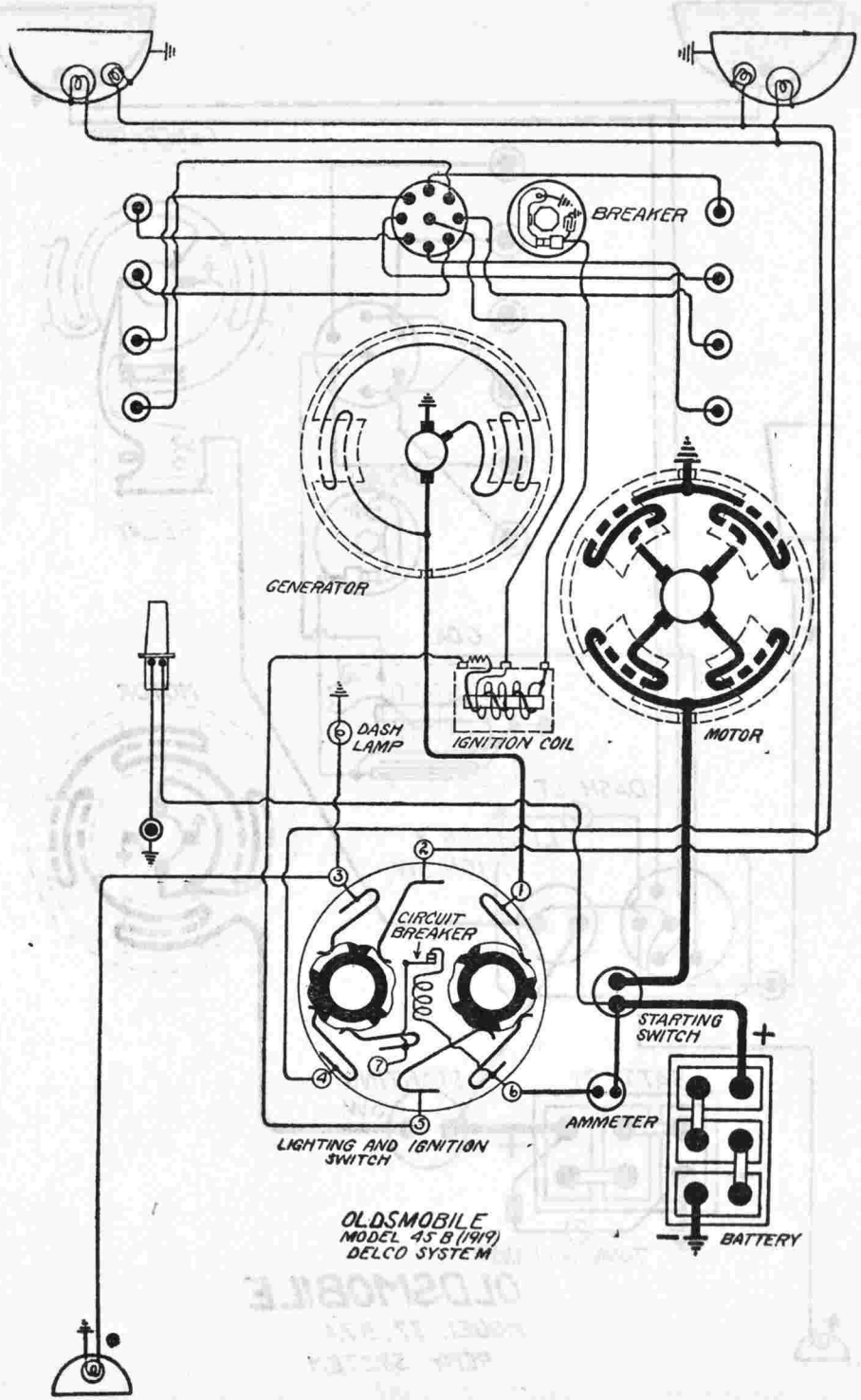
RELAY.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are each 6-8 volt, 2 cp. Tonneau lamp is 6-8 volt, 2 cp.

CIRCUIT BREAKER.—There is a vibrating circuit breaker on the back of the lighting switch which takes the place of fuses in the lighting circuits. It requires a current of 25 amperes to start this device vibrating, but when vibrating, 3 to 5 amperes will cause it to continue.

MODEL NUMBERS.—Generator Nos. 134 and 137 are used. Starter is No. 72. Ignition coil is No. 2162. Combination switch is No. 1104.





OLDSMOBILE

MODEL 45-B (1919)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2162. Switch No. 1146. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put several drops of light engine oil in the oil cup at side of breaker unit every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever two inches from the top of the sector. (First see that the breaker assembly is fully retarded when the control lever is in the fully retarded position.)

FIRING ORDER.—The firing order is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model No. 72. Starter is connected to the engine through a Bendix drive. Lock torque is 17.5 pound-feet, at 3.5 to 3.8 volts. Operating freely, starter current is 40 amperes.

OILING.—Put several drops of light engine oil in starter bearings every month.

GENERATOR.—Model No. 137. Current regulation is by third brush system. Generator begins to supply current at 500-550 R.P.M. of armature or 8 miles per hour. Maximum current output of 14-16 amperes is reached at 1400 R.P.M. or 22 miles per hour.

Amperes	Generator Data	R.P.M.
Neutral		500
10-12		900
14-16		1400
11-13		2000

To increase charging rate loosen the two screws holding third brush arm and move third brush in a counter-clockwise direction (looking at commutator end). To decrease charging rate move third brush in a clockwise direction. Brush must be reseated after adjusting position.

OILING.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch. The overrunning clutch at driving end allows generator to operate as a motor when battery's pressure is above that of generator. If engine is killed when stopping, the noise made by the clutch serves to attract the operator's attention to open the ignition switch. The opening and closing of the generator-battery circuit by the operator takes the place of the relay.

LAMPS.—Head lamps are 6-8 volts, 15 cp. Dimmer lamps are 6-8 volts, 4 cp. Dash and tail lamps are 6-8 volts, 2 cp.

CIRCUIT-BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start this device vibrating. While vibrating, the current is 3-5 amperes.

OLDSMOBILE
MODEL 37-37 A (1917-18-19)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 284-C. Distributor Model No. 356-C. Breaker contacts separate .020 to .025 inch. When condition of contacts affects ignition, resurface with a fine flat jeweler's file or worn No. 00 sandpaper.

TIMING.—Contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

STARTER.—Model 307-A. Starter is connected ot engine through a Bendix drive.

Starter Data.

Torque	R.P.M.	Amperes	Volts
1.00 lb. ft.	2150	140-150	5.50-5.70
2.00 lb. ft.	1650	180-190	5.20-5.40
3.00 lb. ft.	1300	220-230	4.80-4.90
4.00 lb. ft.	1050	258-268	4.35-4.55
5.00 lb. ft.	750	300-310	4.10-4.30
12.75 lb. ft.	Lock	570-590	3.45-3.60

OILING.—Put 5 or 6 drops of light engine oil in each of starter oilers every month.

GENERATOR.—Model 234-A. Generator current regulation is by third brush system. A thermostat located in the brush rigging of the generator cuts in a resistance at a temperature of 175°F., reducing the maximum charging rate 6 amperes. Resistance also acts as a shunt field fuse. The thermostat is intended to change the charging rate as demand of seasons or car operation requires. Never touch the thermostat points.

Generator Data

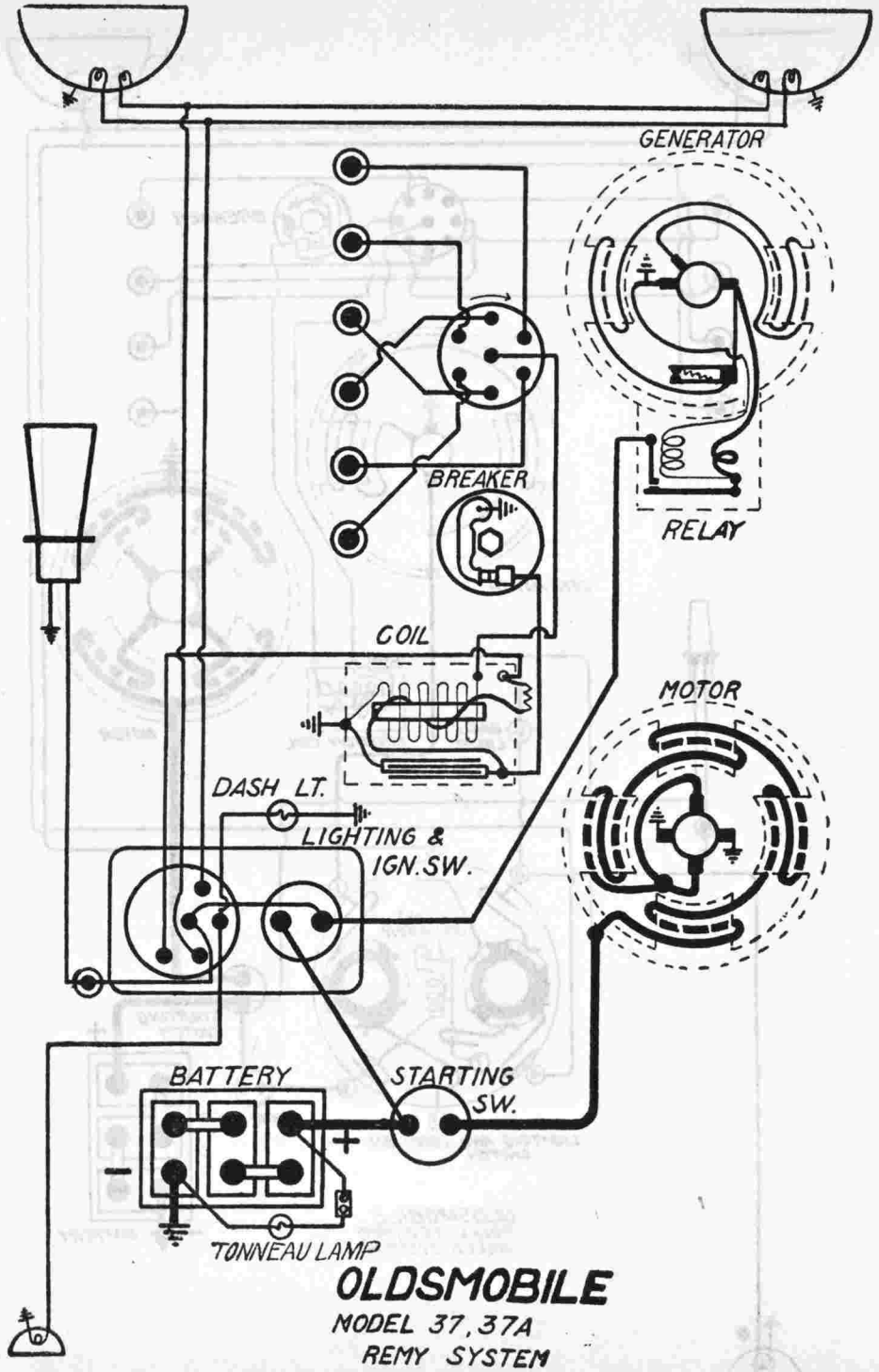
Amperes	R.P.M.	Volts
0	525	6.4
7	780	7.1-7.2
14	1100	7.8
19-20	1680	8.6
19-20	2000	8.6
13-15	3000	8.0

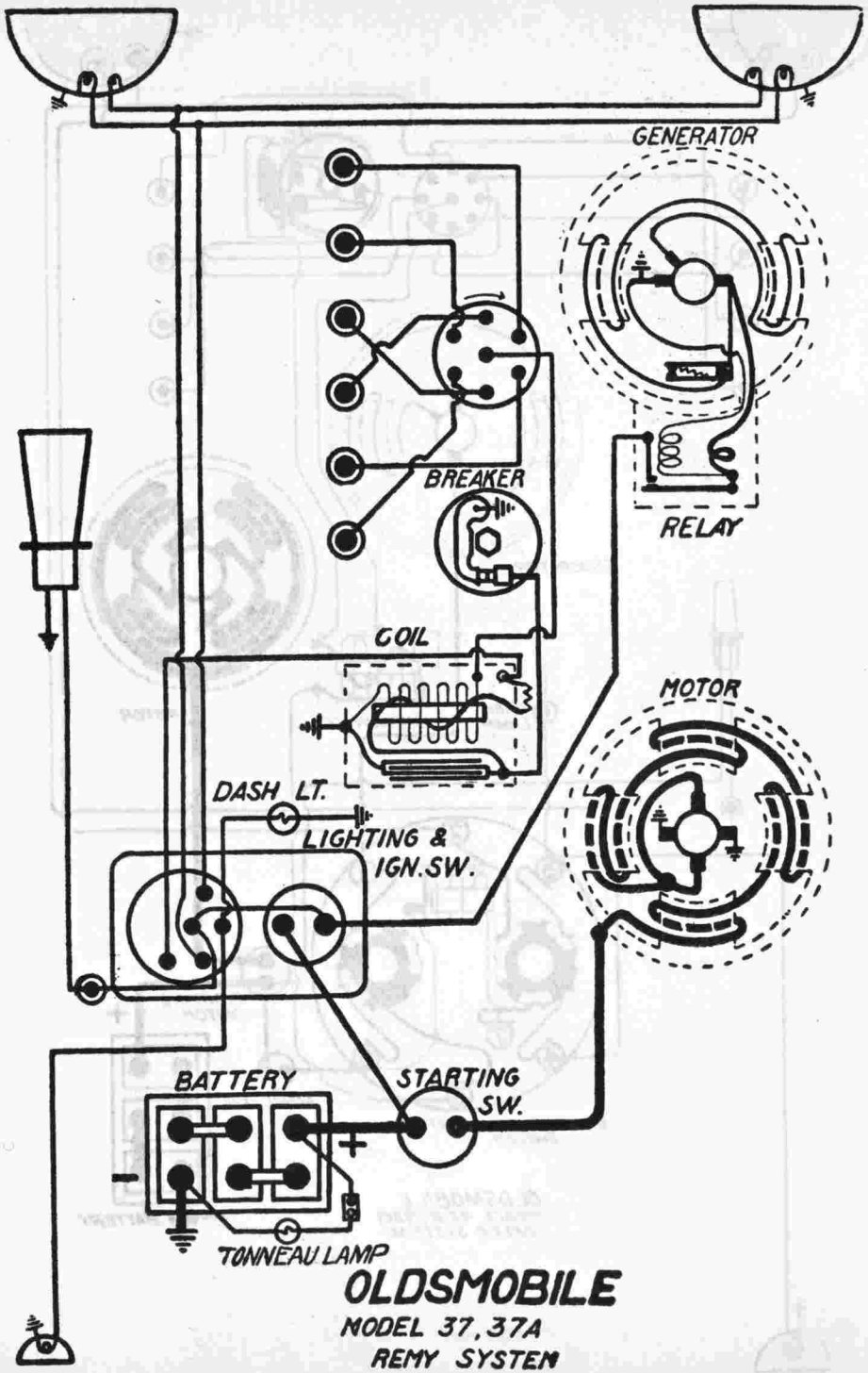
Above tests are made with relay in circuit and thermostat contacts closed. Field current is 5 amperes at 6.4 volts. Pressure of main brushes on commutator is 17 to 20 ounces. Pressure of third brush on commutator is 13 to 17 ounces.

OILING.—Fill generator bearing oilers with light engine oil every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

RELAY.—Relay closes at 7-10 miles per hour or 525-575 R.P.M. of armature and opens at 5-7 miles per hour or 475-525 R.P.M. of armature. Charging current is 1-3 amperes at closing and the discharge current is 0-1 ampere at opening of relay. Air gap between relay armature and coil core is .012 to 0.15 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with a fine flat jeweler's file or worn No. 00 sandpaper. Remove all grit Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash lamp is 6-8 volt, 2 cp. Tonneau lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp. Single contact base is used on all lamps.





OLDSMOBILE

MODEL 37-A (1920-21-22)

REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Willard, 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Model No. 356C. Breaker contacts separate .020 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the grease cup under the breaker head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model No. 701A. Starter is connected to the engine through a Bendix drive

Starter Data

Torque	R.P.M.	Amperes	Volts
0 lb. ft.	10000	65	5.7
2 lb. ft.	2250	175	5.1
4 lb. ft.	1200	275	4.6
6 lb. ft.	750	365	4.2
8 lb. ft.	450	435	3.9
10 lb. ft.	225	500	3.5
12 lb. ft.	Lock	575	3.2

Above tests are made without gear reduction. Pressure of brushes on commutator is 1 to 1¼ pounds.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Model No. 911A. Generator current regulation is by the third brush system. A thermostat, located in the brush rigging of the generator, cuts a resistance into the shunt field circuit at a temperature of 175° F., reducing the maximum charging rate 8 amperes. Never touch the thermostat points.

Generator Data

Cold Test—Thermostat Closed		Hot Test—Thermostat Open	
Amperes	R.P.M.	Amperes	R.P.M.
0	600	0	800
5	750	4	1100
10	950	6	1250
15	1200	8	1450
20	1800	11	2000
14	3200	9	3200

Charging rate is varied by adjustment of the third brush setting. The third brush assembly is moved by turning a screw exposed in the commutator end plate. Pressure of main brushes on the commutator is 17-20 ounces. Pressure of the third brush is 13-17 ounces.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes at 8-10 miles per hour or 600-650 R.P.M. of the armature, and opens at 6-8 miles per hour or 550-600 R.P.M. of the armature. Relay contacts separate .012 to .015 inch. Air gap between relay armature and coil core is .012 to .015 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

OLDSMOBILE

MODELS 45B, 46 (1920-21-22)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Wiillard, 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2127. Distributor Model No. 5210. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put several drops of light engine oil in the upper distributor shaft bearing every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering the power stroke is on top dead center, spark control lever 2 inches from the top of the sector. (First see that the breaker assembly is fully retarded when the control lever is in thefully retarded position.)

FIRING ORDER.—The firing order is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

SPARK PLUGS.—Diameter, 7/8 inch. Spark gaps are .030 inch.

STARTER.—Model No. 178. Starter is connected to the engine through a Bendix drive. Lock torque is 14 pound-feet.

OILING.—Put 4 or 5 drops of light engine oil in the starter oilers every month.

GENERATOR.—Model No. 167. Generator current regulation is by the third brush system. Generator begins to supply current at 550 R.P.M. of the armature or 8 miles per hour. Maximum charging rate is 15 amperes, reached at 1200 R.P.M. of the armature or 18-24 miles per hour.

Amperes	Generator Data	R.P.M.
Neutral		550
4		800
8-10		1000
11-15		1200-1400
11-14		2000

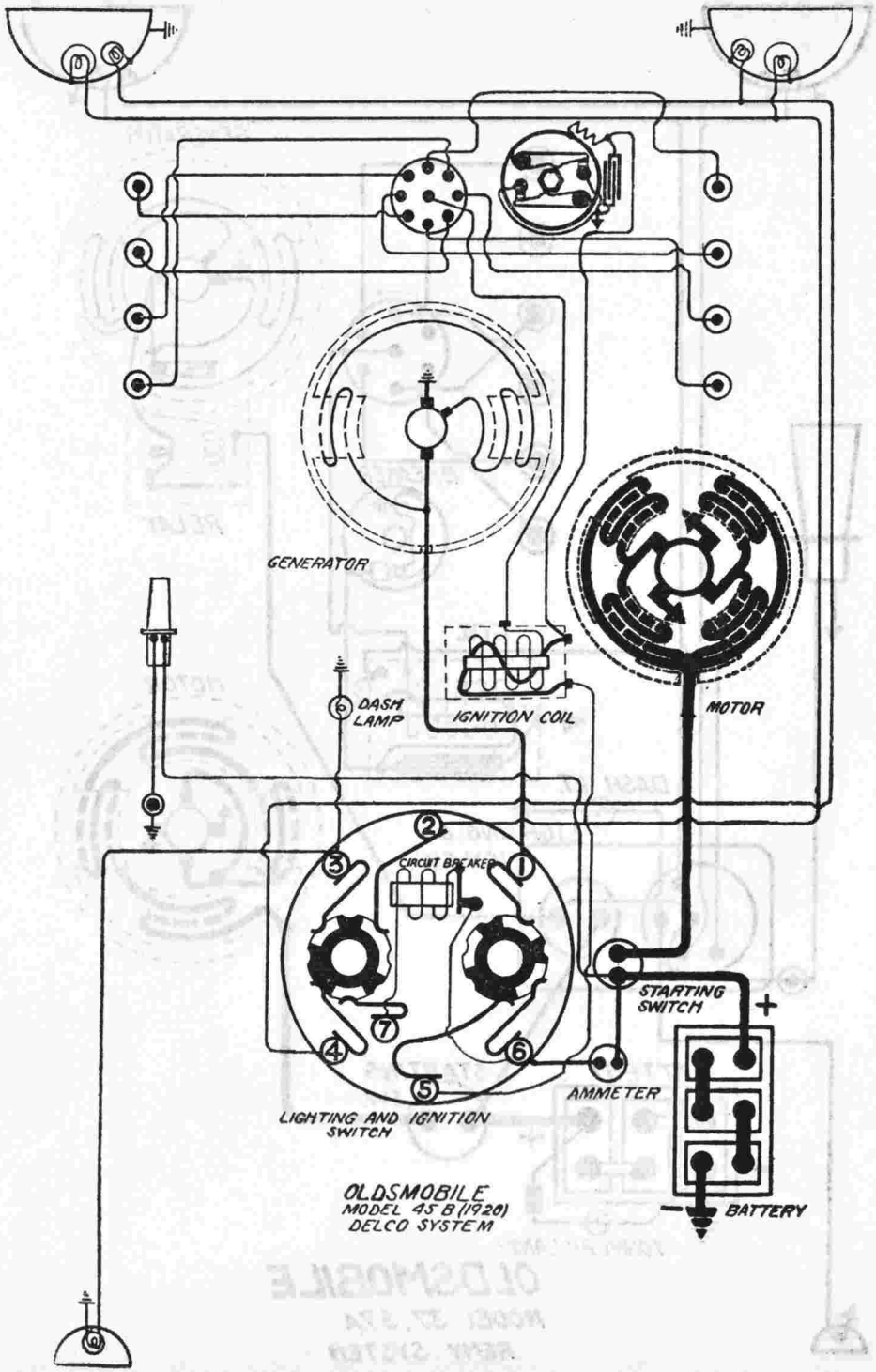
Charging rate is varied by adjustment of the third brush setting. Adjustment is made by loosening the two holding screws on the third brush arm, and moving the brush. Move in the direction of the armature rotation to increase the charging rate and in the opposite direction to decrease the charging rate. Reseat the brush after the adjustment is made.

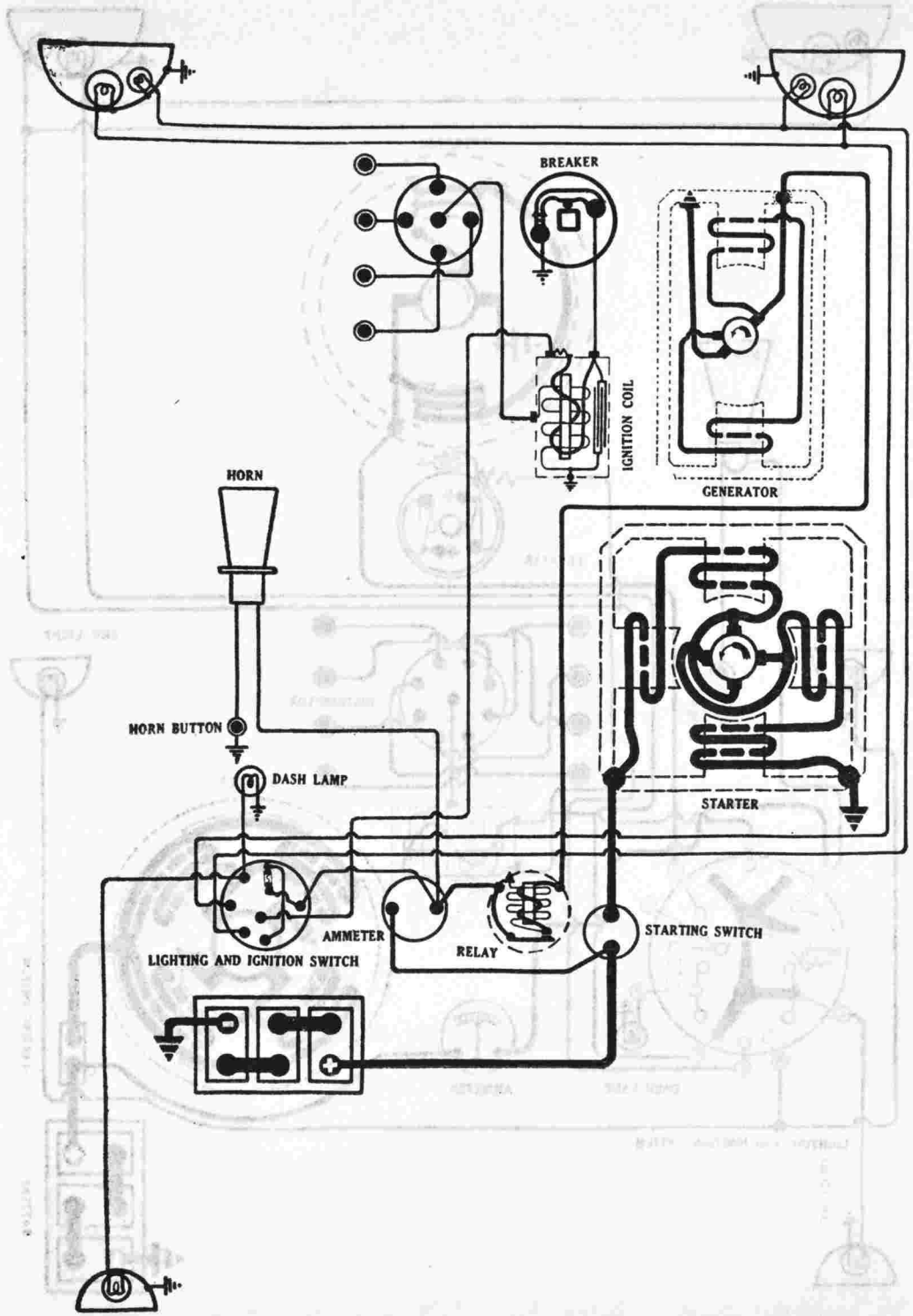
OILING.—Put 5 or 6 drops of light engine oil in the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

CIRCUIT-BREAKER.—A vibrating circuit-breaker takes the place of fuses. It requires 25 amperes to start the vibrator, but 3-5 amperes will cause it to continue.





OLDSMOBILE

MODEL 43-A (1921-1922)

AUTOLITE GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY.—Willard, Type SJRN-4, 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 287-A. Distributor Model No. 350-A. Breaker contacts separate .020 to .025 inch. When the condition of the contacts affects the ignition, resurface them with a fine, flat jeweler's file or worn No. 00 sandpaper.

Oiling.—Fill the grease cup under the distributor head with soft cup grease and turn down two or three turns every 1000 miles.

Timing.—Breaker contacts begiin to separate when the piston entering the power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 2, 4, 3.

Spark Plug Gaps.—The spark plug gaps are .030 inch.

STARTER.—Model M.E. 1067. Starter is connected to the engine through a Benrix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data.—Model M.E. 1067

Torque	R.P.M.	Amperes	Volts
2 lb. ft.	1600	160	5.2
4 lb. ft.	1080	230	4.8
6 lb. ft.	720	300	4.5
8 lb. ft.	460	360	4.2
9 lb. ft.	350	390	4.0

Stall Torque Data

Volts	Amperes	Torque
2	300	7.2 lb. ft.
4	600	17.2 lb. ft.
5	750	23.0 lb. ft.

The above readings obtained using 100 ampere-hour battery of 1.300 specific gravity at 100°F.

Oiling.—Put 5 or 6 drops of light engine oil in the starter oilers every 1000 miles.

GENERATOR.—Model G.H.—The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system.

Generator Data.—Model G.H.

Amperes	R.P.M.	Volts
0.0	550	6.2
10.0	1000	7.2
15.1	1500	7.8
16.3	2000	8.0
15.1	2500	7.8

Fields should draw 2 amperes at 6 volts. Charging rate is varied by the adjustment of the third brush setting. Loosen the stud which clamps the third brush plate. Move the third brush in the direction of armature rotation to increase the charging rate, or in the opposite direction to decrease the charging rate. Tighten the stud and reseat the brush after position adjustment.

Oiling.—Put 5 or 6 drops of light engine oil in the generator oilers every 1000 miles.

RELAY.—The relay is mounted on the dash. Relay closes when the voltage of the generator reaches 6.5 to 7.0 volts, and opens when there is a discharge current of 0 to 2 amperes. Relay contacts separate .020 inch. The air gap between the relay armature and coil core is .010 to .025 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly pitted resurface them with worn worn No. 00 sandpaper. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Fuse is 5 ampere.

OLDSMOBILE

LIGHT EIGHT, MODEL 47 (1922-23)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SR-4, 6 volts, 80 ampere-hour capacity. The **negative (—)** terminal is grounded.

IGNITION.—Coil Model No. 2127. Distributor Model No. 5210. The breaker contacts separate .020 inch. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone.

Oiling.—Put 8 or ten drops of light engine oil into the distributor oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles. Repack distributor housing with medium soft cup grease once each season up to advance ring and yoke. Apply a very small amount of vaseline on breaker cam every 2000 miles.

Timing.—Breaker contact begins to separate when piston No. 1 is at top dead center mark 1-4 on flywheel is at dead center, spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

Spark Plugs.—Spark plug gaps are .030 inch.

STARTER.—Model No. 219. The direction of rotation is clockwise, looking at commutator end. The starter is connected to the engine by a Bendix drive. Cranking engine, it takes a current of 125-200 amperes at 5 volts.

Starter Test Data.

Torque	R.P.M.	Amperes	Volts
0 lb. ft.	4500	40- 50	5.5
16 lb. ft.	0 (Lock)	450-550	3-4

Oiling.—Put 8 or 10 drops of light engine oil into starter oilers every month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles.

GENERATOR:—Model No. 148,220. direction of rotation is counter-clockwise, looking at commutator end. The third brush is used for current regulation. To increase the charging rate of the generator, move the third brush in a counter-clockwise direction; to decrease output, move the third brush in a clockwise direction. The maximum charging rate is 19 amperes. The shunt field current is 2 amperes at 6 volts.

Generator Test Data

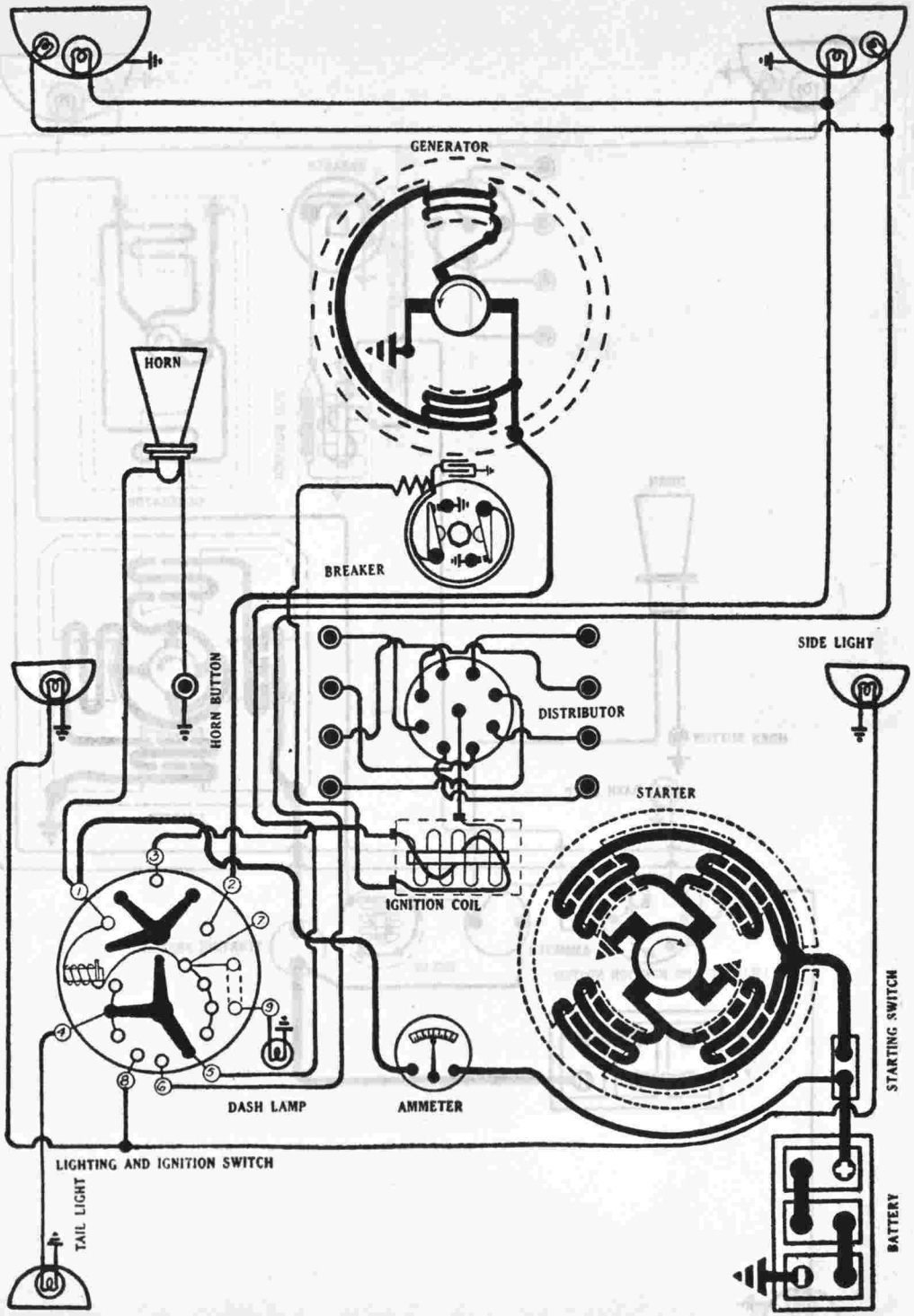
Amperes	R.P.M.	M.P.H.
0	550	—
10	900	—
17-19 (Max.)	1400	20
13-17	1800	—

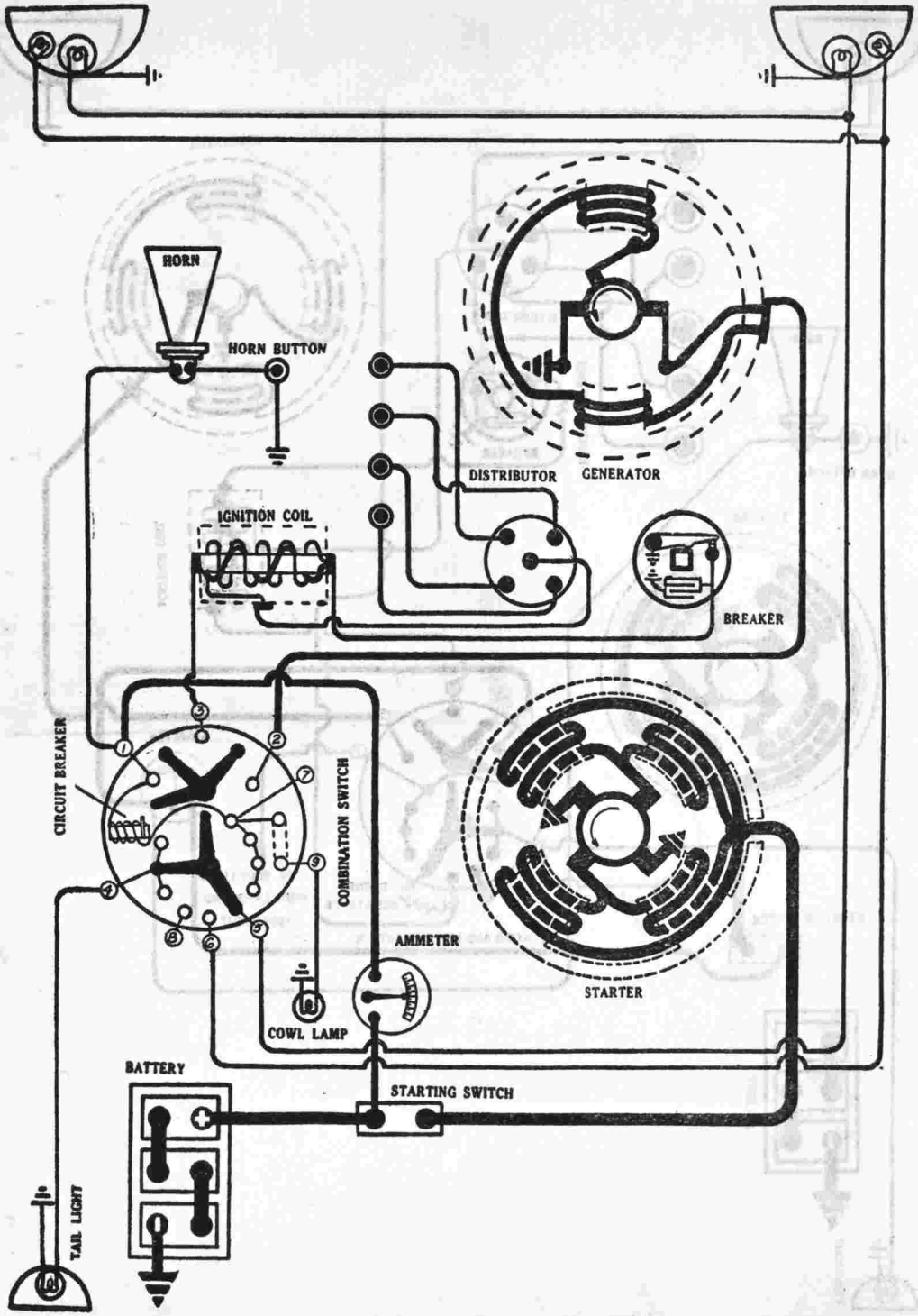
Oiling.—Put 8 or 10 drops of light engine oil into generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—No relay is used on this car. The generator is conected to battery directly through a combination switch, when the switch is turned on.

LIGHTING.—Delco Combination Switch No. 1198 is used. Head lights are 6-8 volts, 15 cp. Dimmer lamps are 6-8 volts, 4 cp. Dash, tail and cowl lamps are 6-8 volts, 2 cp. All lights have single contact base.
with a dead short circuit across the circuit breaker terminals.

CIRCUIT BREAKER:—A circuit breaker is used in place of fuses. Circuit breaker begins to vibrate with a current flow of 25-30 amperes. It will continue to vibrate with a current flow not exceeding 15 amperes.





OLDSMOBILE

MODEL 43-A (1923-24)

DELCO GENERATING, STARTING, AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SR-4, 6 volts, 80 ampere-hour capacity. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2178. Distributor Model No. 260. (Generator-Distributor.) Breaker contacts separate .020 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone.

Oiling.—Put 8 or 10 drops of light engine oil into each distributor oiler every two weeks. If the car is driven more than 500 miles in two weeks, this attention must be given every 500 miles. Repack the distributor shaft housing up to the advance ring and yoke with medium soft cup grease once a season. Apply a very small amount of vaseline to the surface of the cam breaker each 2000 miles.

Timing.—Breaker contacts begin to separate when piston No. 1 is at top dead center, entering power stroke, spark control lever and breaker assembly fully retarded. To adjust timing of distributor, loosen screw in the center of shaft, place breaker cam in position so that when back lash in the distributor gears is rocked forward, the contacts will be opened by the breaker cam, and when the back lash in the gears is rocked backward the contacts will just close.

Firing Order.—The firing order is 1, 2, 4, 3.

Spark Plugs.—The spark plug diameters are 7/8 inch, gaps are .030 inch.

STARTER.—Model No. 261. The direction of rotation is counter-clockwise, looking at commutator end. The starter is connected to the engine by a Bendix drive. Cranking the engine at 125 R.P.M. taking a current of 125-200 amperes, 5 volts.

Starter Test Data.

Torque	R.P.M.	Amperes	Volts
0	4000	40-50	5.5
10-12 lb. ft.	0 (Lock)	400-450	3-4

Oiling.—Put 8 or 10 drops of light engine oil into starter oilers every month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles.

GENERATOR.—Generator-Distributor Model No. 260. The direction of rotation is counter-clockwise, looking at commutator end. Third brush system is used for current regulation. To increase the charging rate, adjust third brush in a counter-clockwise direction, by first loosening the two screws holding the third brush arm. The generator motoring freely takes a current of 3-5 amperes at 6 volts. The shunt field current is 2 amperes at 6 volts. The maximum charging rate is 18 amperes reached at 1400 R. P. M. of armature or 20 M.P.H. of car speed in high gear.

Generator Test Data

Amperes	R.P.M	M.P.H.
0	500	7
11-13	900	
16-18 (Max.)	1400	20
14-16	2000	

Oiling.—Put 8 or 10 drops of light engine oil into generator oilers every two weeks. If the car is driven more than 500 miles in two weeks this care must be given every 500 miles.

RELAY.—There is no relay used as the generator is connected directly to the battery through the switch, when the ignition is turned on.

LIGHTING.—Delco Combination Switch, Model No. 1245 is used. Head lights are 6-8 volts, 21 cp. Dimmer lamps are 6-8 volts, 5 cp. Dash and tail lamps are 6-8 volts, 2 cp. All lamps have single contact base except the dash lamp which has a double contact base.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. Circuit breaker begins to operate with a current of 25-30 amperes and continues to vibrate with a current flow of not more than 15 amperes. Also not over 15 amperes must pass with dead short circuit across the circuit breaker terminals.

OLDSMOBILE

MODEL 30 (1924)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Willard, Type XW-13. 6 volt. 80 ampere hour. The lighting capacity is 5 amperes for 16 hours. The negative (—) terminal is grounded.

IGNITION: — Coil Model No. 2178. The distributor is integral with the generator. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oil stone or with a fine flat jeweler's file.

Oiling:—Put 8 or 10 drops of light engine oil in the distributor oiler every month or each 1000 miles. Once each year remove the grease plug in the gear housing and fill the housing with medium heavy cup grease. Place a small bit of medium heavy cup grease on the breaker cam every 1000 miles.

TIMING: — Breaker contacts begin to separate when piston No. 1 reaches top dead center on compression stroke with the spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plug Gaps:—Spark plug diameters are ⅞ inch. Gaps are .030 inch.

STARTER:—Model No. 274. The starter is connected to the engine by means of a Bendix drive. The direction of rotation is clockwise, looking at the commutator end. Starter cranks the engine at 175 R.P.M. taking 150 amperes at 6 volts. Lock torque is 10 pound feet at 3.1 volts. Starter running free takes 60 amperes at 6 volts. The tension of each of the starter brushes should be from 2¼ to 2¾ pounds.

Oiling:—Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles.

GENERATOR:—Model No. 273. Generator current regulation is by means of the third brush system. The direction of rotation is counter-clockwise, looking at the commutator end. The maximum charging rate is 12 amperes reached at 1665 R.P.M. of the armature or 18-24 miles per hour, car speed in high gear.

Generator Data

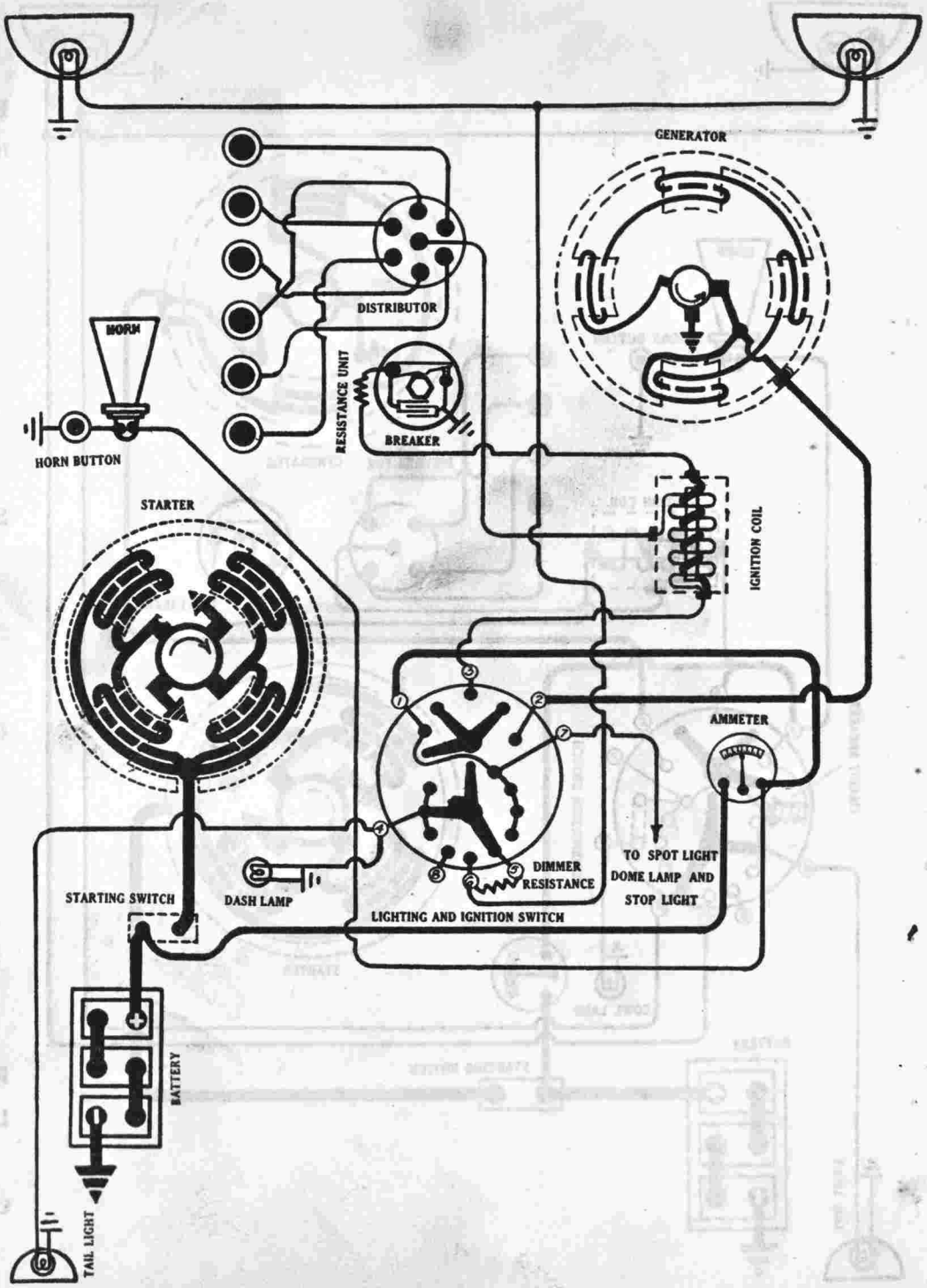
Cold Test (65°)			Hot Test (200°		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
14	6.25	1665	8	—	1000
			12	6.25	1665

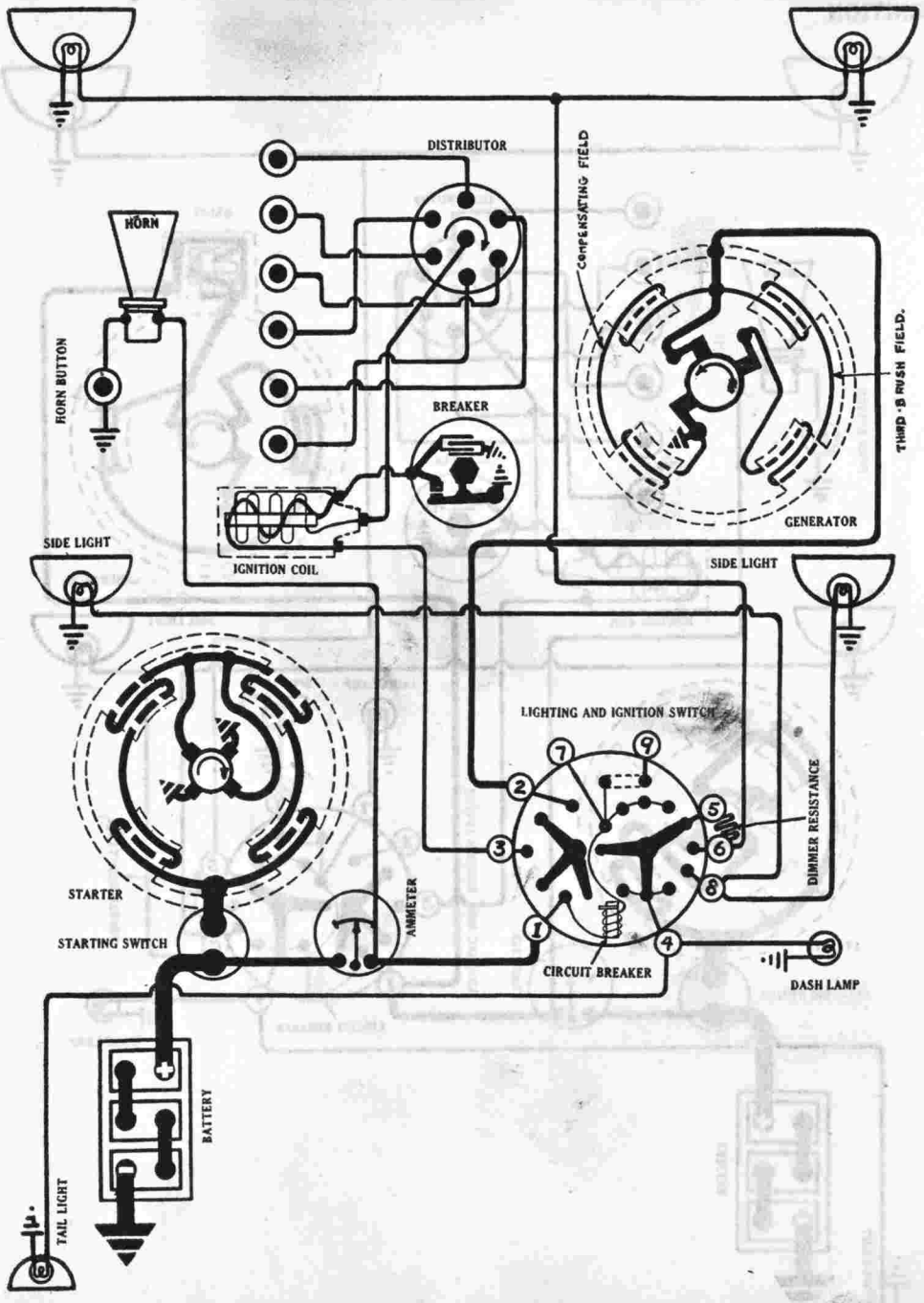
To adjust the generator output, loosen the commutator cover band and shift the third brush mounting plate by means of the handle attached. Shifting the third brush in the direction of rotation (counter-clockwise) increases the charging rate while moving it in the opposite direction (clockwise) decreases the charging rate. The field current is 3 amperes at 6 volts. The tension of the generator brushes should be from 1½ to 1¾ pounds each.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles.

RELAY:—No relay is used. The circuit between the generator and the battery is controlled by the ignition switch. Shutting off the ignition disconnects the generator and prevents the battery from discharging.

LIGHTING:—Combination Switch Model No. 1258. Head lamps are 6-8 volt, 21 cp. S.C. Dome lamp is 6-8 volt, 4 cp. S.C. Dash and tail lamps are each 6-8 volt, 2 cp. S.C.





OLDSMOBILE

MODEL 30 (1925)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM.

DELCO IGNITION.

BATTERY: — Willard, Type XW-13, 6 volt, 80 ampere-hour. The lighting capacity is 5 amperes for 16 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. 2182. Distributor Model Number 5273. Breaker contacts separate .020 inch They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oil stone or with a fine flat jeweler's file.

OILING: — Put 8 or 10 drops of light engine oil in the distributor oiler every month or each 1000 miles. Once each year remove the grease plug in the gear housing and fill the housing with medium heavy cup grease. Place a small bit of medium heavy cup grease on the breaker cam every 1000 miles.

Timing.—Breaker contacts begin to separate when piston No. 1 on compression stroke reaches a position .055 inch (measured on the flywheel) before top dead center. To time engine, loosen clamp nut on distributor housing and turn distributor cup in a counter-clockwise direction until contacts begin to separate. Then tighten the clamp nut. Make certain that the rotor is under the high tension terminal connected to cylinder No. 1.

FIRING ORDER: — The firing order is 1,5,3,6,2,4.

SPARK PLUG GAPS: — Spark plug diameters are 7/8 inch. Gaps are .030 inch.

STARTER: — Model No. 274. The starter is connected to the engine by means of a Bendix drive. The direction of rotation is clockwise looking at the commutator end. Starter cranks the engine at 175 R. P. M. taking 150 amperes at 6 volts. Lock torque is 10 pound feet at 3.1 volts. Starter running free takes 60 amperes at 6 volts. The tension of each of the starter brushes should be from 2¼ to 2¾ pounds.

OILING: — Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles.

GENERATOR:—Model No. 295. Generator current regulation is by means of the third brush system. The direction of rotation is counter-clockwise, looking at the commutator end. The maximum charging rate is 12 amperes reached at 1665 R. P. M. of the armature or 18-24 miles per hour, car speed in high gear.

	Cold Test (65°)			Hot Test (200°)		
	Amperes	Volts.	R. P. M.	Amperes.	Volts.	R. P. M.
OILING: – Put 8 or 10 drops of light engine oil in the oiler on the commutator end	14	6.25	1665	8	.....	1000
				12	6.25	1665

To adjust the generator output, loosen the commutator cover band and shift the third brush mounting plate by means of the handle attached. Shifting the third brush in the direction of rotation (counter-clockwise) increases the charging rate while moving it in the opposite direction (clockwise) decreases the charging rate. The field current is 3 amperes at 6 volts. The tension of the generator brushes should be from 1½ to 1¾ pounds each.
of the generator every month or each 1000 miles.

RELAY: — No relay is used. The circuit between the generator and the battery is controlled by the ignition switch. Shutting off the ignition disconnects the generator and prevents the battery from discharging.

LIGHTING:—Combination Switch Model No. 1273. Head lamps are 6-8 volt, 21 cp. S. C. Dome lamp is 6-8 volt, 4 cp. S. C. Dash and tail lamps are each 6-8 volt, 2 cp. S. C.

OLDSMOBILE

MODEL 30 (1926)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Willard, Type XW-13, 6 volt, 90 ampere hour. The starting capacity is 98 amperes for 20 minutes. Lighting capacity is 5 amperes for 16 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model 2182. Distributor Model 5284. Breaker contacts separate .015-.022 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone or with a fine, flat jeweler's file. Distributor is of the full automatic type. Automatic advance begins at 600 R.P.M. and reaches a maximum of 28-30° at 2800 R.P.M. The tension of the contact arm spring should be 13-16 ounces.

Mounting:—Distributor is mounted on the rear of the generator. To remove, loosen the timing adjustment clamp nut. Then lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

Timing:—Breaker contacts begin to separate when piston No. 1 on compression stroke reaches a position .055 inch (measured on the flywheel) before top dead center. To check timing, crank engine over until piston No. 1 is coming up on the compression stroke. This is the upstroke with both valves closed. Continue to crank engine until piston reaches a position .055 inch (measured on the flywheel) before top dead center. Breaker contacts should separate at this point. If they do not, loosen clamp nut on the distributor housing and turn the distributor cup in a counter-clockwise direction until contacts begin to separate. Then tighten the clamp nut and make certain that the rotor is under the high tension terminal connected to the spark plug in cylinder No. 1 and connect the remaining plugs in order 5-3-6-2-4 around the distributor head.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .027 inch.

VALVE TIMING:—INLET VALVES:—Head diameter is 1½ inches; stem diameter is 5/16 inch; stem length is 4½ inches. Tappet clearance is .004 inch (hot). Spring pressure is 45 pounds with valves open. Inlet valves open at 2 degrees after top dead center and close at 34 degrees after lower dead center.
EXHAUST VALVES:—Head diameter is 1½ inches; stem diameter is 5/16 inch; stem length is 4½ inches. Tappet clearance is .004 inch (hot). Spring pressure is 45 pounds with valves open. Exhaust valves open at 42 degrees before lower dead center and close at top dead center.

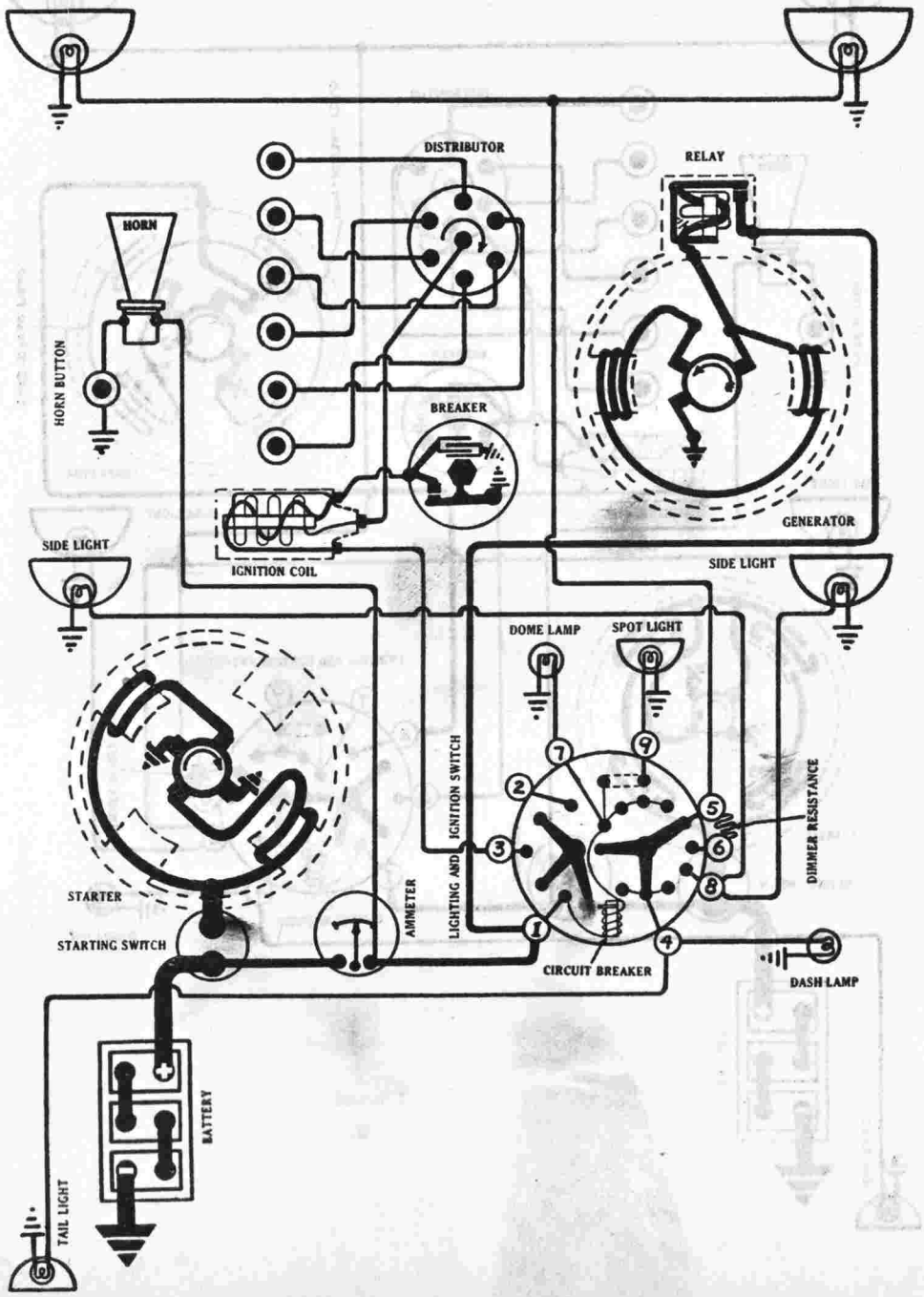
STARTER.—Model No. 326. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, looking at the commutator end. Starter switch is Model 1952. Starter brush tension should be 2¼-2½ pounds each.

Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	50
12.5 lb. ft.	Lock	3	....

Oiling:—Self-oiling bearings are used. They require no attention.
Mounting:—Starter is mounted at left of engine by a sleeve mounting. To remove, remove large pilot mounting screw and slide starter to rear and out.

GENERATOR.—Model No. 327. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the charging rate, remove the commutator cover band and shift the third



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OLDSMOBILE

MODEL 30 (1926)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

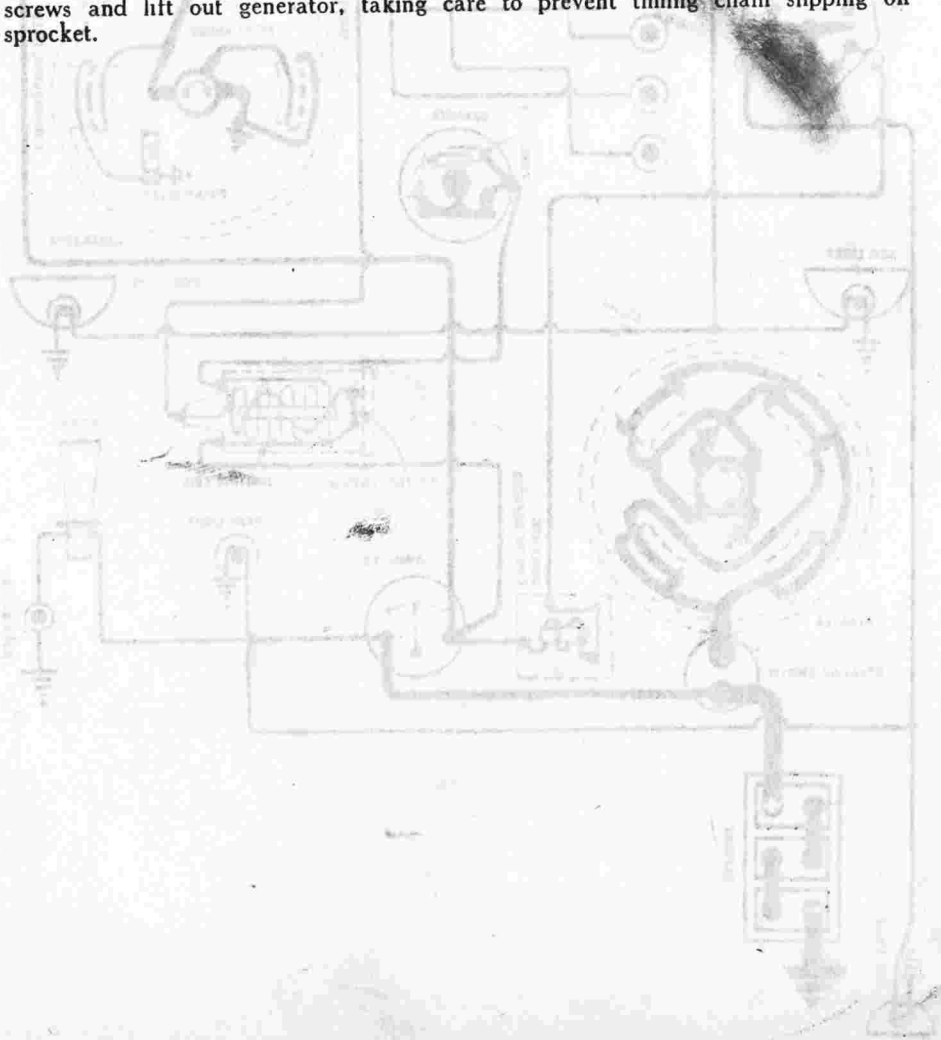
brush mounting plate by the handle on the plate. Shifting the third brush in the direction of generator rotation increases the charging rate and in the opposite direction decreases the charging rate. The mounting plate is held in any desired position by friction washers.

Generator Data.

Amperes	R.P.M.
5	800
15	1200

Generator brush tension should be 1¼ pounds each.

Mounting:—Generator is mounted at right of engine. To remove, loosen carburetor mounting cap screws and drop carburetor. Then remove three flane mounting screws and lift out generator, taking care to prevent timing chain slipping off sprocket.



Oiling.—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the generator every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY.—Relay is mounted on the generator. Contacts close when the voltage of the generator reaches 6¾-7½ volts and open with a discharge current of 0-3 amperes. Air gap between relay armature and coil core is .009-.010 inch, contacts closed.

LIGHTING.—Switch Model 1270. Head lamps are 6-8 volt, 21 cp. Dash, dome and tail lamps are each 6-8 volt, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker on the back of the switch takes the place of fuses. A current of 25-30 amperes causes this device to vibrate. While operating the current is 10-15 amperes.

OLDSMOBILE

MODEL E-30 (1927) FIRST 12,000 CARS
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY.—Willard, Type XW-13. 6 volt, 90 ampere hour. The starting capacity is 98 amperes for 20 minutes. Lighting capacity is 5 amperes for 16 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model 2198. Distributor Model 5284. Breaker contacts separate .020-.027 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine, flat contact file. Distributor is of the full automatic type. Automatic advance begins at 600 R.P.M. and reaches a maximum of 26-30° at 2800 R.P.M. The tension of the breaker arm spring is 13-16 ounces. Ignition coil is of the new type with switch and lock in the coil. It is mounted on the back of the instrument board with the switch extending through to the face of the instrument panel. The ignition switch cannot be turned "On" until it has been unlocked and the key removed. Turning the switch "Off" automatically locks the ignition.

Mounting.—Distributor is mounted on the rear of the generator. To remove, loosen the timing adjustment clamp nut. Then lift distributor from place.

Oiling.—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position .055 inch before top dead center. To time engine, loosen the distributor clamp screw and rotate distributor housing until contacts begin to separate. Then tighten the screw to hold the adjustment. Make certain that the rotor is under the segment connected to the spark plug in the cylinder firing.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are ⅞ inch. Gaps are .027 inch.

STARTER:—Model 354. The starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, looking at the commutator end. Starter switch is Model 1952. Starter brush tension is 2¼-2½ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	45
15 "	Lock	3.5	....

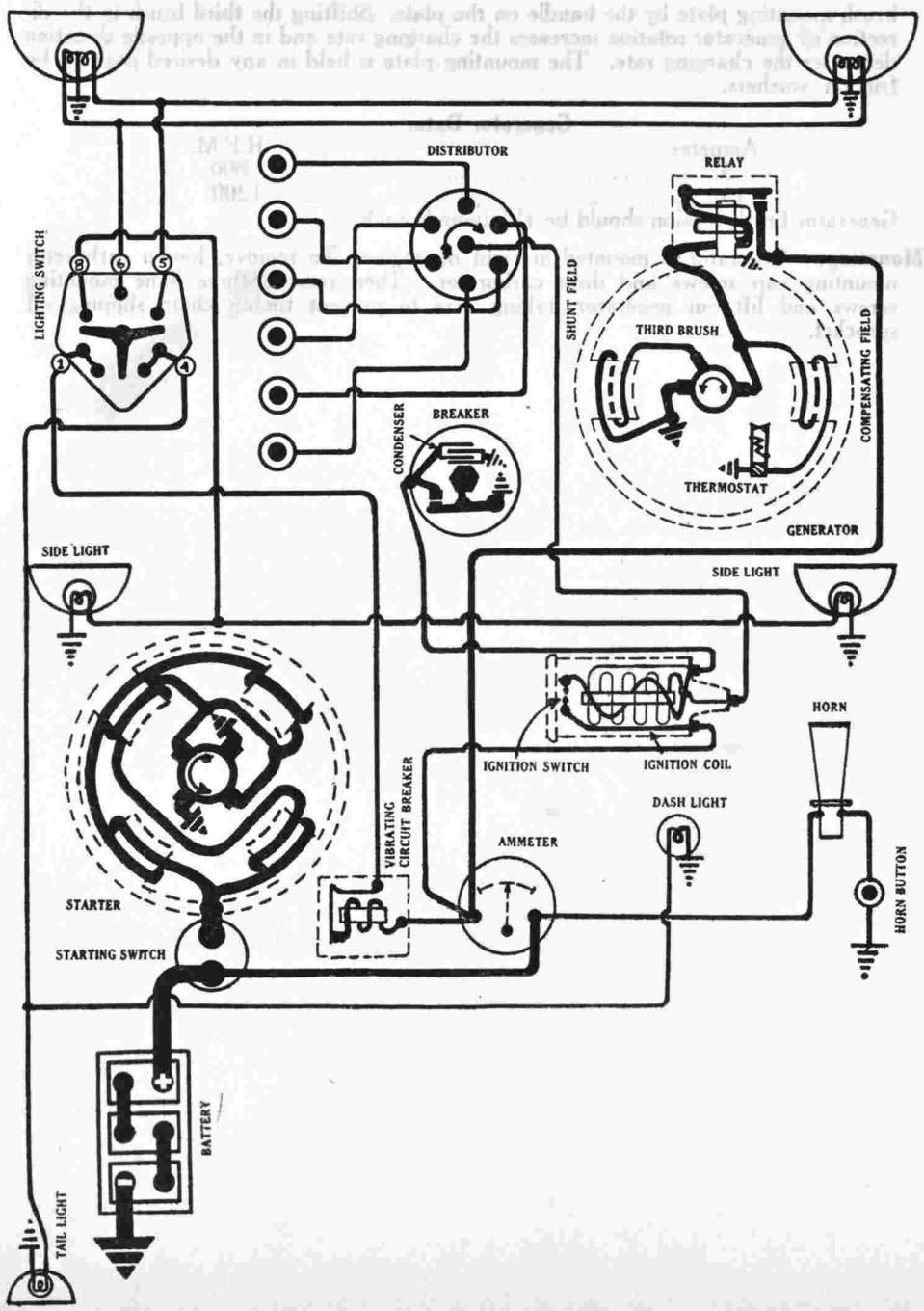
Mounting.—Starter is mounted at left of engine by a sleeve mounting. To remove, remove large pilot mounting screw and slide starter to rear and out.

Oiling.—Self-oiling bearings are used. They require no attention.

GENERATOR:—Model 352. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system, combined with a thermostat. To adjust generator output, loosen locking nut on the outside of the end frame. Then shift third brush mounting plate by turning the stud on the generator end plate in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The generator brush tension should be 16 to 20 ounces.

Generator Data.

Amperes	R.P.M.
5	800
12	1200



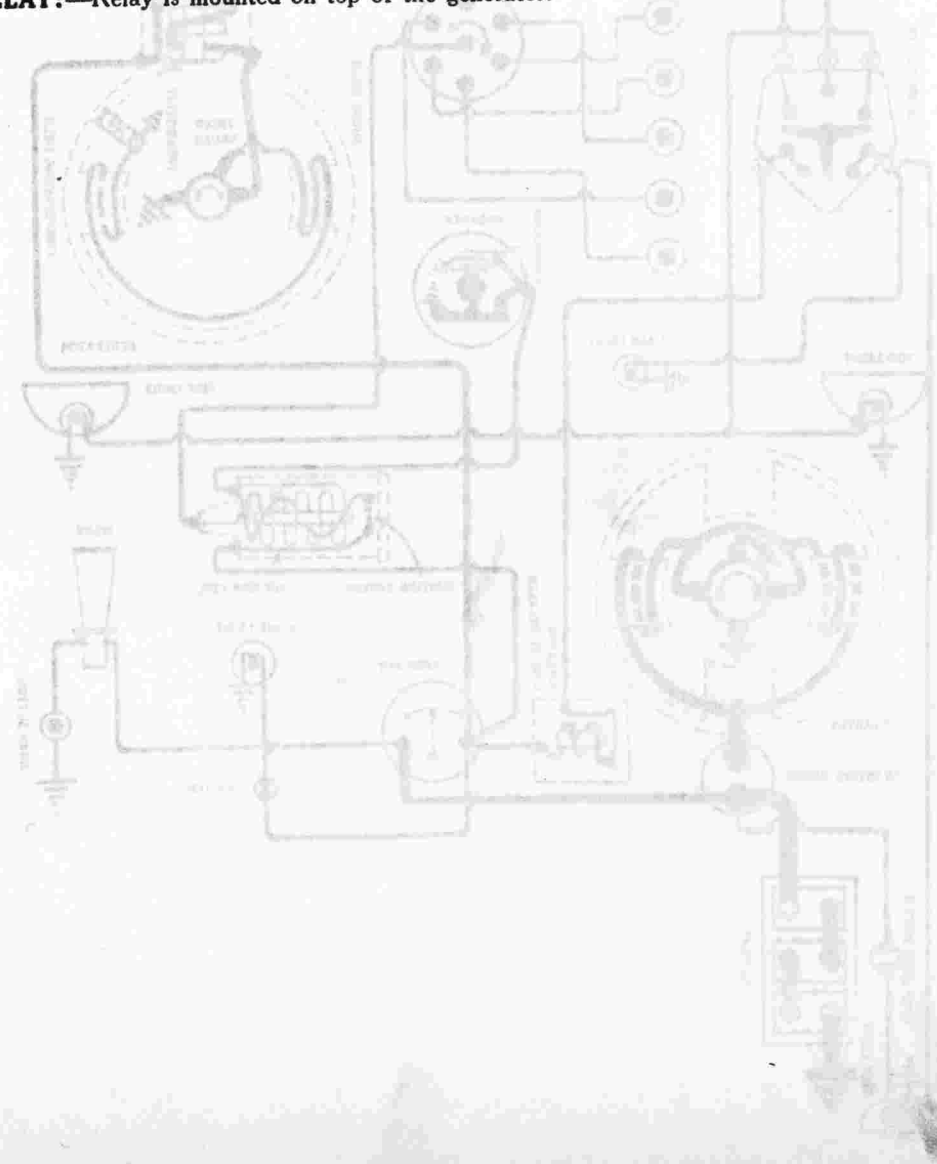
OLDSMOBILE

MODEL E-30 (1927) FIRST 12,000 CARS
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

Mounting.—Generator is mounted at right of engine. To remove, loosen carburetor mounting screws and drop carburetor. Then remove three flange mounting screws and lift out generator, taking care to prevent timing chain slipping off sprocket and

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the generator every two weeks or each 500 miles. Every six months remove the plug in the distributor gear case and replenish with medium cup grease.

RELAY:—Relay is mounted on top of the generator.



LIGHTING:—Lighting Switch Model 1303. Switch is mounted at base of steering column. Head lamps are 6-8 volt, 21cp. double filament using second 21 cp. filament for dimming. Dash, dome and tail lamps are each 6-8 volt, 2 cp.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the back of the dash. It is in the lighting switch lead and protects the lighting lines. A current of 25-35 amperes will cause the circuit breaker to vibrate limiting the current flow to 10-15 amperes.

OLDSMOBILE

MODEL E-30 (1927) AFTER FIRST 12,000 CARS
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type XW-13, 6 volt, 90 ampere hour. Starting capacity is 98 amperes for 20 minutes. Lighting capacity is 5 amperes for 16 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model 2198. Distributor Model 637-T. Breaker contacts separate .022-.025 inch. They are made of tungsten. When the condition of the contacts affects the ignition remove and resurface on a medium hard oilstone or with a fine, flat contact file. Distributor is of the full automatic type, with 25° engine advance. The tension of the breaker arm spring should be 15 to 20 ounces. Ignition coil is of the new type with switch and lock in the coil. It is mounted on the back of the instrument board with the switch extending through to the face of the instrument panel. The ignition switch cannot be turned "on" until it has been unlocked and the key removed. Turning the switch "off" automatically locks the ignition.

Mounting:—Distributor is mounted on the rear of the generator. To remove distributor, loosen timing adjustment clamp screw. Then lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in oiler on side of the distributor every 500 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position of .020-.030 inch before top dead center. To time engine, loosen distributor clamp screw and rotate distributor housing until contacts begin to separate. Then tighten the screw to hold the adjustment. Make certain that the rotor is under the segment connected to the spark plug in the cylinder firing.

Valve Timing:—INLET VALVES:—Head diameter, 1⅜ inches; stem diameter, 5/16 inch; stem length, 5 9/32 inches; tappet clearance, .005 inch; spring pressure, 60 pounds; valve lift, .283 inch; intake opens at top dead center and closes 40° past lower dead center.

EXHAUST VALVES:—Head diameter, 1⅜ inches; stem diameter, 5/16 inch; stem length, 9/32 inch; tappet clearance, .005 inch; spring pressure, 60 pounds; valve lift, .283 inch; exhaust opens at 35° before lower dead center and closes at 5° past top dead center. Stem guides are removable. No oversize valve stems are made.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .025-.030 inch.

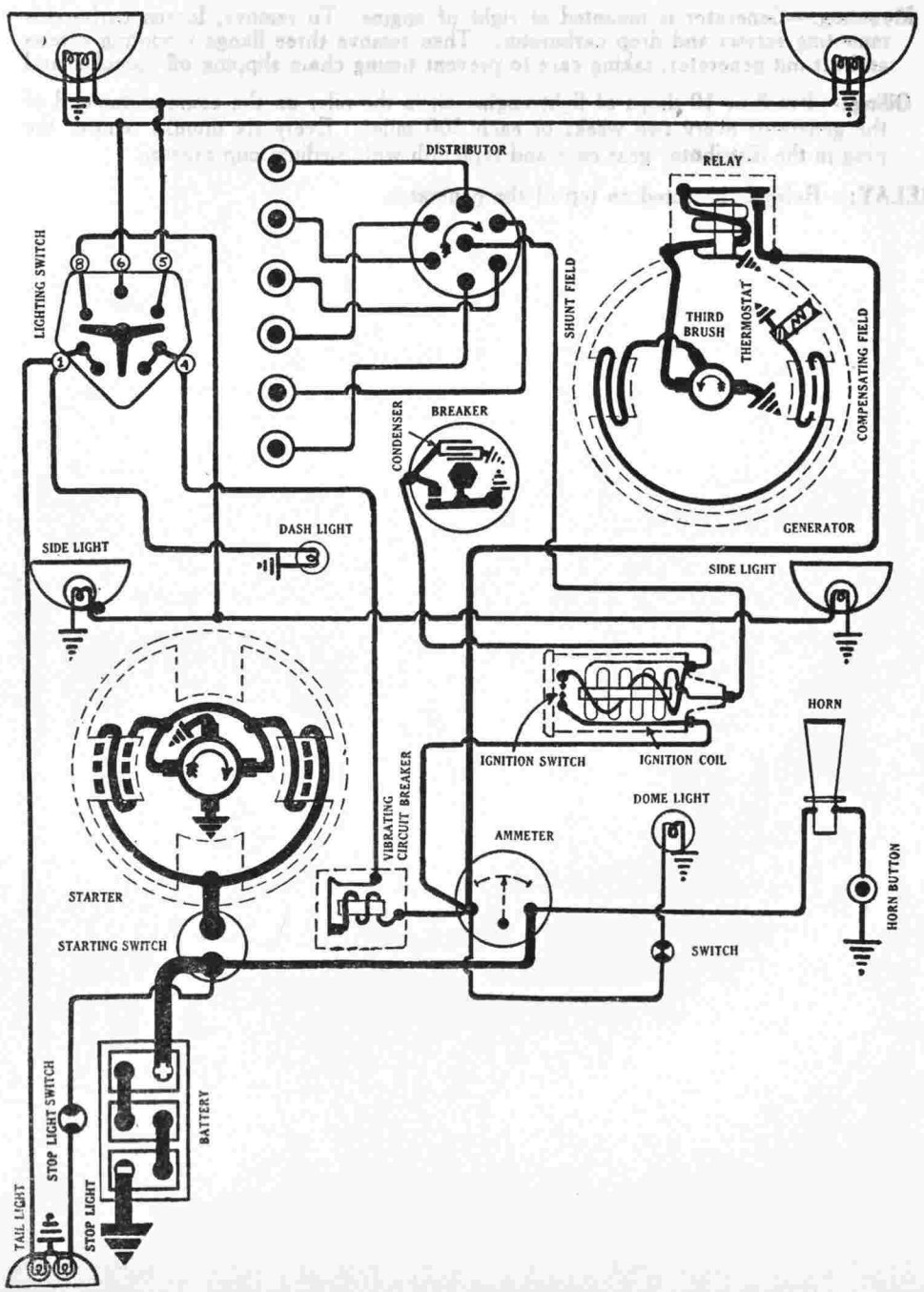
STARTER:—Model 713-G. The starter is connected to the engine through an inboard Bendix R-11-X. The direction of rotation is clockwise, looking at the commutator end. Starting switch is Model 406 D. Starter brush tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lbs. ft.	5000	5	65
12 "	Lock	3.63	475

Oiling:—Starter bearings are oilless. They require no attention.

Mounting:—Starter is sleeve mounted at left of engine on clutch housing. To remove starter remove large pilot mounting screw and slide starter from place.



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MODEL E-30 (1927) AFTER FIRST 12,000 CARS
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

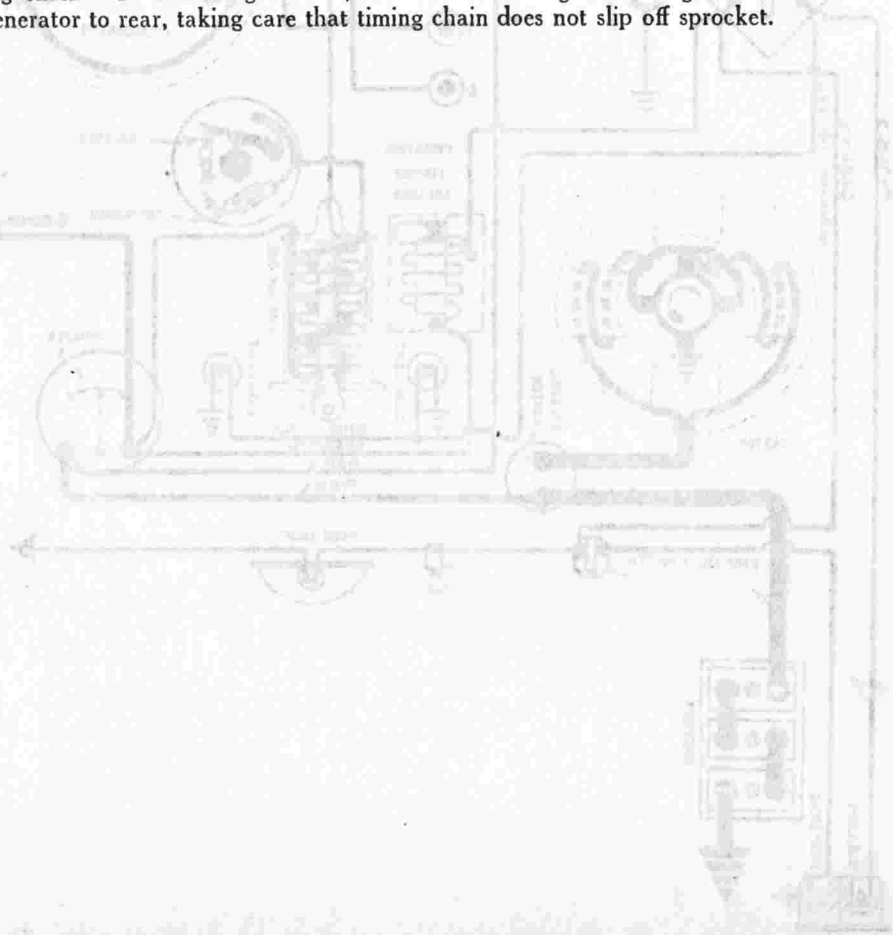
GENERATOR:—Model 940-B. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system, combined with a thermostat. To adjust generator output, loosen the round-head screw on the outside of the commutator end bracket. Then shift third brush in a counter-clockwise direction to increase the charging rate and opposite direction to decrease the charging rate. The generator brush tension is 14 to 18 ounces.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7.0 -7.3	750	9	7.35	1800
19-21	8.35-8.65	1450	12	7.65	2000

Thermostat opens at 162°F. with 75 ohms resistance.

Mounting:—Generator is flange mounted at front right of engine and driven by timing chain. To remove generator, remove three flange mounting screws and slide generator to rear, taking care that timing chain does not slip off sprocket.



Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the generator every 500 miles. Every six months remove the plug in the distributor gear case and replenish with medium cup grease.

RELAY:—Model 265-B. Relay is mounted on top of generator. Contacts open with a discharge current of 3 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .018-.022 inch; contacts closed.

LIGHTING:—Lighting Switch Model 1303. Switch is mounted at base of steering column. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament for dimming. Side, dash, dome and tail lamps are each 6-8 volt, 3 cp. Stop light is 6-8 volt, 15 cp.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the back of the dash. It is in the lighting switch lead and protects the lighting lines. A current of 25-35 amperes will cause the circuit breaker to vibrate limiting the current flow to 10-15 amperes.

OLDSMOBILE

MODEL F-28 (1928)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type XWR-13, 6 volt, 13 plates. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 16 hours. Plates are 5¾ inches wide, 4¾ inches high, 3/32 inch thick. Battery is mounted under the front floor boards.

IGNITION:—Coil Model 550-F. Coil is mounted on the dash with ignition switch in base extending through the instrument board. Ignition current is .5-2.5 amperes at 6 volts with engine running and 4.5 amperes at 6 volts with engine stopped.

Distributor Model 639-B. Breaker contacts separate .020-.025 inch. Adjust contact opening by loosening lock screw on plate directly back of contacts and turn eccentric adjusting screw to secure proper adjustment. Tighten the lock screw. Resurface contacts with a fine flat contact file or on a medium hard oil-stone. Distributor is full automatic. Automatic advance begins at 500 R.P.M. Maximum automatic advance is 18° reached at 2500 R.P.M. Breaker arm spring tension is 17-21 ounces.

Mounting:—Distributor is mounted on cylinder head. To remove distributor, disconnect primary lead and remove distributor head with high tension cables intact. Then remove clamp screw and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft and turn down one turn every 1000 miles. At the same time, remove the distributor head and rotor and saturate the wick in the oiler in the center of the shaft.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position .020 inch before top dead center with the breaker assembly in the fully retarded position. To set timing, crank engine until piston No. 1 reaches firing position. Then loosen clamp screw and rotate distributor until contacts begin to separate. Tighten the clamp screw and connect the segment opposite the rotor to spark plug in cylinder No. 1. Connect remaining plugs in order 5-3-6-2-4 around distributor head in a clockwise direction.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 18 MM. metric. Gaps are .027 inch.

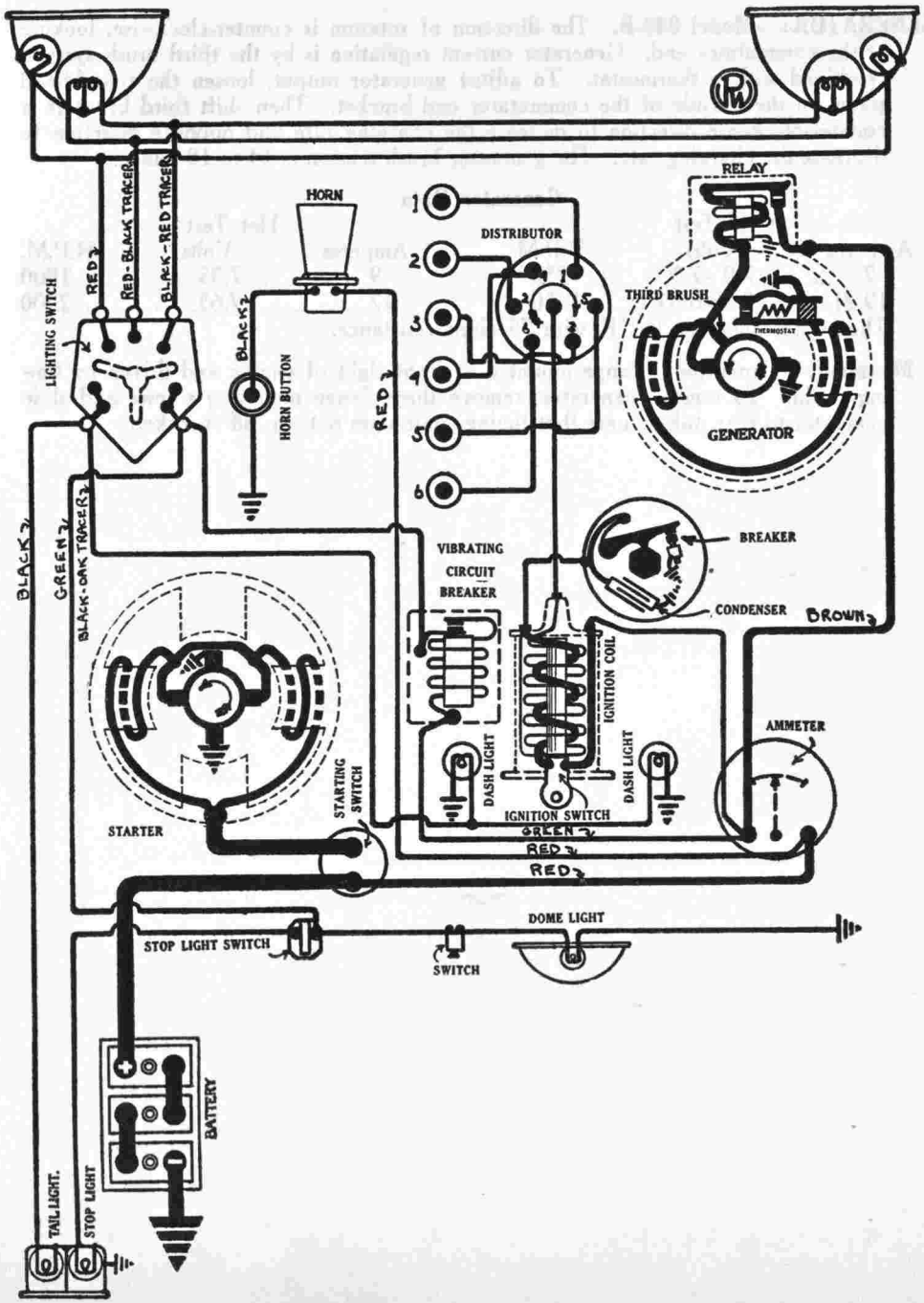
VALVE TIMING:—INLET VALVES:—Head diameter, 1 15/32 inches; stem diameter, 11/32 inch; stem length, 4¾ inches. Valve lift, 5/16 inch. Spring pressure, 48 pounds closed, 68 pounds open. Tappet clearance, .008 inch (hot). Inlet valves open at top dead center and close 50° after lower dead center. Inlet opening point is marked on flywheel by mark 'TDC-1-6'.

EXHAUST VALVES:—Head diameter, 1 13/32 inches; stem diameter, 11/32 inch; stem length, 4¾ inches. Valve lift, 5/16 inch. Spring pressure, 48 pounds closed, 68 pounds open. Tappet clearance, .008 inch (hot). Exhaust valves open 40° before lower dead center and close 10° after top dead center. Valve stem guides are removable.

STARTER:—Model 714-H. The direction of rotation is counter-clockwise, looking at the commutator end. Starter is connected to the engine through an over-running clutch and pinion. Starter cranks the engine at 125 R.P.M. drawing 130 amperes at 5.5 volts. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
6 "	150	3.6	200
12 "	Lock	3.6	475



OLDSMOBILE

MODEL F-28 (1928)

DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove 3 flange mounting cap screws. Then pull starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every 1000 miles.

GENERATOR:—Model 949-W. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. putting the resistance across the contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the the adjustment. With standard car setting, the maximum charging rate is 19 amperes (cold) reached at 1700 R.P.M. or 25 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
20	8.5	1600	11	6.75	1800

Motoring generator draws 7 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 14-18 ounces.



Mounting:—Generator is flange mounted on right side of engine on rear of timing chain case. To remove generator, disconnect lead and remove 3 flange mounting cap screws. Then pull generator to the rear and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the commutator end oiler every 1000 miles. The drive end bearing is oiled by splash from the chain case.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay closes at 12 M.P.H. or 650 R.P.M. when the generator voltage reaches 7-7.5 volts and opens at 10 M.P.H. or 600 R.P.M. with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch wtih contacts closed.

LIGHTING:—Delco-Remy Switch Model 486-B. Switch is mounted at lower end of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base, uring second filament instead of dimming) Mazda No. 1110. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dash, tail, side and dome lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the dash to protect lighting circuits. Circuit breaker begins to operate when the current reaches 25-30 amperes and continues to vibrate limiting the current to 15 amperes until the short circuit is removed.



Olympian

Model 35 (1917)

Auto-Lite Generating, Starting and Lighting System

Connecticut Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded a starting motor.

Ignition.—Breaker contacts separate .023 inch. They are made of tungsten. When the condition of the points affects the ignition, renew the inner breaker mechanism. For tem porary service resurface contacts with fine emery cloth.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Timing.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 2, 4, 3.

Spark Plug Gaps.—Spark plug gaps are .027 to .030 inch.

Starter.—Model ME. Starter is connected to engine through a Bendix drive.

Oiling.—Thoroughly clean out and repack starter bearings with soft cup or ball bearing grease every six months.

Generator.—Model GH. Generator current regulation is by third brush system. Maximum charging rate of 14-16 amperes is reached at 20-25 miles per hour.

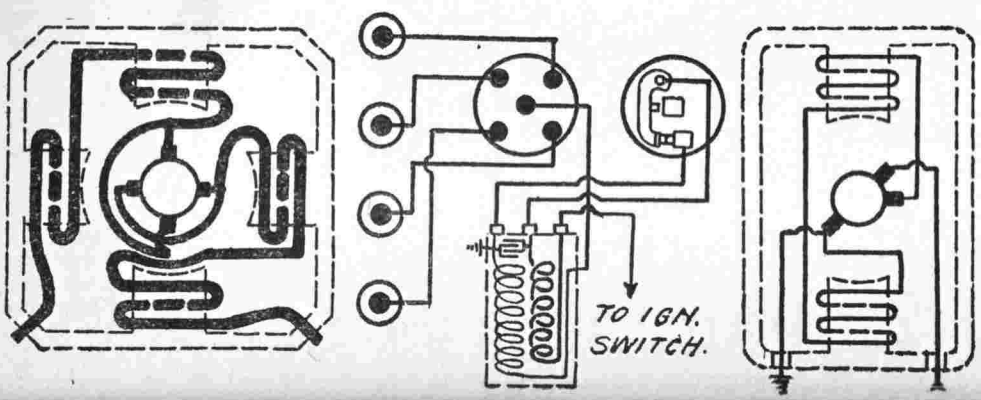
Amperes	Generator Data	R. P. M.
5.0		760- 820
10.0		1020-1100
12.5		1200-1300
15.0		1460-1675
15.5-16.8		1950-2250

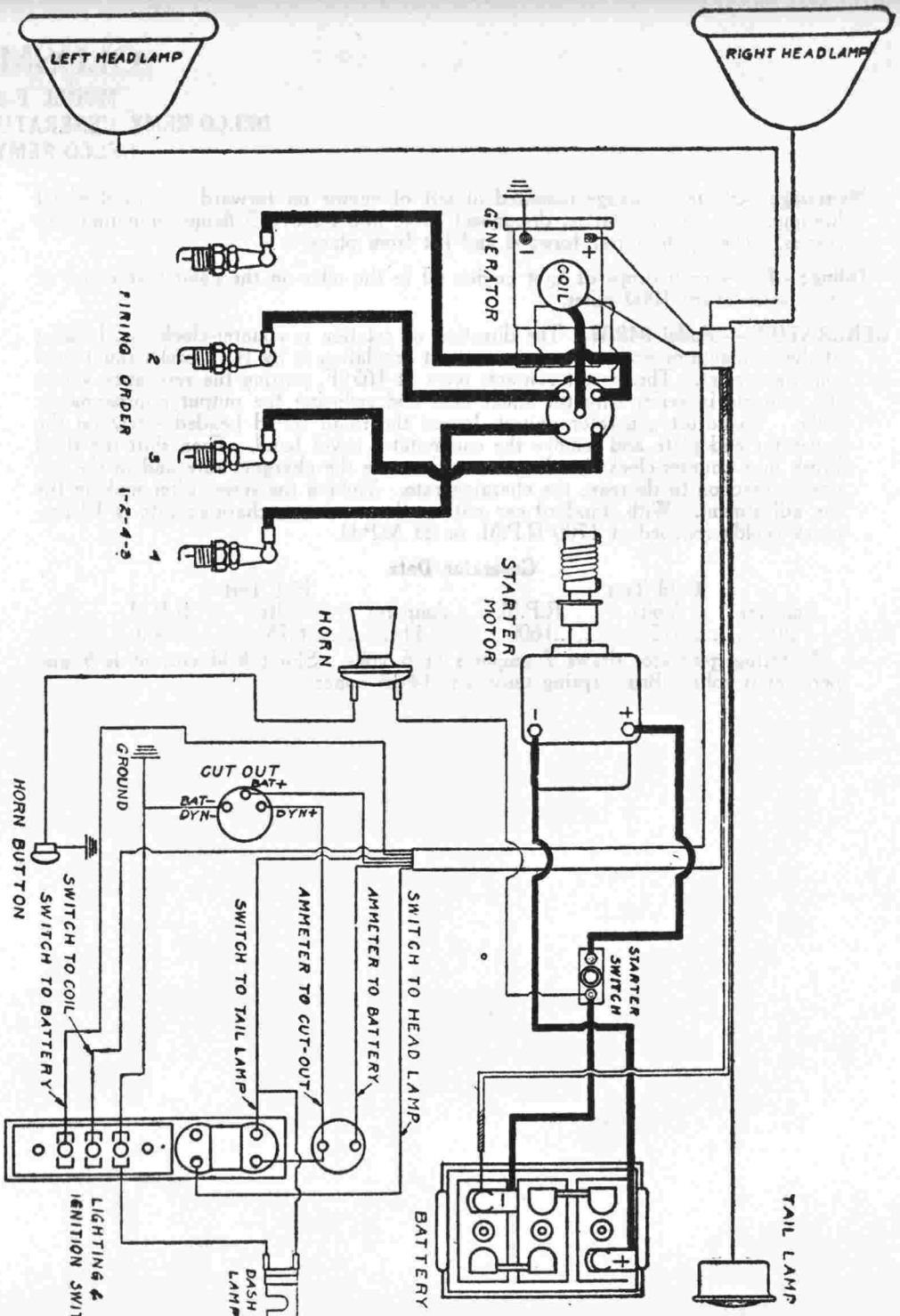
Output is varied by adjusting third brush. Moving third brush in direction of armature rotation increases output. Moving it in the opposite direction decreases output. When generator is operating freely as a motor, current is 2.7 amperes, armature revolving at 450 R. P. M. Shunt field current is 1.7 amperes.

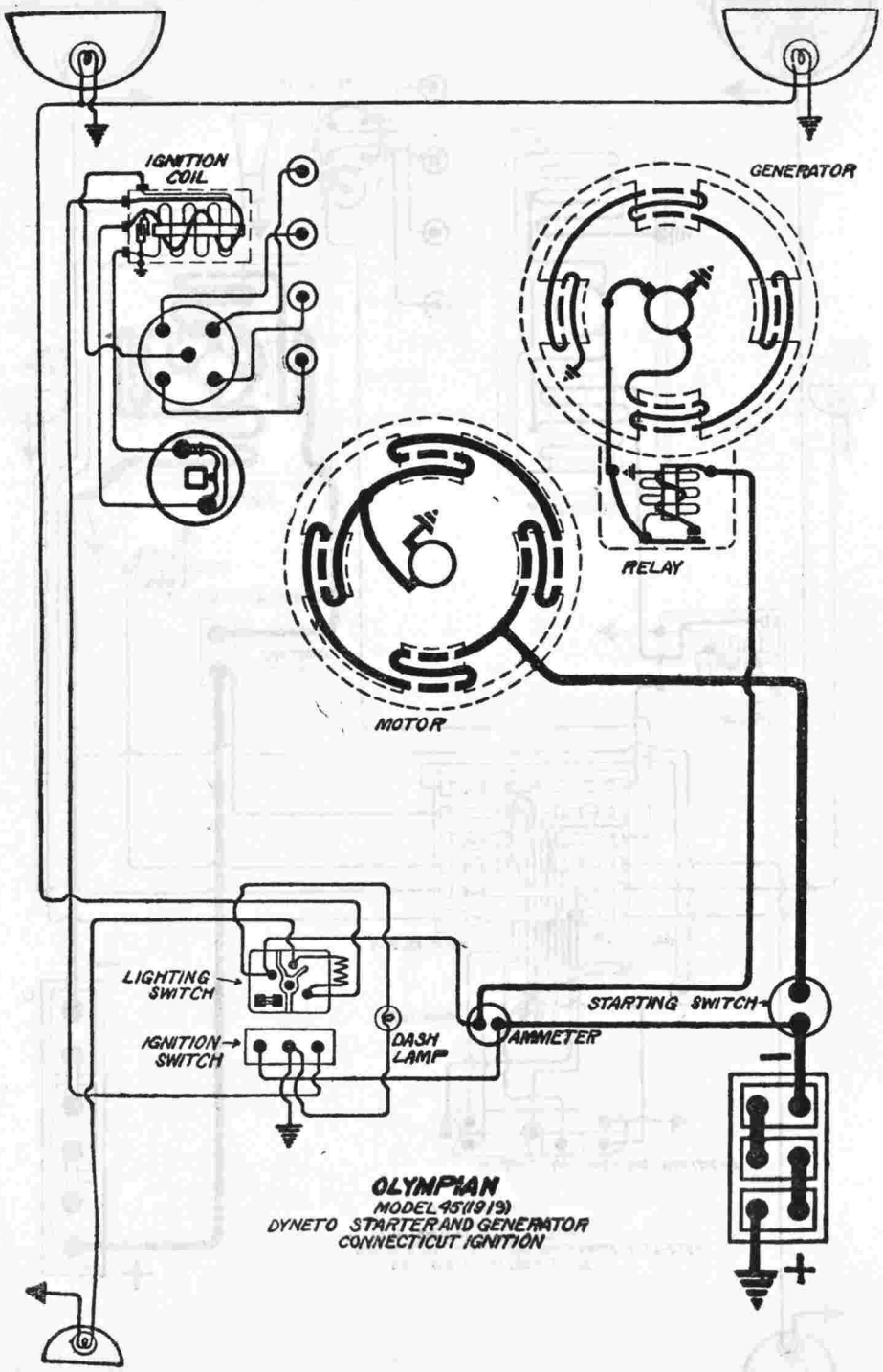
Oiling.—Put 4 or 5 drops of light engine oil in each of generator oilers every two weeks If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles

Relay.—Relay closes at 7-9 miles per hour or 550-600 R. P. M. of armature and opens at 5-7 miles per hour or 500-550 R. P. M. of armature. Charging current is .5 to 1.5 amperes at closing, and the discharge current 0 to 1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.







OLYMPIAN

MODEL 45 (1918-19)

DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

OILING.—Refill the grease cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 2, 4, 3.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER.—Model D-162. Starter is connected to the engine through a Bendix drive. When cranking engine, starter takes 130 amperes, armature revolving at 1500 R.P.M.

Starter Data

Torque	R.P.M.	Amperes	Volts
0.0 lb. ft.	5600	25	6.4
2.5 lb. ft.	1400	150	5.8
5.0 lb. ft.	850	250	5.3
10.0 lb. ft.	250	420	4.6
14.0 lb. ft.	Lock	530	4.0

OILING.—Put several drops of light engine oil in starter oilers every month.

GENERATOR.—Model C-162. Generator current regulation is by the third brush system. Maximum current output is 12-15 amperes, reached at 1200 R.P.M. of the armature or 20-25 miles per hour.

Generator Data

Amperes	Cold Test R.P.M.	Amperes	Hot Test R.P.M.
6	600	5	600
13	900	10	900
15	1200	12	1200
13.5	1600	11.5	1600
11.5	2000	10	2000

Shunt field current is 3.5 amperes at 6.5 volts. Charging rate is varied by adjustment of the third brush setting. Remove the leather plug in the commutator end of the generator, loosen the screw exposed and move in the direction of armature rotation to increase the charging rate. Move in the opposite direction to decrease the charging rate. Tighten the adjusting screw and replace the leather plug after adjustment is made.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 450-500 R.P.M. of armature, and opens at 6-8 miles per hour or 400-450 R.P.M. of armature. Relay contacts separate 3/32 inch. Air gap between relay armature and coil core is 1/8 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are 6-8 volt, 2 cp.

OVERLAND

MODELS 80, 81 AND 82 (1915)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
SPLITDORF MAGNETO IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded at the starting motor.

IGNITION.—Dixie Magneto. Breaker contacts separate .020 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Fill the magneto oil cups with light engine oil every month. Apply one drop of oil to the breaker bar bearing. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark "U. P. 1 & 4" or "U. P. 1 & 6" is 1¼ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order of Models 80 and 81 is 1, 3, 4, 2. The firing order of Model 82 is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .020 inch.

STARTER.—Model MC or MD. Starter is connected to the engine through a pinion shifted 80 and 81 there is a device mounted on top of the gear housing, to prevent the gears being accidentally meshed when the engine is running, or the starter being used when being accidentally meshed when the engine is running, or the starter being used when the lighting switch is locked. This device is shown on next page. When the "Start" button in the lighting switch is pressed, the current flowing through the solenoid produces an electro-magnet, which draws up the iron plunger permitting the depressing of the starting switch on the floor of the car, which in turn meshes the pinion with the flywheel gear and closes the switch contacts. When the "Start" button in the lighting switch is released, the iron plunger is allowed to drop down, locking the main starting switch in the off position. The brown wire coming out of the switch leads to the solenoid. A ground in this wire will cause the solenoid to fail to release the switch. On Model 82 cars, equipped with the Bendix drive, there is a similar device to lock the starting switch "Off." It operates the same as the one described above. The switch will not operate if the "Start" button is not pressed.

OILING.—The rear motor bearing is packed with grease. This grease should be renewed every season. Use soft cup grease in the cup at the gear end. Tighten this cup a turn every week. Do not lubricate the Bendix drive. Keep spiral clean with gasoline. The manually operated, sliding gear, and the flywheel gear on this type, should be cleaned with kerosene and lubricated with a mixture of graphite and oil every month.

GENERATOR.—Model GC or GA. Generator current regulation is by reverse series field.

Generator Data

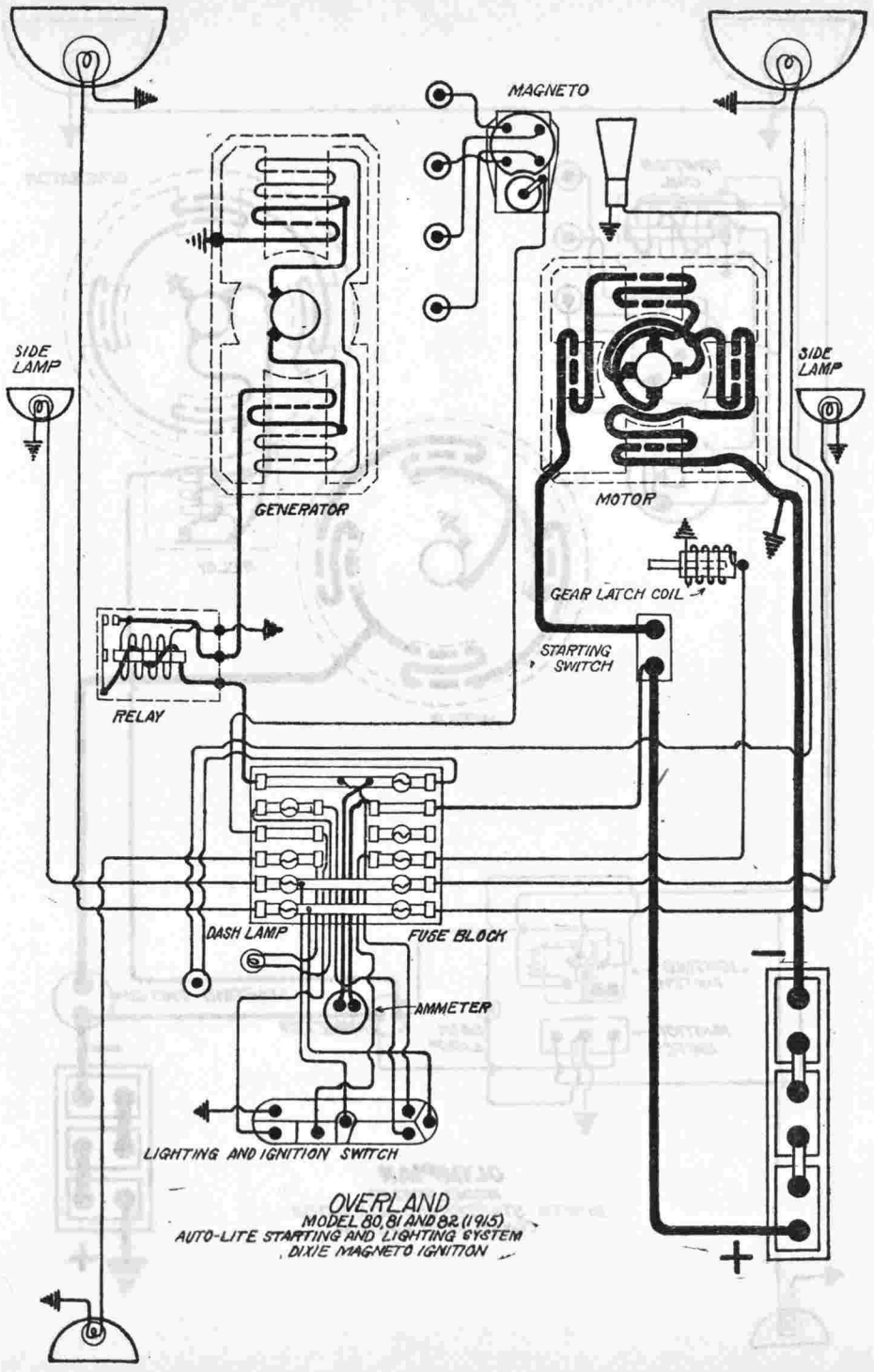
Model GA (6 Cylinder Cars)		Model GC (4 Cylinder Cars)	
Amperes	R.P.M.	Amperes	R.P.M.
5	550- 650	5	800-1000
10	980-1120	10	1350-1575
12.5	1365-1520	12.5	1700-2050
15	1850-2400	15	2250-3300
17-19	3000-3750	15-18	3300-3700

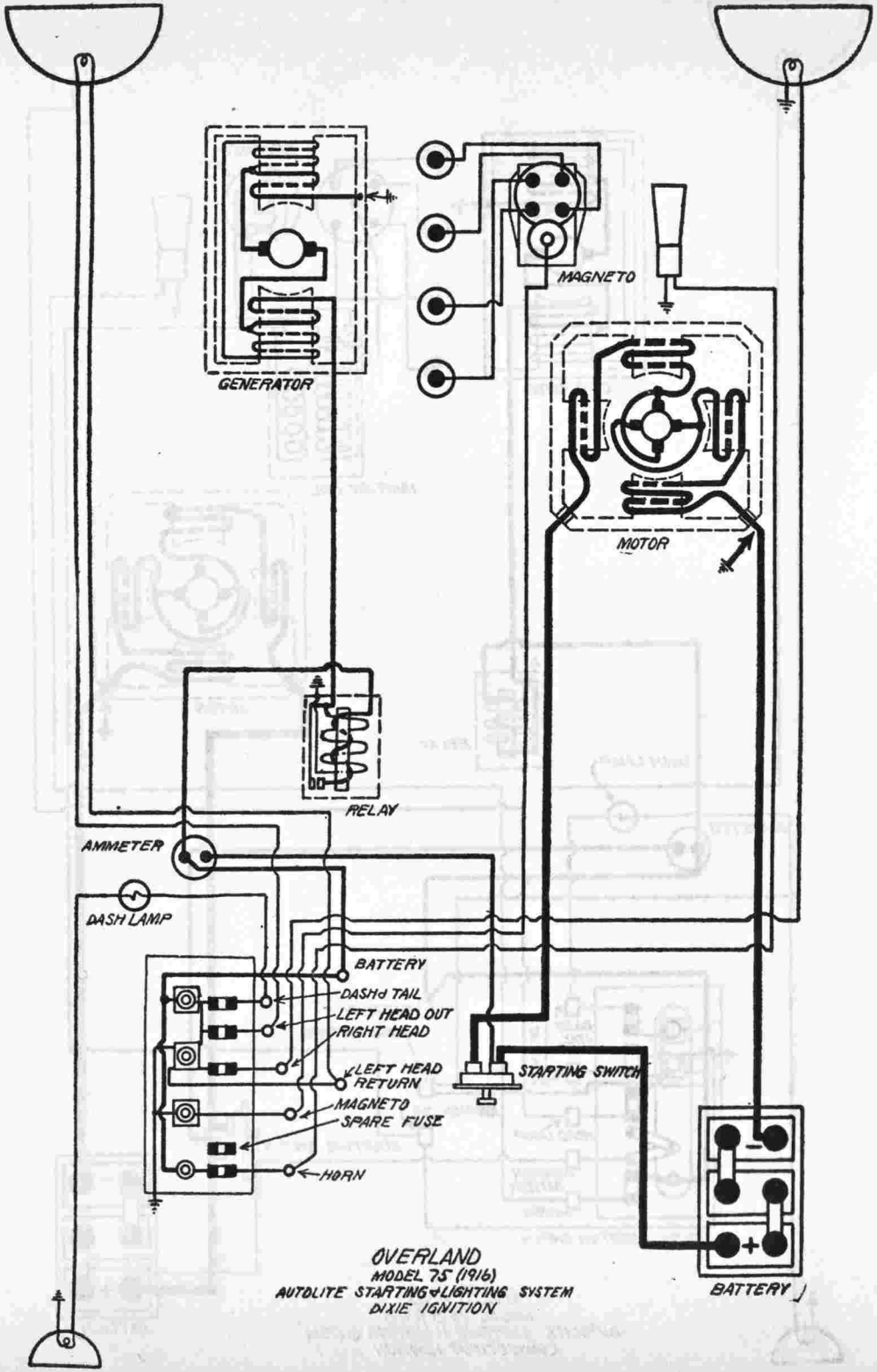
Current output may be varied slightly by adjustment of the brush tension. Brush tension should be 1 to 1¼ pounds. Generator Model GA takes 2 amperes when operating freely as a motor, armature revolving at 200 R.P.M. Model GC takes 2.25 amperes, armature revolving at 450 R.P.M. Shunt field winding of Model GA takes 1.4 amperes. Shunt field winding of Model GC takes .8 ampere.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles. Thoroughly clean out and repack the bearings with soft cup grease every six months.

RELAY.—On Models 80 and 81 the reay closes at 575-650 R.P.M. of the armature or 8-10 miles per hour, and opens at 525-575 R.P.M. of the armature or 6-8 miles per hour. On Model 82, the relay closes at 310-380 R.P.M. of the armature or 8-10 miles per hour and opens at 250-310 R.P.M. of the armature or 6-8 miles per hour. Charging current is .5 to 1.5 amperes at closing and the discharge current 0-1 ampere at opening of relay contacts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are connected in series and are each 3-4 volt, 2 cp. Other lamps are 6-8 volt, 4 cp.





OVERLAND

MODEL 75 (1916). BEFORE SERIAL NO. 33,850

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

DIXIE MAGNETO IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Magneto breaker contacts separate .018 inch to .020 inch. When condition of contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

TIMING.—Breaker contacts begn to separate when the top dead center mark on the flywheel is 1¼ inches past indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .027 inch.

OILING.—Fill magneto oil wells with light machine oil every month. If car is driven more than 1000 miles in a month, oiling must be done every 1000 miles.

STARTER.—Starter is connected to the engine through a Bendix drive.

OILING.—Thoroughly clean out and repack the starter bearings with soft cup or ball bearing grease every six months.

GENERATOR.—Generator current regulation is by reverse series field.

2 Inch Diameter Armature — 2½ Inch Diameter Armature

Generator Data.—Model GB

Amperes	R.P.M.	Amperes	R.P.M.
5	1000-1250	5	985-1140
10	1960-2300	10	1625-1875
12	2500-3500	12.5	2125-2545
12-14	3500-4500	12.0-14	2725-3500

A variation of 1.5 amperes from these amounts is allowable. The output may be varied slightly by adjusting the brush pressure. Brush pressure should be 1 to 1¼ pounds. When operating freely as a motor, the generator with 2 inch armature takes 1.9 amperes, armature revolving at 450 R.P.M. Generator with 2½ inch armature takes 1.7 amperes, armature revolving 435 R.P.M. Shunt field takes 1 ampere.

OILING.—Generator bearings are packed with grease. Put 1 or 2 drops of oil in each of the bearings every 500 miles. Thoroughly clean out and repack bearings with soft cup or ball bearing grease every six months.

RELAY.—Relay closes at 8-10 miles per hour or 525-650 R.P.M. of armature. Charging current is 1 to 1.5 amperes at closing and the discharge current 0 to 1 ampere at opening of relay. Clean relay contacts by drawing a strip of unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into cervice.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are in series. They are each 3-4 volt, 2 cp.

FUSES.—Fuses are 20 ampere.

Overland

Model 75B (1917)

Auto-Lite Generating, Starting and Lighting System
Connecticut Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded at starting motor.

Ignition.—Breaker contacts separate .023 inch. They are made of tungsten. When the condition of the points affects the ignition, renew the inner breaker mechanism. For temporary service resurface contacts with fine emery cloth.

Timing.—Contacts should begin to separate when the top dead center mark "1-4 UP" on the flywheel is 1¼ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps are .027 inch.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Starter—Starter is connected to engine through a Bendix drive.

Oiling.—Thoroughly clean out and repack starter bearings with soft cup or ball bearing grease every six months.

Generator.—Generator current regulation is by reverse series field.

GENERATOR DATA, MODEL GB

2 Inch Diameter Armature		2½ Inch Diameter Armature	
Amperes	R. P. M.	Amperes	R. P. M.
5	1000-1250	5.0	985-1140
10	1960-2300	10.0	1625-1875
12	2500-3500	12.5	2125-2545
12-14	3500-4500	12.0-14	2725-3500

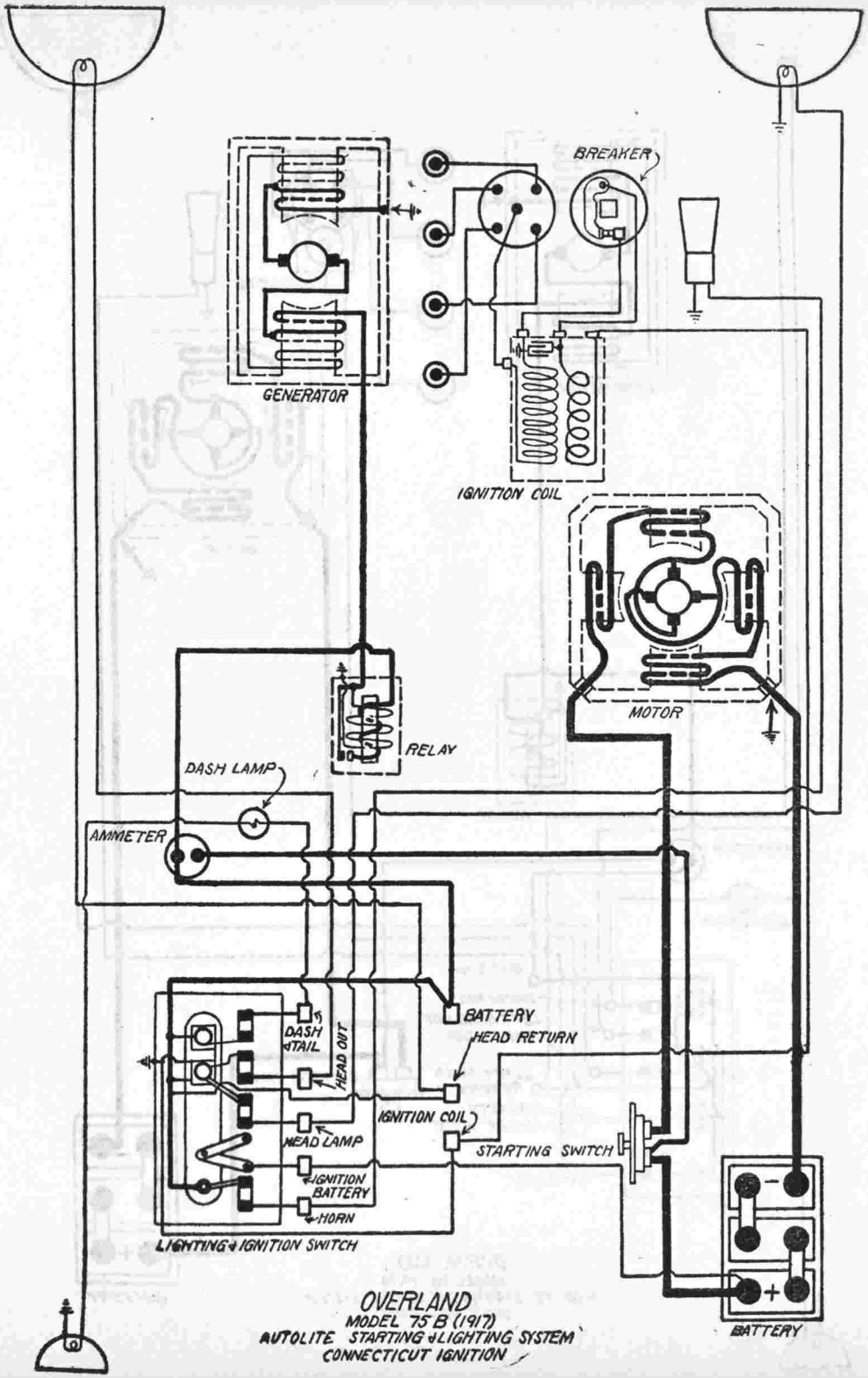
A variation of 1.5 amperes from these amounts is allowable. Output may be varied slightly by adjusting brush pressure. Brush pressure should be 1 to 1¼ pounds. When operating freely as a motor, generator with 2 inch armature takes 1.9 amperes, armature revolving at 450 R. P. M. Generator with 2½ inch armature takes 1.7 amperes, armature revolving at 435 R. P. M. Shunt field takes 1 ampere.

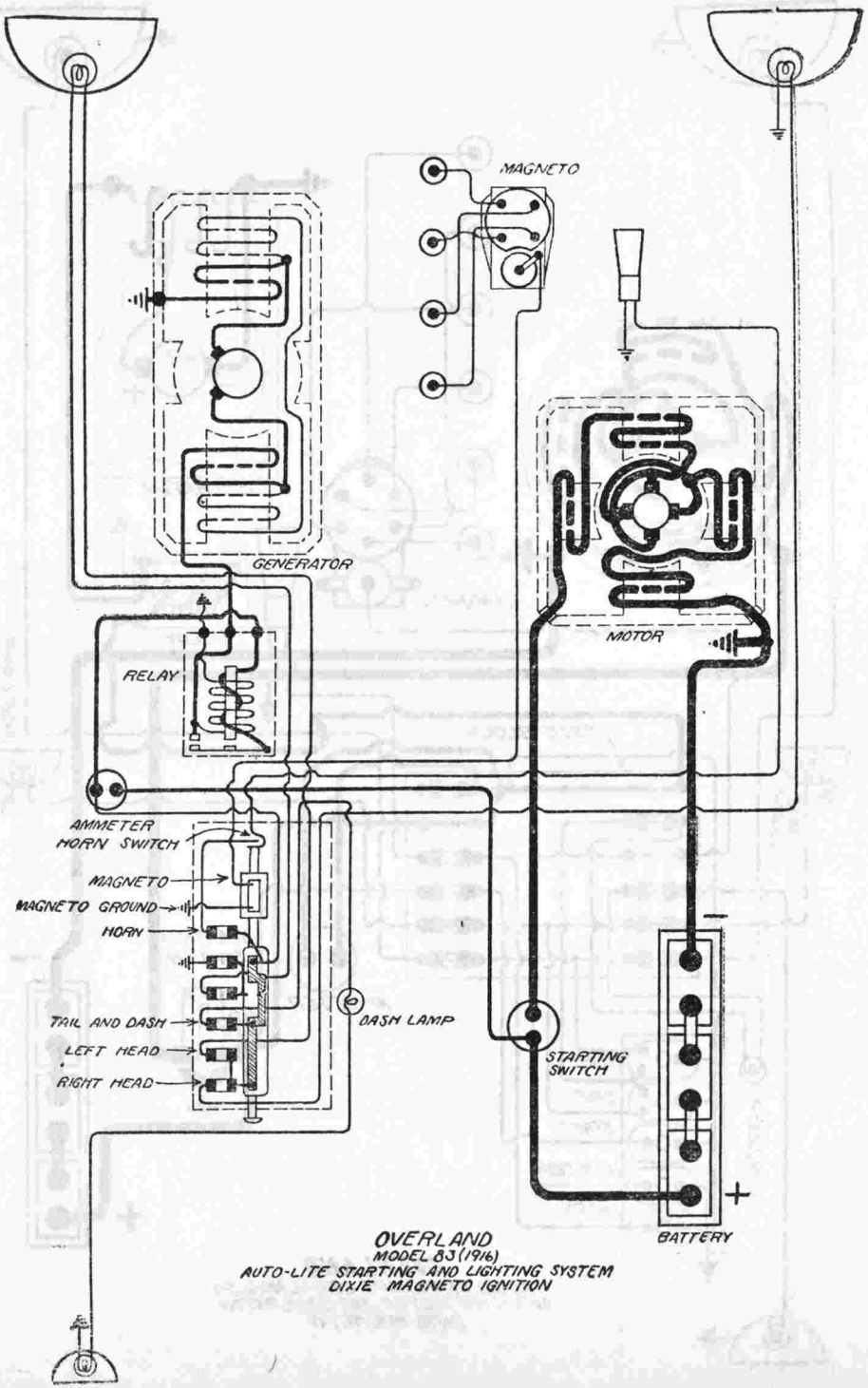
Oiling.—Generator bearings are packed with grease. Put one or two drops of oil in each of the bearings every 500 miles. Thoroughly clean out and repack bearings with soft cup or ball bearing grease every six months.

Relay.—Relay closes at 8-10 miles per hour or 525-650 R. P. M., of armature. Charging current is 1 to 1.5 amperes at closing and the discharge current 0 to 1 ampere a opening of relay. Clean relay contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are in series. They are each 3-4 volt, 2 cp.

Fuses.—Fuses are 20 ampere.





OVERLAND

MODEL 83 (1916-17-18)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
DIXIE MAGNETO IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded at the starting motor.

IGNITION.—Magneto breaker contacts separate .018 to .020 inch. When condition of contacts affects ignition, resurface with a fine flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill magneto oil wells with light machine oil every month. If car is driven more than 500 miles in a month, oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when the mark "1-4 U-P." on flywheel is 1 3/16 inches past indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .018 to .022 inch.

STARTER.—Model MC. Starter is connected to engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes
1 lb. ft.	2650	100
2 lb. ft.	1900	145-150
3 lb. ft.	1600	185-190
4 lb. ft.	1400	225
5 lb. ft.	1250	250-255
6 lb. ft.	1000	290-300

Lock torque is 16 lb. ft., current being 450-460 amperes at 3.8 to 4.2 volts.

OILING.—Clean out and repack starter bearings with soft cup or ball bearing grease every 6 months.

GENERATOR.—Model GD. Generator current regulation is by reverse series field.

Amperes	**Generator Data**	R.P.M.
5.0		800-1000
10.0		1350-1575
12.5		1700-2050
15.0		2250-3300
15.0-18		3300-3700

A variation of 1.5 amperes from these amounts is allowable. Generator current may be varied slightly by adjusting brush pressure on commutator. The correct pressure is 1 to 1¼ lbs. Operating freely as a motor, generator takes 1.75 amperes, armature revolving at 450 R.P.M. Shunt field current is .8 ampere.

OILING.—Put 5 or 6 drops of light engine oil in each of generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Relay closes at 7-10 miles per hour or 575-650 R.P.M. of armature and opens at 5-7 miles per hour or 500-575 R.P.M. of armature. Charging current is .5 to 1.5 amperes at closing and the discharge current 0 to 1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 16 cp. Dash and tail lamps are in series. They are each 3-4 volt, 2 cp.

OVERLAND

MODEL 86 (1916). BEFORE SERIAL NO. 2150
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
DIXIE IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded at the starting motor.

IGNITION.—Dixie Magneto. Breaker contacts separate .020 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Fill the oil cups with light engine oil every month. Apply one drop of oil to the breaker bar bearing. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1¼ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .020 inch.

STARTER.—Model MD. Starter is connected to the engine through a Bendix drive or by a pinion shifted by the operator.

OILING.—Put 4 or 5 drops of light engine oil in the starter oilers every month. Thoroughly clean out and repack bearings with soft cup or ball bearing grease every six months.

GENERATOR.—Model GA. Generator current regulation is by reverse series field. Maximum charging rate is 16-18 amperes, reached at 3000-3750 R.P.M. of the armature.

Amperes	Generator Data	R.P.M.
5		550- 650
10		980-1120
12.5		1365-1520
15		1850-2400
16-18		3000-3750

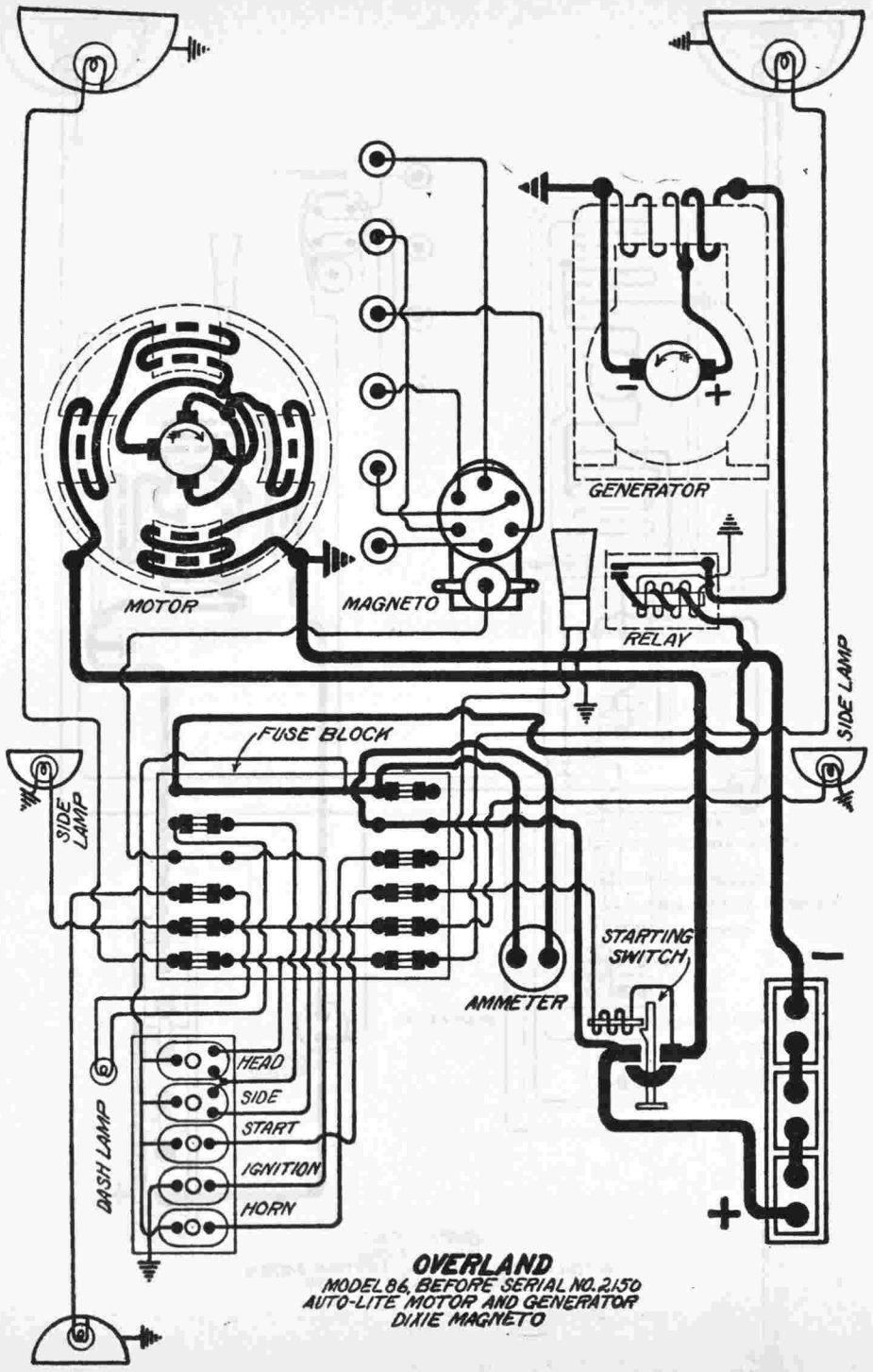
Charging rate may be varied slightly by changing the pressure of the brushes on the commutator. Running freely as a motor, generator takes 2 amperes, armature revolving at 200 R.P.M. Shunt field winding takes 1.4 amperes.

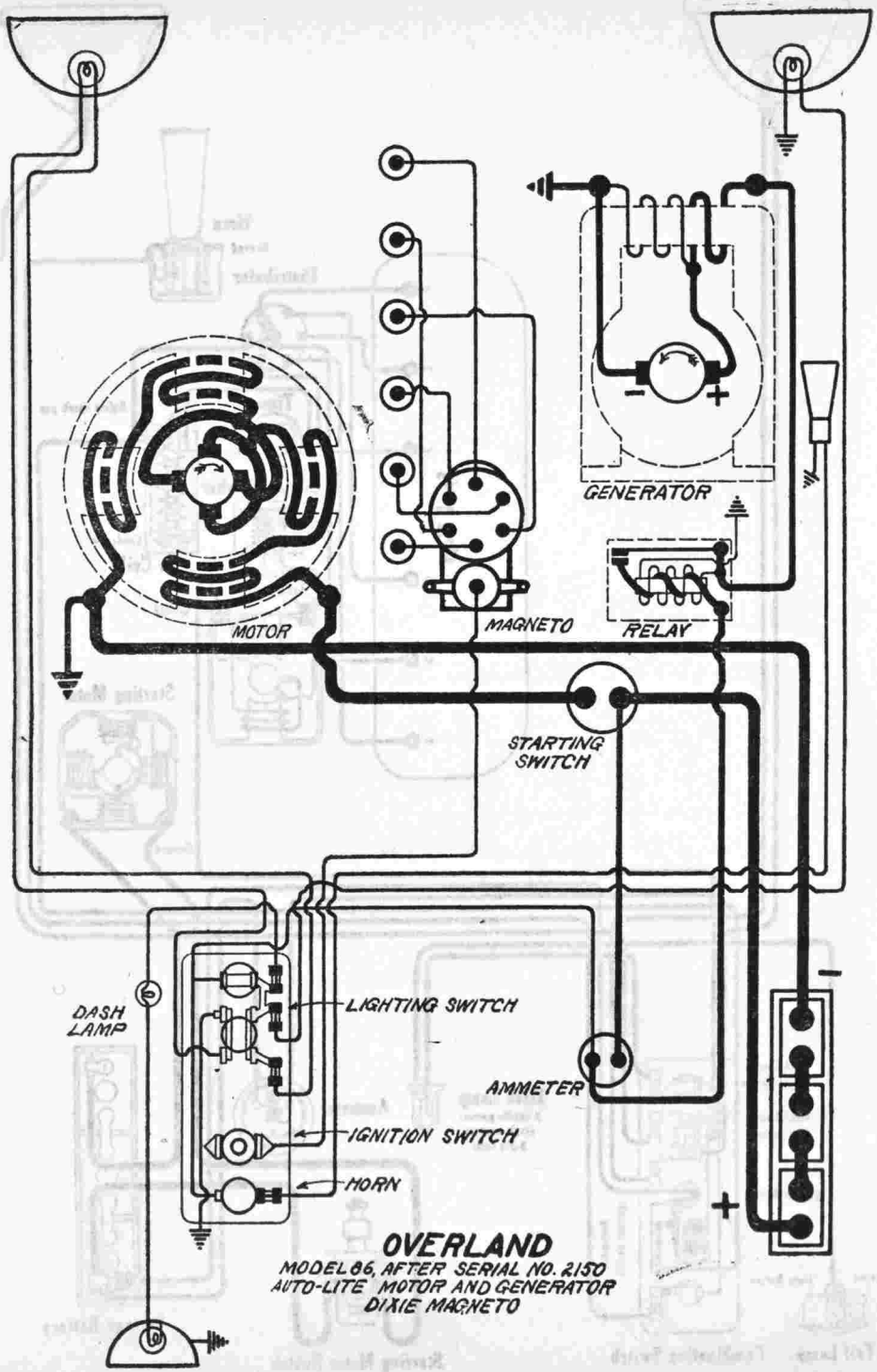
OILING.—Put 5 or 6 drops of light engine oil in the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 310-380 R.P.M. or 8-10 miles per hour, and opens at 250-310 R.P.M. of the armature or 6-8 miles per hour. Charging current is .5 to 1.5 amperes at closing and the discharge current 0-1 ampere at the opening of the relay contacts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are connected in series and are each 3-4 volt, 2 cp.

FUSES.—Fuses are 20 ampere.





OVERLAND

MODELS 86 AND 86-B (1916-17) SERIAL NOS. 2150 UP
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
DIXIE IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded at the starting motor.

IGNITION.—Dixie Magneto. Breaker contacts separate .020 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Fill the oil cups with light engine oil every month. Apply one drop of oil to the breaker bar bearing. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1¼ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .020 inch.

STARTER.—Model MD. Starter is connected to the engine through a Bendix drive or by a pinion shifted by the operator.

OILING.—Put 4 or 5 drops of light engine oil in the starter oilers every month. Thoroughly clean out and repack bearings with soft cup or ball bearing grease every six months.

GENERATOR.—Model GA. Generator current regulation is by reverse series field. Maximum charging rate is 16-18 amperes, reached at 3000-3750 R.P.M. of the armature.

Amperes	Generator Data	R.P.M.
5		550- 650
10		980-1120
12.5		1365-1520
15		1850-2400
16-18		3000-3750

Charging rate may be varied slightly by changing the pressure of the brushes on the commutator. Running freely as a motor, generator takes 2 amperes, armature revolving at 200 R.P.M. Shunt field winding takes 1.4 amperes.

OILING.—Put 5 or 6 drops of light engine oil in the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 310-380 R.P.M. or 8-10 miles per hour, and opens at 250-310 R.P.M. of the armature or 6-8 miles per hour. Charging current is .5 to 1.5 amperes at closing and the discharge current 0-1 ampere at the opening of the relay contacts Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are connected in series and are each 3-4 volt, 2 cp.

FUSES.—Fuses are 20 ampere.

OVERLAND

MODEL 85-6 (1917-18)

Auto-Lite Starting and Lighting System. Connecticut Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded at the starting motor.

Ignition.—Breaker contacts should separate .018 inch to .020 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should begin to separate when the mark "1-6 D-C" on the flywheel is 1⅛ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be about .023 inch.

Ignition Thermostat.—There is a thermostat in the lighting-ignition switch case to open the ignition circuit, should the switch be left "On" with engine idle, contacts closed. This device is treated on Page 50.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Starter.—Starter is connected to engine by a Bendix drive. Cold engine, tight bearings, heavy oil or other obstructions will cause slow cranking speed and high current.

Oiling.—Clean and repack starter bearings with soft cup grease every six months. Put in one or two drops of oil every month to keep grease soft.

Generator.—Generator current regulation is by reverse series field in the type GG generator and by third brush system in the GH type generator. Relay should close at 500-575 R. P. M., of generator armature on the GG generator and at 550-600 R. P. M. on GH type generator. Charging current should be .5 to 1.5 ampere at closing and the discharge current 0 to 1 at opening.

GENERATOR DATA.

Model GG (Reverse Series Type).		Model GH (Third Brush Type).	
Amperes	R. P. M.	Amperes.	R. P. M.
5.0	750- 860	5.0	760- 820
10.0	1225-1400	10.0	1020-1100
12.5	1600-1825	12.5	1200-1300
15.0	2175-2450	15.0	1460-1675
17-18	3200-3700	15-17	1950-2250

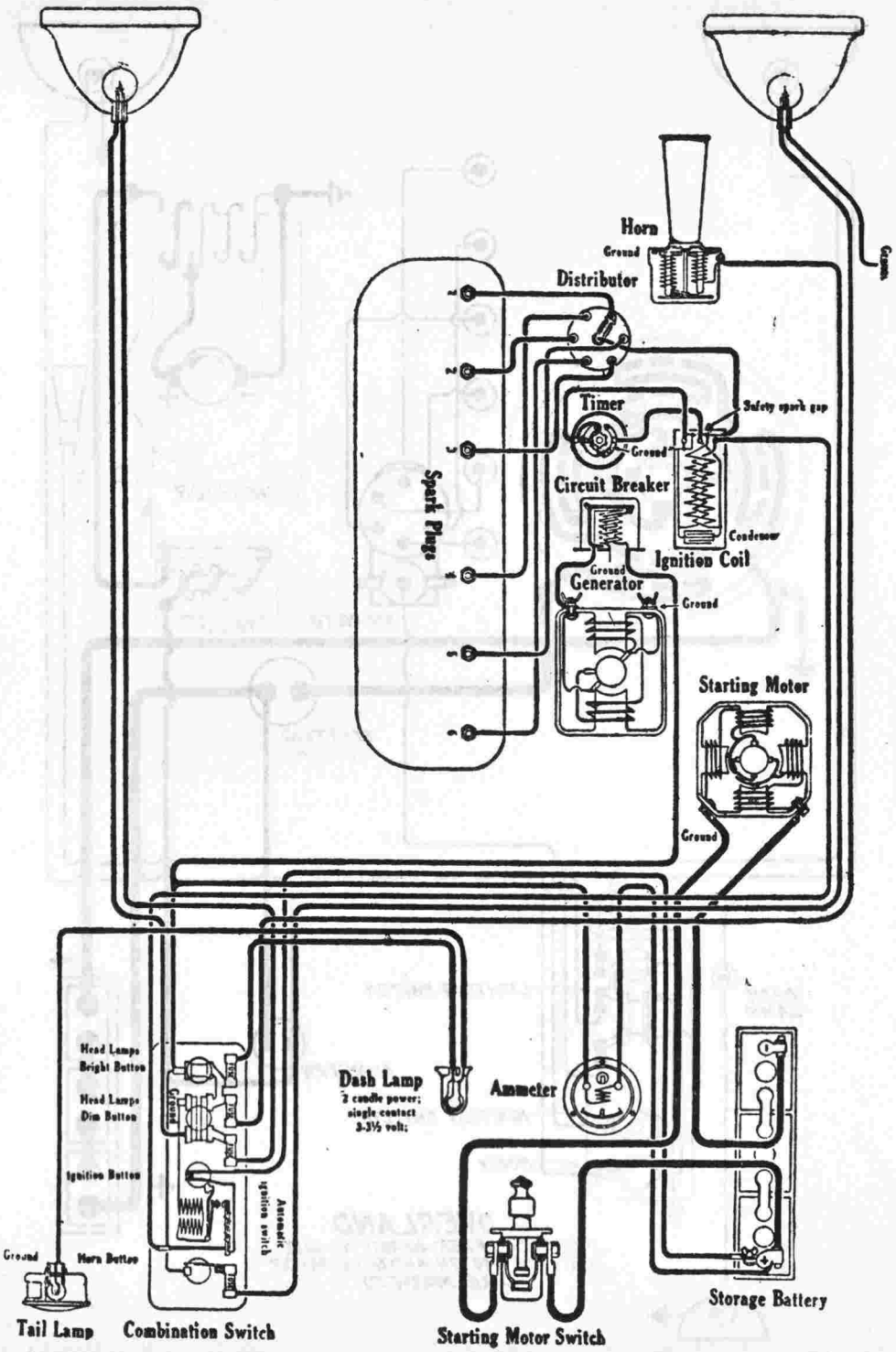
A variation of 1.5 amperes from these amounts is allowable. Output may be varied somewhat by adjusting brush pressure on commutator on GG type or third brush on GH type. The pressure should be 1 to 1¼ pounds. If operated freely as a motor, type GG generator should take 2.8 amperes, armature revolving at 350 R. P. M. Model GH generator should take 2.7 amperes, armature turning at 450 R. P. M. Geater speed indicates damp, grounded or short circuited field coils. Greater current or lower speed indicates tight bearings or damp, grounded or short circuited armature windings or commutator. Periodic swinging of ammeter needle indicates grounded or short circuited armature coils or commutator bars. Shunt field should take approximately 1.1 amperes on model GG and 1.7 amperes on model GH.

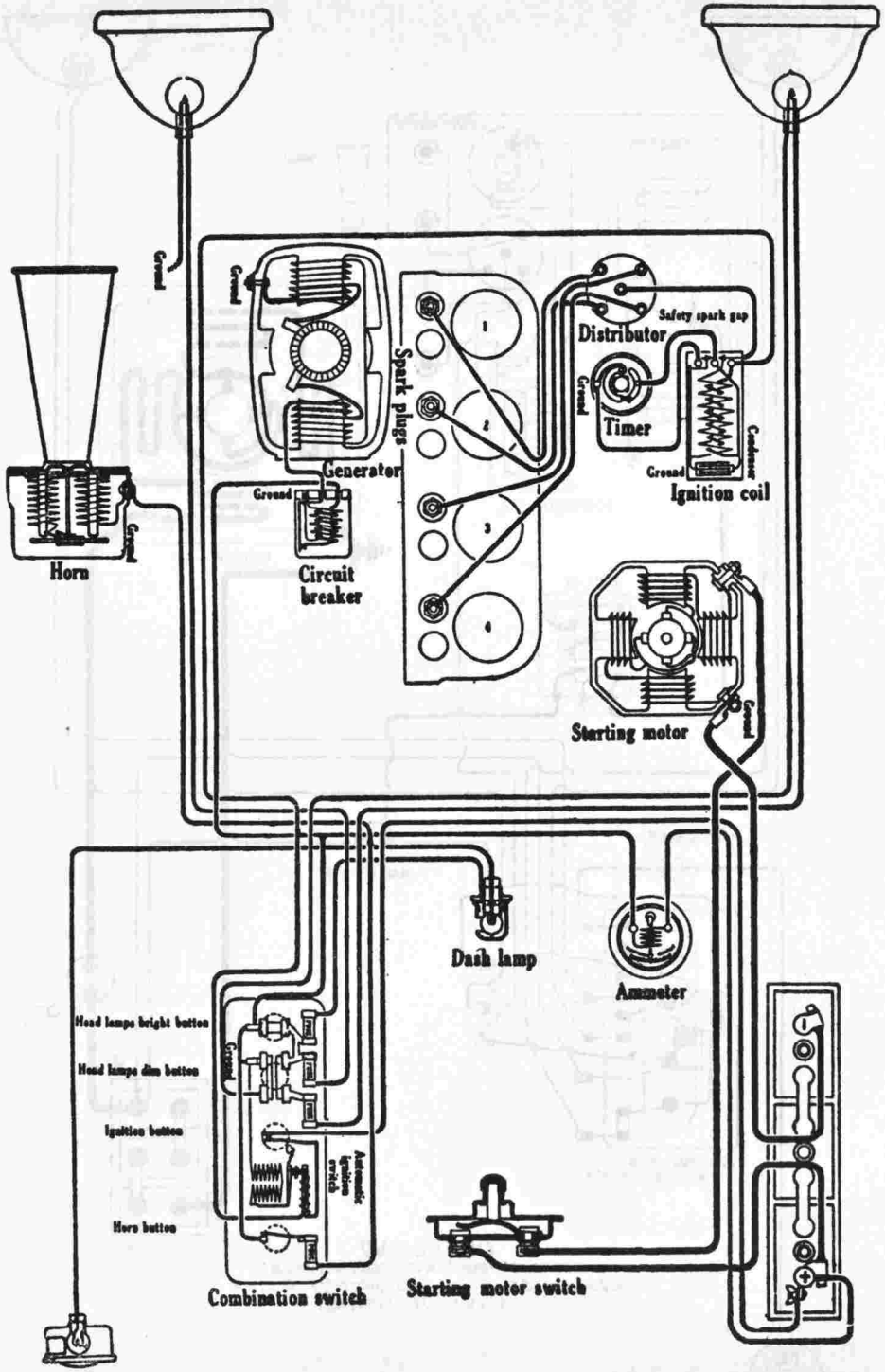
Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-7 volts, 16 cp. Dash and tail lamps are in series. They are each 3-3.5 volts, 2 cp.

Fuses.—Fuses are 20 ampere.

Model Numbers.—Generator Model GG 1064 is used on cars having Serial Number up to 13,000. On cars above this number, type GH 1006 generator is used. Starter is Model ME 1021 on cars up to Serial Number 1179. After this number type ME 1026 is used. A USL AD 313 battery is used on late cars. On early cars battery is Williard OHSLB or Prestolite 613 W 02.





MODEL 85-4 (1917-18)
Auto-Lite Starting and Lighting System
Conneticut Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded at the starting motor.

Ignition.—Breaker contacts should separate .016 inch to .018 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should begin to separate when the mark "1-4 U-P" on the flywheel is 1-1/4 to 1-7/16 inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps should be about .023 inch.

Ignition Cutout.—There is a thermostat in the combination switch to prevent discharging of battery through ignition should the switch be left "On" with engine idle and contacts closed. This device is fully described on Page 41.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Starter.—Starter is connected to engine through a Bendix drive. When running free, armature should revolve at about 4200 R. P. M., taking 50-55 amperes. Greater speed indicates grounded, short circuited or damp field windings. Greater current or vibrating of the ammeter needle indicates grounded or short circuited armature coils or commutator. Damp armature windings will cause high current or slow speed.

STARTER DATA, MODEL MC

Torque	R. P. M.	Amperes
1 lb. ft	2650	100
2 lb. ft	1900	145-150
3 lb. ft	1000	185-190
4 lb. ft	1400	225
5 lb. ft	1250	250-255
6 lb. ft	1000	290-300

Starter should develop 16 pound-feet lock torque, taking 450-460 amperes at 3.8 to 4.2 volts.

Oiling.—Clean and repack starter bearings with soft cup grease every six months. Put in one or two drops of oil every month to keep grease soft.

Generator.—Generator current regulation is by reverse series field. Relay should close at 8-10 miles per hour or 575-650 R. P. M., of generator armature. Charging current should be .6 to 1.5 amperes at closing and discharge current 0-1 at opening.

GENERATOR DATA, MODEL GD

Amperes	R. P. M.
5.0	800-1000
10.0	1350-1575
12.5	1700-2050
15.0	2250-3300
15-18	3300-3700

A variation of 1.5 amperes from these amounts is allowable. Generator output may be varied slightly by adjusting the brush pressure on commutator. The pressure should be 1-1¼ pounds. Shunt field should take about .8 ampere. If operated freely as a motor, armature should revolve at 450 R. P. M., taking 1.75 amperes. Much higher speed indicates damp, grounded or short circuited field coils. Greater current or lower speed indicates tight bearings, or damp, grounded or short circuited armature windings or commutator. Periodic swinging of ammeter needle indicates grounded or short circuited armature coils or commutator bars.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-7 volts, 16 cp. Dash and tail lamps are in series. They are each 3-3½ volts, 2 cp.

Fuses.—Fuses are 20 ampere.

OVERLAND

MODEL 90 (1917-18) SERIAL NOS. 1 TO 104,400
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—Battery is 6 volt, 75 ampere-hour. The negative **(—)** terminal is grounded at starting motor.

IGNITION.—Breaker contacts separate .016 to .020 inch. They are made of tungsten. When the condition of the points affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts begin to separate when the mark "1-4 U-P" on flywheel is 1¼ inches past indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .023 inch.

RENEWING BREAKER.—To renew breaker mechanism, remove wire leading from breaker to coil terminal marked "C." Unclasp and remove distributor head. Lift off the distributor rotor. Remove the two ring retaining screws which hold the breaker mechanism in place. Then remove breaker by pulling upward. Remove the primary wire attached to breaker and keep it to be installed on the new breaker. To install new breaker, reverse above operations.

STARTER.—Starter is connected to engine through a Bendix drive.

OILING.—Clean out and repack starter bearings with soft cup grease every 6 months.

GENERATOR.—Model GH. Generator current regulation is by third brush system.

Amperes	Generator Data	R.P.M.
5.00		760- 820
10.00		1020-1100
12.50		1200-1300
15.00		1460-1675
15-17		1950-2250

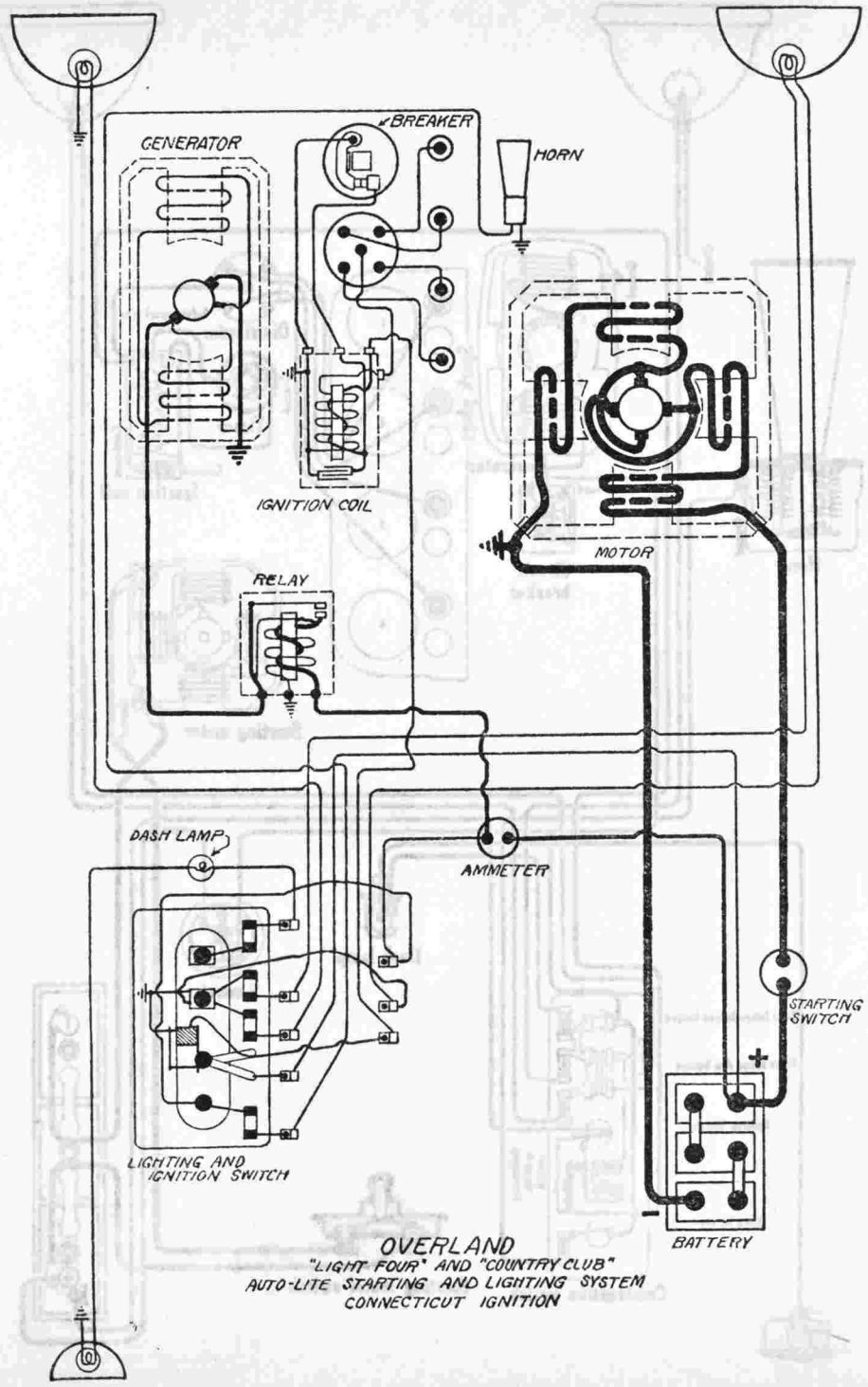
Operating freely as a motor, generator takes 2.7 amperes, armature revolving at 450 R.P.M. Shunt field takes 1.7 amperes.

OILING.—Put 4 or 5 drops of light machine oil in each of starter generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

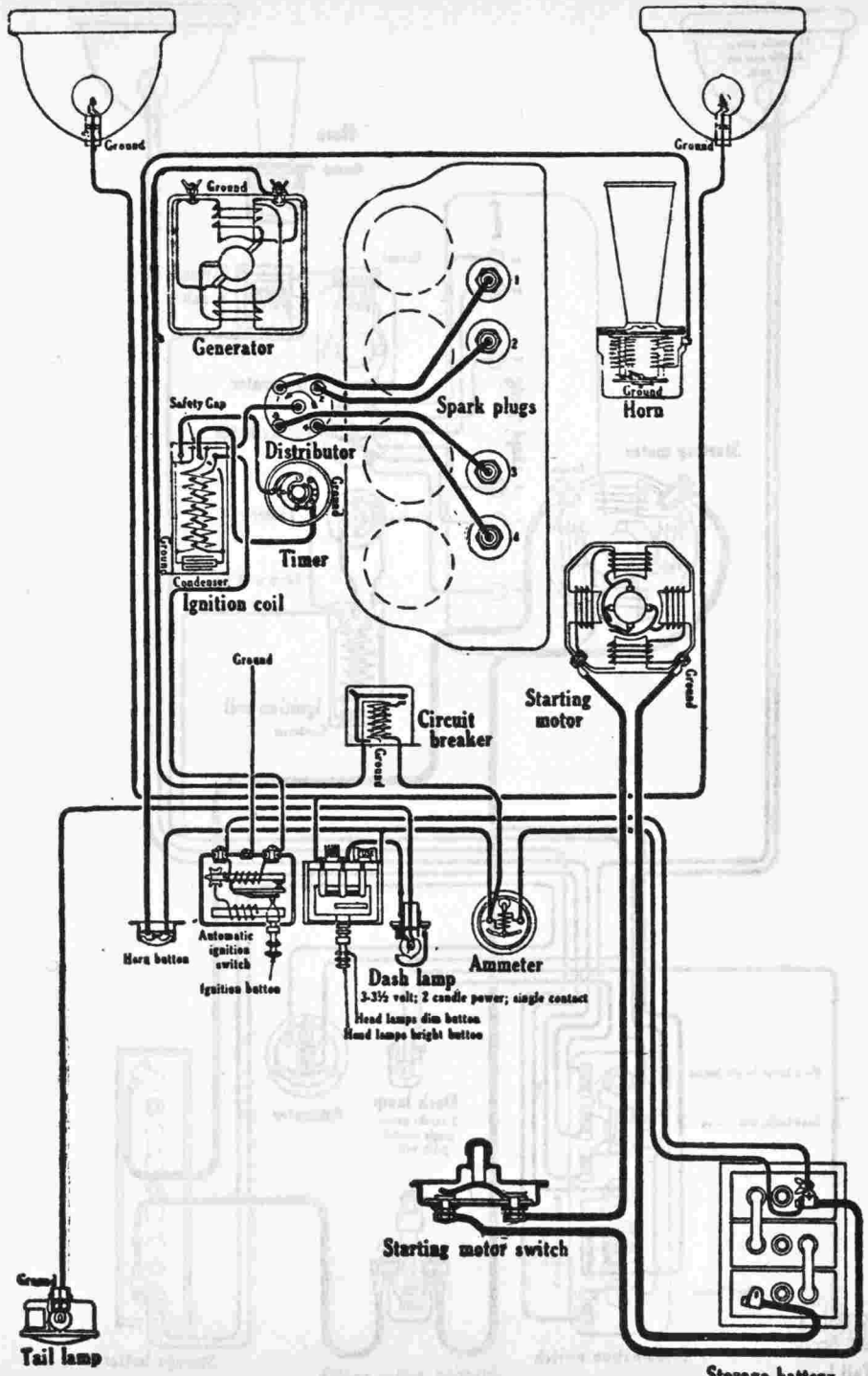
RELAY.—Relay closes at 7-9 miles per hour or 550-600 R.P.M. of armature and opens at 5-7 miles per hour or 500-550 R.P.M. of armature. Charging current is .5 to 1.5 amperes at closing and the discharge current 0 to 1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 16 cp. Dash and tail lamps are in series. They are each 3-4 volt, 2 cp.

FUSES.—Fuses are 20 ampere.



OVERLAND
"LIGHT FOUR" AND "COUNTRY CLUB"
AUTO-LITE STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION



Overland

Model 90 (1918)

Auto-Lite Starting and Lighting System
Connecticut Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded at the starting motor.

Ignition.—Breaker contacts should separate .016 inch to .018 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should begin to separate when the top dead center mark "1-4 U-P" on the flywheel is 1¼ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps should be about .023 inch.

Ignition Thermostat.—There is a thermostat or automatic overload release in the ignition switch. If the ignition switch is left on, with the engine idle, the thermostat will open the circuit after a short time. Cars having serial number below 107,706 are equipped with the device described on Page 41. Cars above this number have the new type switch. In this device, the current flowing through the heavy winding heats the blade sufficiently to cause it to bend, separating the contacts. This causes the current to flow through the other, fine coil, heating it. This causes the blade to bend away, releasing the latch which holds the ignition switch "On". The device should operate within 3 minutes after engine is stopped, contacts closed. With proper adjustment it will act in 10-15 seconds.

Starter.—Starter is connected to the engine through a Bendix drive. Cold engine, heavy oil, tight bearings or other obstructions or damp, grounded or short circuited motor windings or commutator bars will cause low speed and excessive current during the cranking operation.

Oiling.—Clean and repack starter bearings with soft cup grease every six months. Put in one or two drops of oil every month to keep grease soft.

Generator.—Generator current regulation is by third brush system. Relay contacts should close at 550-600 R. P. M., of generator armature. Charging current should be .5 to 1.5 amperes at closing and 0 to 1 ampere at opening of relay contacts.

GENERATOR DATA, MODEL GH

Amperes	R. P. M.
5	760- 820
10	1020-1100
12.5	1200-1300
15	1460-1675
15-17	1950-2250

If operated freely as a motor, generator should take 2.7 amperes, armature revolving at 450 R. P. M. Much higher speed indicates damp, grounded or short circuited field coils. Greater current or lower speed indicates tight bearings or damp, grounded or short circuited armature windings or commutator. Periodic swinging of the ammeter needle indicates grounded or short circuited armature coils or commutator bars. Shunt field should take about 1.7 amperes.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-7 volts, 16 cp. Dash and tail lamps are in series. They are each 3-3.5 volts, 2 cp.

Fuses.—Fuse is 20 ampere.

Model Numbers.—Generator is Model GH 1006. Starter is Model MF 1086. Battery is USL CD 311. On some of the early cars, Gould B 7675 or Willard OLBA battery was used.

OVERLAND

MODELS 88-6, 89-6 (1918)

Auto-Lite Starting and Lighting System

Connecticut Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded at the starting motor.

Ignition.—Breaker contacts should separate .016 inch to .018 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should begin to separate when the mark "1-6 D-C" on the flywheel is 1⅛ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be about .023 inch.

Ignition Thermostat.—There is a thermostat in the ignition switch case to open the circuit should switch be left "On," engine idle, contacts closed. This device is treated on Page 41.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Starter.—Starter is connected to the engine through a Bendix drive. It should crank the engine at 100 to 125 R. P. M., taking about 250 amperes. Cold engine, tight bearings, heavy oil or other obstructions will cause a greater current flow and reduce the speed.

Oiling.—Clean and repack starter bearings with soft cup grease every six months.

Generator.—Generator current regulation is by reverse series field. Relay should close at 8-10 M. P. H., or 300-380 R. P. M., of generator armature. Charging current should be .6 to 1.5 amperes at closing and discharge current 0 to 1 ampere at opening.

GENERATOR DATA, MODEL GA

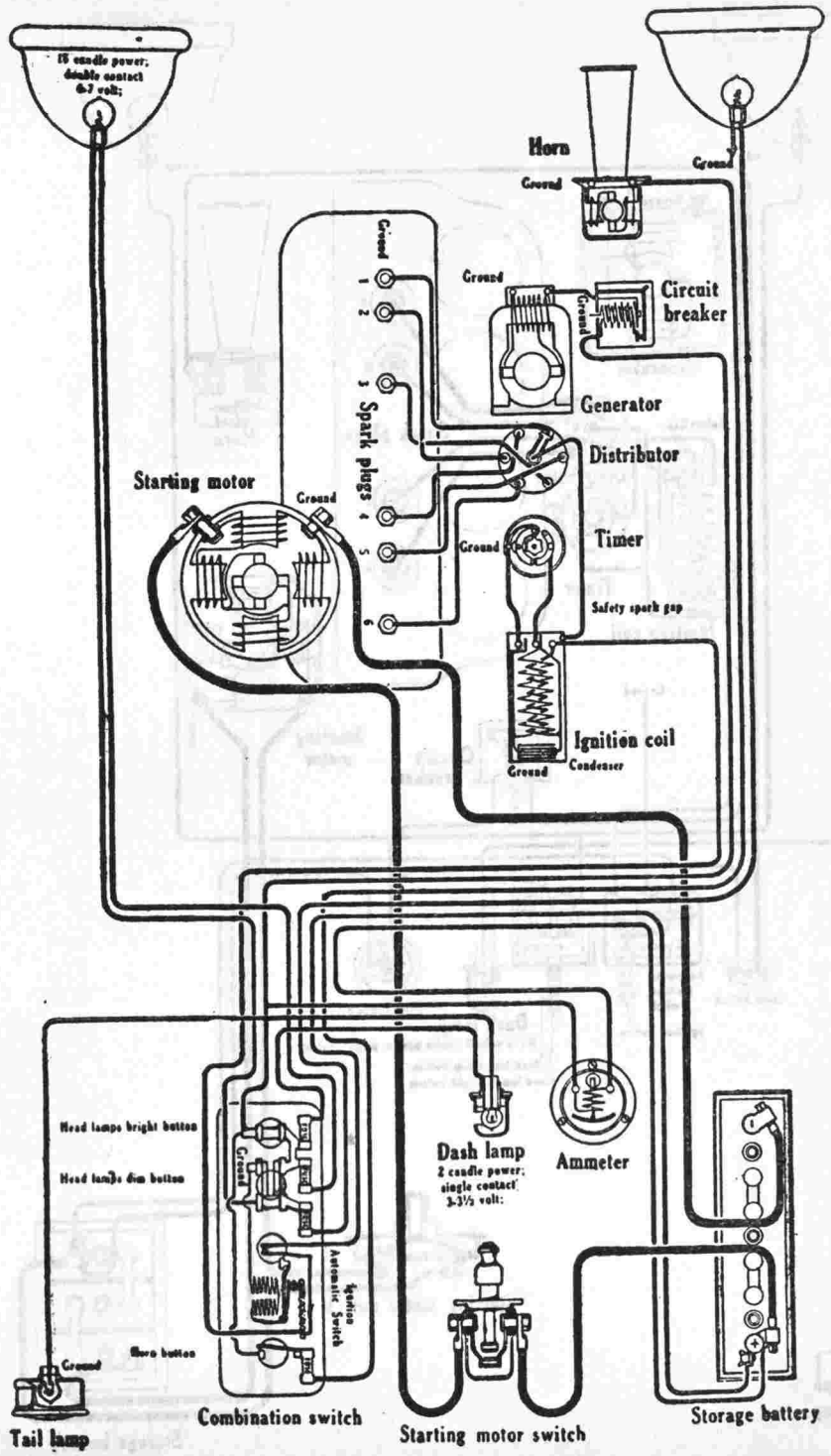
Amperes	R. P. M.
5	550- 560
10	980-1120
12.5	1365-1570
15	1850-2400
16-18	3000-3750

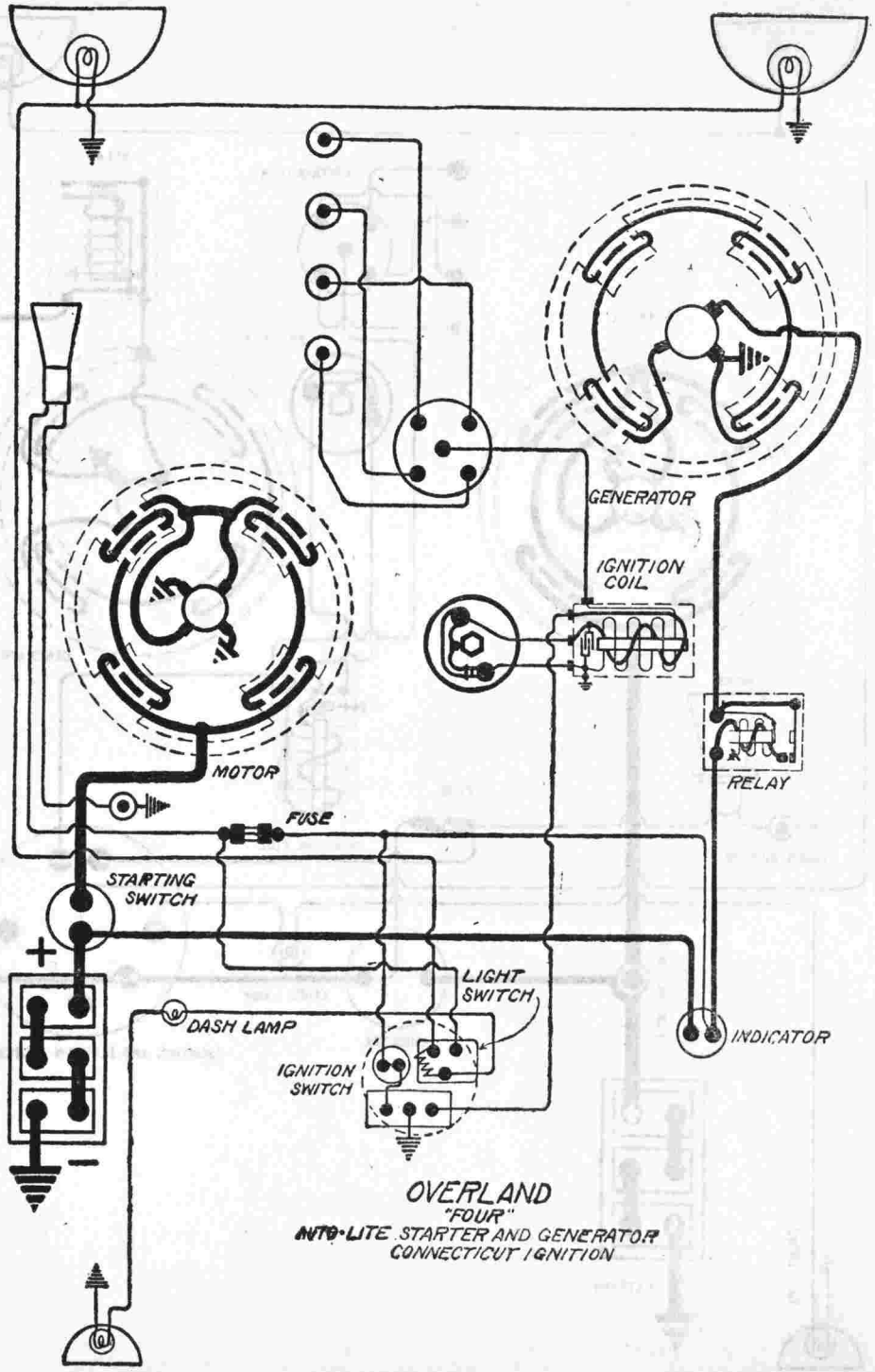
A variation of 1.5 amperes from these rates is allowable. Output may be varied slightly by adjusting brush pressure on commutator. The pressure should be 1 to 1¼ pounds. If operated freely as a motor, armature should revolve at 200 R. P. M., taking 2 amperes. Much higher speed indicates damp, grounded or short circuited field coils. Greater current or lower speed indicates tight bearings or damp, grounded or short circuited armature windings or commutator. Periodic swinging of ammeter needle indicates grounded or short circuited armature coils or commutator bars. Shunt field should take about 1.4 amperes.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps—Head lamps are 6-7 volts, 16 cp. Dash and tail lamps are in series. They are each 3-3.5 volts, 2 cp.

Fuses.—Fuses are 20 ampere.





OVERLAND

MODEL 4 (1919-20-21)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

CONNECTICUT IGNITION

BATTERY.—U. S. L., Type CDN-311-X, 6 volt. The negative (—) terminal is grounded. Starting capacity—90 amperes for 20 minutes. Lighting capacity—5 amperes for 17 hours.

IGNITION.—Breaker contacts separate .016-.018 inch. When the condition of the points affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4. 2.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model MG-1001. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes
2 lb. ft	1280	135
4 lb. ft	900	210
6 lb. ft	600	275
8 lb.ft	400	335
10 lb. ft	180	390
12 lb. ft	Lock	500

OILING.—The drive end bearing is lubricated by splash, and the commutator end bearing is of the oilless type.

GENERATOR.—Model GK-1001. Generator current regulation is by third brush system. Maximum current output is 16 amperes, reached at 1200-1400 R.P.M. of the armature or 22-24 miles per hour.

Generator Data

Cold Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
0	350	0	420
4	420	4	540
8	540	8	700
12	710	12	1000
16	1200-1400	13	1200-1400
11	2800	9.4	2800

Above readings are obtained with a battery solution of 1.300.

OILING.—Put 4 or 5 drops of light engine oil in the rear generator bearing oiler every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 7-8 miles per hour or 350-450 R.P.M of the armature and opens at 5-6 miles per hour or 300-400 R.P.M. of the armature. Charging current is .5 to 1.5 amperes at closing, and the discharge current 0-1 ampere at the opening of relay contacts. Contacts separate .030 to .045 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 16 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Fuses are 20 ampere.

OVERLAND

MODEL 4 (1922)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—U. S. L., CDN-311-X, 6 volts, 84 ampere-hours. Starting capacity—96 amperes for 20 minutes. Lighting capacity—5 amperes for 17 hours. The negative (—) terminal is grounded.

IGNITION.—Connecticut Battery Ignition. Breaker contacts separate .018 inch. If condition of contact points affects ignition, remove and resurface on a hard oilstone.

Oiling—Fill grease cup with vaseline every month. If the car is driven more than 1000 miles per month, this attention must be given each 1000 miles.

Timing.—Breaker contacts just open when piston No. 1 is on top dead center of compression stroke, spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plugs.—Spark plug diameter, ½ inch, gaps separate .030 inch.

STARTER.—Model MG. The direction of rotation is counter-clockwise, looking at commutator end. The connection to the motor is by a Bendix drive. Running free at 4000 R.P.M. of armature, current is 40-60 amperes at 6 volts. Cranking engine at 125 R.P.M., it takes 150 amperes at 5 volts. Lock torque is 18 pound-feet, 3-4 volts, 600-650 amperes.

Oiling.—Put 5 or 6 drops of light engine oil into starter oilers every two weeks. If car is driven over 500 miles in two weeks, this care must be given every 500 miles.

GENERATOR.—Model GP. The direction of rotation looking at commutator end is counter-clockwise. Generator motoring freely takes 4 to 5 amperes, 6 volts. Field test current is 2.2 amperes, 6 volts. Each coil separately, 8.8 amperes, 6 volts. The third brush system is employed for current regulation.

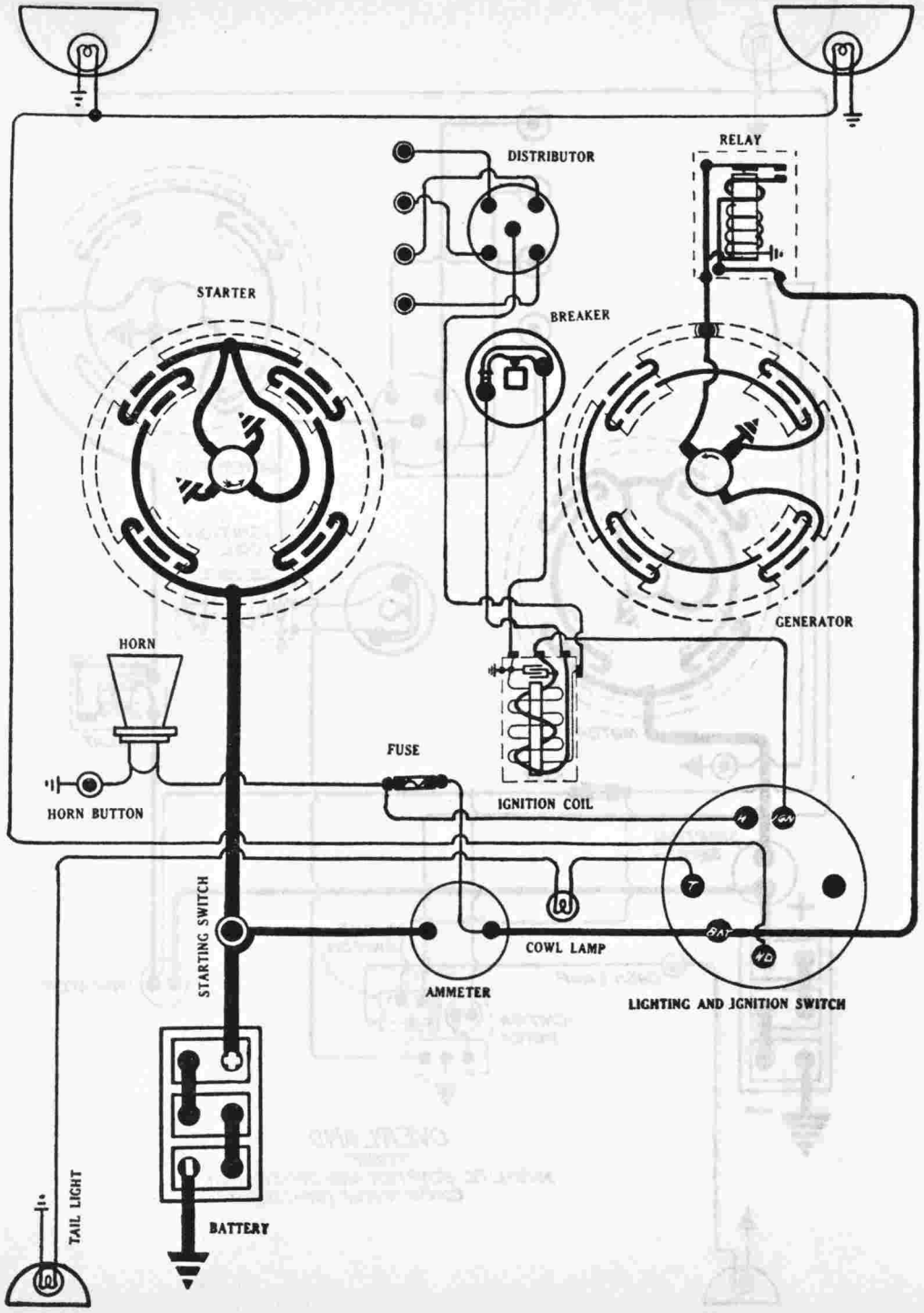
Generator Test Data

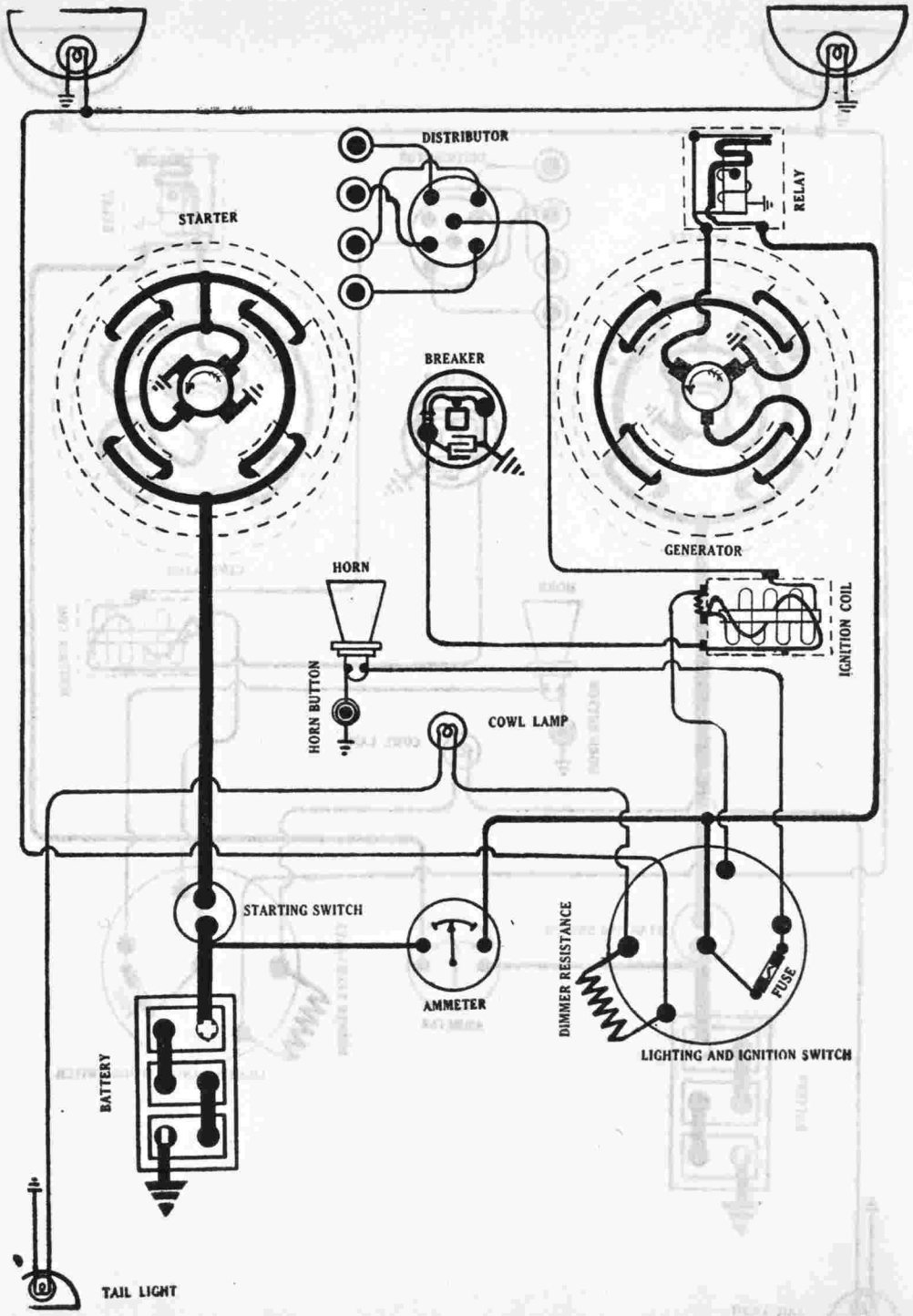
Cold Test (77°F.)			Hot Test (167°F.)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	7	375	0	6.5	475
4	7.2	500	4	6.8	640
8	7.4	650	7	7.4	800
12	7.8	875	10	7.6	1200
15	7.9	1225	10.6	7.8	1540
16	8	1600	8.2	7.8	2400
13	7.8	2400			

Oiling.—Put 5 or 6 drops of light engine oil into generator oilers every week or 250 miles.

RELAY.—Relay closes at 325 to 375 R.P.M. of armature or 7 to 9 M.P.H., 7-8 volts, and opens at 275 to 325 R.P.M. of armature or 5 to 7 M.P.H. 1-2 ampere discharge. Air gap between relay armature and core is .010 to .015 inch, contacts closed. Contact gap separates .025 to .035 inch.

LIGHTING.—Head lamps 6-8 volts, 21 cp., S.C. Tail and dash lamps, 3-4 volts, 2 cp., S.C.





OVERLAND

MODEL 91 (1923)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L. Type CDN-311-X. 6 volt. The starting capacity is 96 amperes for 20 minutes. The lighting capacity is 5 amperes for 17 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model IG-4035. Distributor Model IG-4036A. Breaker contacts separate .018 inch, contacts fully separated. If condition of contact points affects ignition, remove and resurface on a hard oilstone.

Oiling:—Put 4 or 5 drops of light engine oil into the distributor oiler each week. If the car is driven over 250 miles in a week, this must be done each 250 miles.

Timing:—Breaker contacts just open when top dead center mark on flywheel is 2½ inches before reaching dead top center indicator, on compression stroke, spark control lever and breaker assembly fully advanced.

Firing Order:—The firing order is 1-3-4-2.

Spark Plugs:—Spark plug diameters are ½ inch. Gaps are .025 inch.

STARTER:—Model MG-1001. The direction of rotation, looking at commutator end, is counter-clockwise. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	6	60
.6 "	2700	5.5	100
2.9 "	1500	5	200
5.5 "	850	4.5	300
8.2 "	410	4	400
17.5 "	Lock	4	600

Oiling:—Put 7 or 8 drops of light engine oil into oil filler hole of the starting motor every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles. Keep drive end bearing well lubricated.

GENERATOR:—Model GP-4003A. The direction of rotation of the armature, looking at commutator end, is counter-clockwise. The third brush system is employed for current regulation. Move third brush in counter-clockwise direction to increase the output and in the opposite direction to decrease the output. The maximum charging rate is 10-11 amperes (generator hot) reached at 1500 R.P.M. of the generator armature or approximately 20-25 miles per hour.

Generator Data

Cold Test (77°F.)			Hot Test (167°F.)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	7	375	0	6.5	475
4	7.2	500	4	6.8	640
8	7.4	650	7	7.4	800
12	7.8	875	10	7.6	1200
15	7.9	1225	10.6	7.8	1540
16	8	1600	8.2	7.8	2400
13	7.8	2400			

Motoring freely generator draws 4-5 amperes at 6 volts. The shunt field current is 2.2 amperes at 6 volts. Each coil tested separately draws 8.8 amperes at 6 volts.

Oiling:—Put 8 or 10 drops of light engine oil into the generator oilers each week. If the car is driven more than 250 miles in a week, this oiling must be done each 250 miles.

RELAY:—Model CB-1078. Relay closes at 325-375 R.P.M. or 7-9 M.P.H. at 7-8 volts and opens at 275-325 R.P.M. of armature, or 5-7 M.P.H., 1-2 ampere discharge. Contact gaps separate .025 to .035. Core gap is .010-.015 inch, contacts closed.

LAMPS:—Head lamps, 6-8 volts, 21 cp. S.C. Dimmer resistance employed. Tail and dash lamps, each 3-4 volts, 2 cp. S.C.

FUSES:—One 20 ampere fuse is used.

OVERLAND

MODEL 91 AND 92 (1924-25)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L., Type 3-CVX-5X6. 6 volt. The starting capacity is 96 amperes for 20 minutes. The lighting capacity is 5 amperes for 17 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model IG-4035. Distributor Model IG-4036A. Breaker contacts separate .018 inch, contacts fully separated. If condition of contact points affects ignition, remove and resurface on a hard oilstone.

Oiling:—Put 4 or 5 drops of light engine oil into the distributor oiler each week. If the car is driven over 250 miles in a week, this must be done each 250 miles.

Timing.—Breaker contacts just open when top dead center mark on flywheel is 2½ inches before reaching dead top center indicator, on compression stroke, spark control lever and breaker assembly fully advanced.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plugs.—Spark plug diameters are ½ inch. Gaps are .025 inch.

STARTER:—Model MO-4001. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 200 R.P.M., drawing 125 amperes at 5.3 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free (no Bendix)	5.5	45
0 "	Free (with Bendix)	5.5	50
2 "	1700	5.1	180
5 "	700	4.4	315
7 "	230	4.0	395
10 "	Lock	3.6	490

Oiling.—Put 7 or 8 drops of light engine oil into oil filler hole of the starting motor every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles. Keep drive end bearing well lubricated.

GENERATOR:—Model GP-4003A. The direction of rotation of the armature looking at commutator end, is counter-clockwise. The third brush system is employed for current regulation. Move third brush in counter-clockwise direction to increase the output and in the opposite direction to decrease the output. The maximum charging rate is 10-11 amperes (generator hot) reached at 1500 R.P.M. of the generator armature or approximately 20-25 miles per hour.

Generator Test Data

Cold Test. (77°F.) Amperes.	Volts.	R.P.M.	Hot Test. (167°F.) Amperes.	Volts.	R.P.M.
0	7.	375	0	6.5	475
4	7.2	500	4	6.8	640
8	7.4	650	7	7.4	800
12	7.8	875	10	7.6	1200
15	7.9	1225	10.6	7.8	1540
16	8.	1600	8.2	7.8	2400
13	7.8	2400			

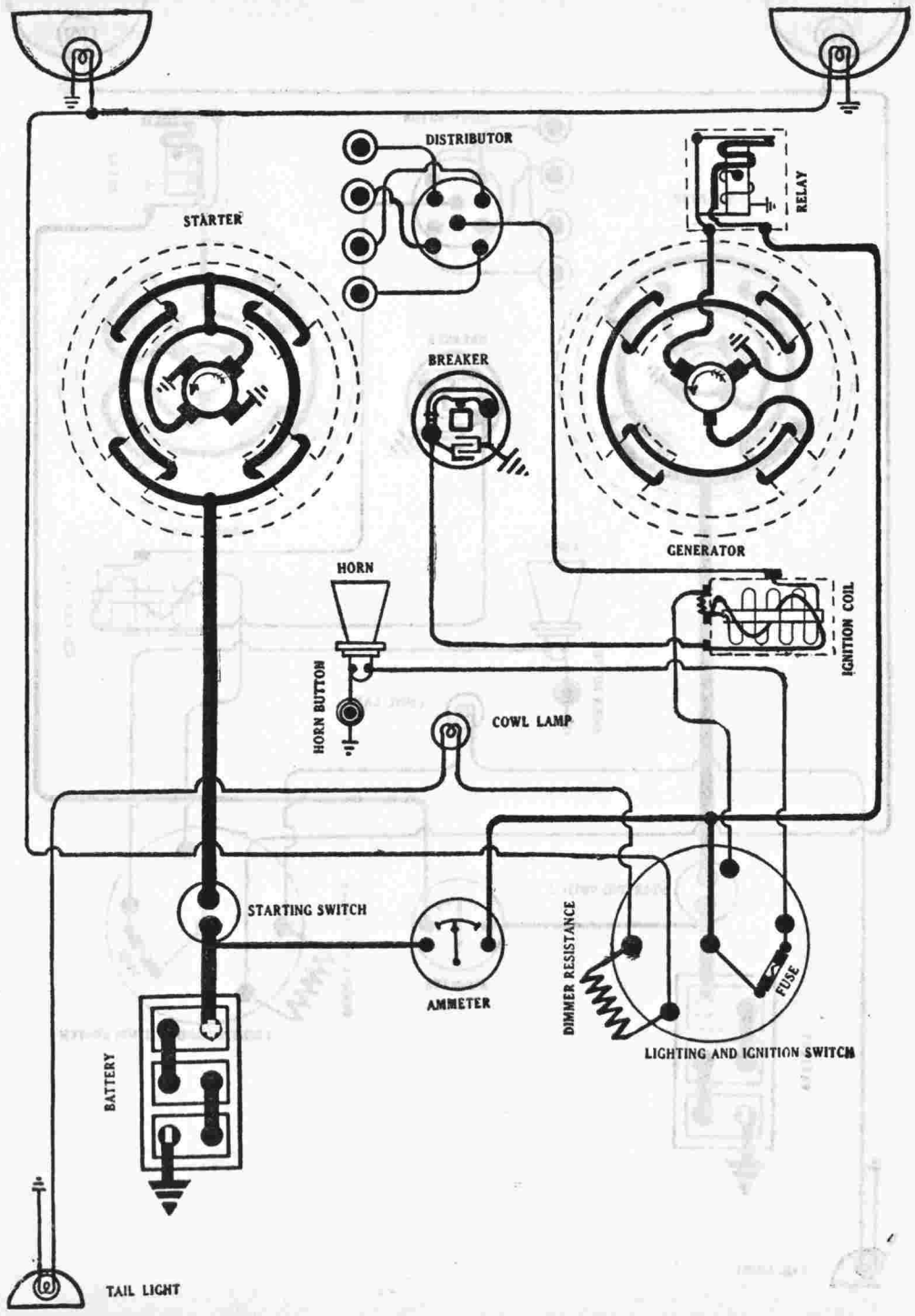
Motoring freely generator draws 4-5 amperes at 6 volts. The shunt field current is 2.2 amperes at 6 volts. Each coil tested separately draws 8.8 amperes at 6 volts.

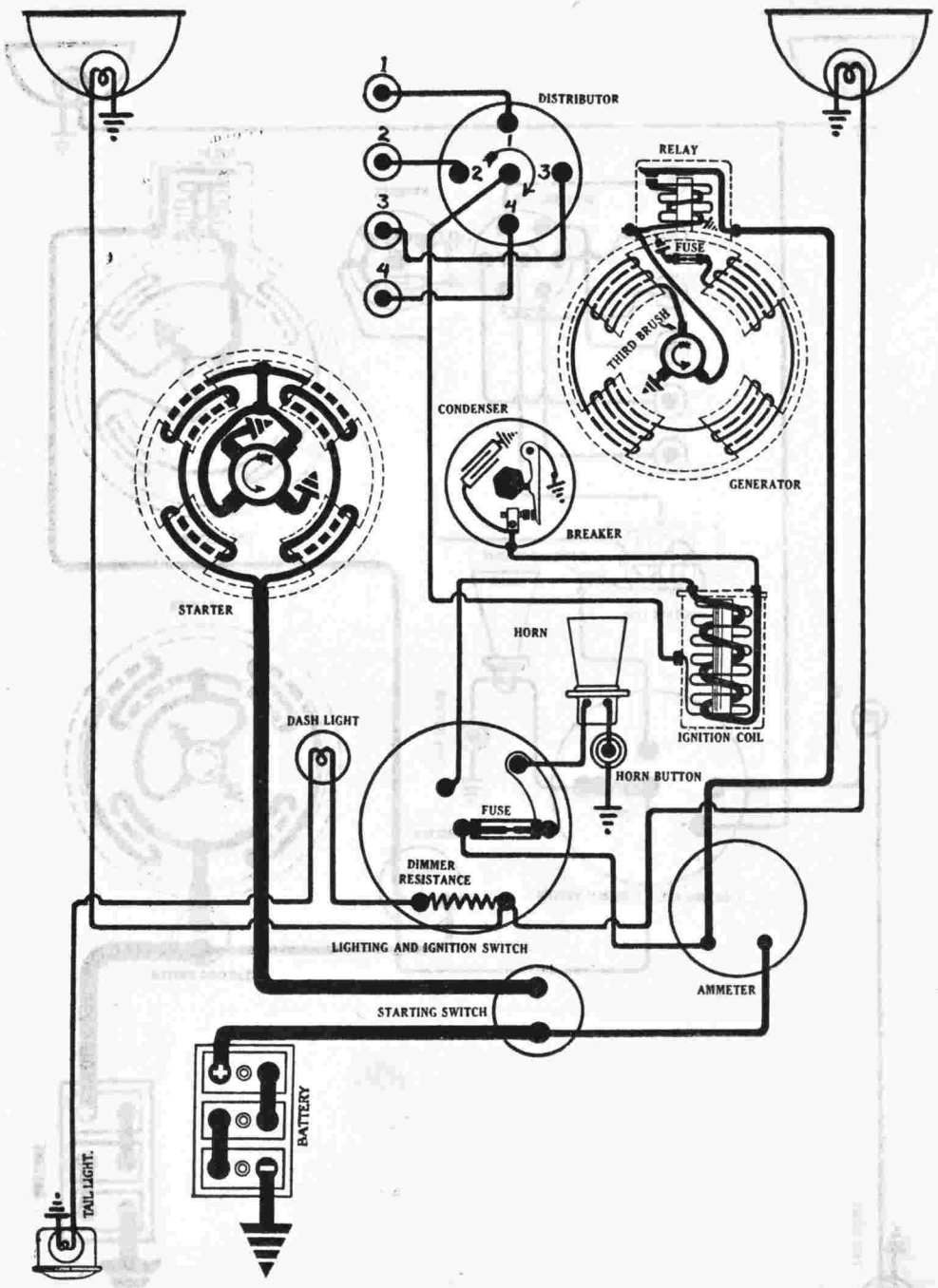
Oiling:—Put 8 or 10 drops of light engine oil into the generator oilers each week. If the car is driven more than 250 miles in a week, this oiling must be done each 250 miles.

RELAY:-Model CB-1078. Relay closes at 325-375 R.P.M. or 7-9 M.P.H. at 7-8 volts and opens at 275-325 R.P.M. of armature, or 5-7 M.P.H., 1-2 ampere discharge. Contact gaps separate .025 to .035. Core gap is .010-.015 inch, contacts closed.

LIGHTING:—Briggs and Stratton Switch Model 38200. Head lights are 6-8 volt, 21 cp. S.C. Mazda 1129. Dash and tail lights are connected in series. They are each 3-4 volt, 2 cp. Mazda 61. Head lights are dimmed by resistance on switch.

FUSES.—One 20 ampere fuse is used.





OVERLAND

MODELS 91 AND 92 (1926)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION.

BATTERY:—U.S.L., Type 3-CVX-5X. 6 volts. The starting capacity is 96 amperes for 20 minutes. The lighting capacity is 5 amperes for 17 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model IG-4035. Distributor Model IG-4036A. Breaker contacts separate .018 inch, contacts fully separated. If condition of contact points affects ignition, remove and resurface on a hard oilstone.

Oiling:—Put 4 or 5 drops of light engine oil into the distributor oiler each week. If the car is driven over 250 miles in a week, this must be done each 250 miles.

Timing:—Breaker contacts just open when top dead center mark on flywheel is 2½ inches before reaching dead top center indicator, on compression stroke, spark control lever and breaker assembly fully advanced.

Firing Order:—The firing order is 1-3-4-2.

Spark Plugs:—Spark plug diameters are ½ inch. Gaps are .025 inch.

STARTER:—Model MO-4001. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 200 R.P.M., drawing 125 amperes at 5.3 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free (no Bendix)	5.5	45
0 "	Free (with Bendix)	5.5	50
2 "	1700	5.1	180
5 "	700	4.4	315
7 "	230	4.0	395
10 "	Lock	3.6	490

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GP-4101. The direction of rotation of the armature, looking at the commutator end, is counter-clockwise. The third brush system is employed for current regulation. Move third brush in counter-clockwise direction to increase the output and in the opposite direction to decrease the output. The maximum charging rate is 10-11 amperes (generator hot) reached at 1500 R.P.M. of the generator armature or opproximately 20-25 miles per hour.

Generator Data

Cold Test (77° F.)			Hot Test (167° F.)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	7	375	0	6.5	475
4	7.2	500	4	6.8	640
8	7.4	650	7	7.4	800
12	7.8	875	10	7.6	1200
15	7.9	1225	10.6	7.8	1540
16	8	1600	8.2	7.8	2400
13	7.8	2400			

Motoring freely generator draws 4-5 amperes at 6 volts. The shunt field current is 2.2 amperes at 6 volts. Each coil tested separately draws 8.8 amperes at 6 volts.

Oiling:—Put 8 or 10 drops of light engine oil into the generator oilers each week. If the car is driven more than 250 miles in a week, this oiling must be done each 250 miles.

RELAY:—Model CB-1078. Relay closes at 325-375 R.P.M. or 7-9 M.P.H. at 7-8 volts and opens at 275-325 R.P.M. of armature, or 5-7 M.P.H., 1-2 ampere discharge. Contact gaps separate .025 to .035. Core gap is .010-.015 inch, contacts closed.

LAMPS:—Head lamps, 6-8 volt, 21 cp. S.C. Dimmer resistance employed. Tail and dash lamps, each 3-4 volts, 2 cp. S.C.

Switches:—Lighting switch is Briggs and Stratton Model 38200.

FUSES:—One 20 ampere fuse is used.

OVERLAND

MODEL 93 (1925-26)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L. Type 3-CVX-5X. 6 volt. The starting capacity is 96 amperes for 20 minutes. The lighting capacity is 5 amperes for 16.8 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model IG-4060. Distributor Model IG-4057-A. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone.

Oiling:—Turn up the grease cup on the distributor shaft two turns every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke is 20° before top dead center (measured on the flywheel) with the spark control lever in the fully advanced position or when the piston reaches top dead center with the spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

STARTER:—Model MN-4104. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	5.	60
.6 "	2700	5.5	100
2.9 "	1500	5.	200
5.5 "	850	4.5	300
8.2 "	410	4.	400
17.6 "	Lock	4.	600

Oiling:—Put 4 or 5 drops of light engine oil in the starter oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR:—Model GP-4103. The direction of rotation is counter-clockwise, looking at the commutator end. Current regulation is by the third brush system. To adjust the charging rate, loosen the generator cover band and the hexagon headed nut holding the third brush mounting arm and shift the third brush. Shifting the brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate.

Generator Data.

	Cold Test			Hot Test	
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	7.	375	0	6.5	475
4	7.2	500	4	6.8	640
8	7.4	650	7	7.4	800
12	7.8	875	10	7.6	1200
16	8.	1600	10.6	7.8	1540
13	7.8	2400	8.2	7.8	2400

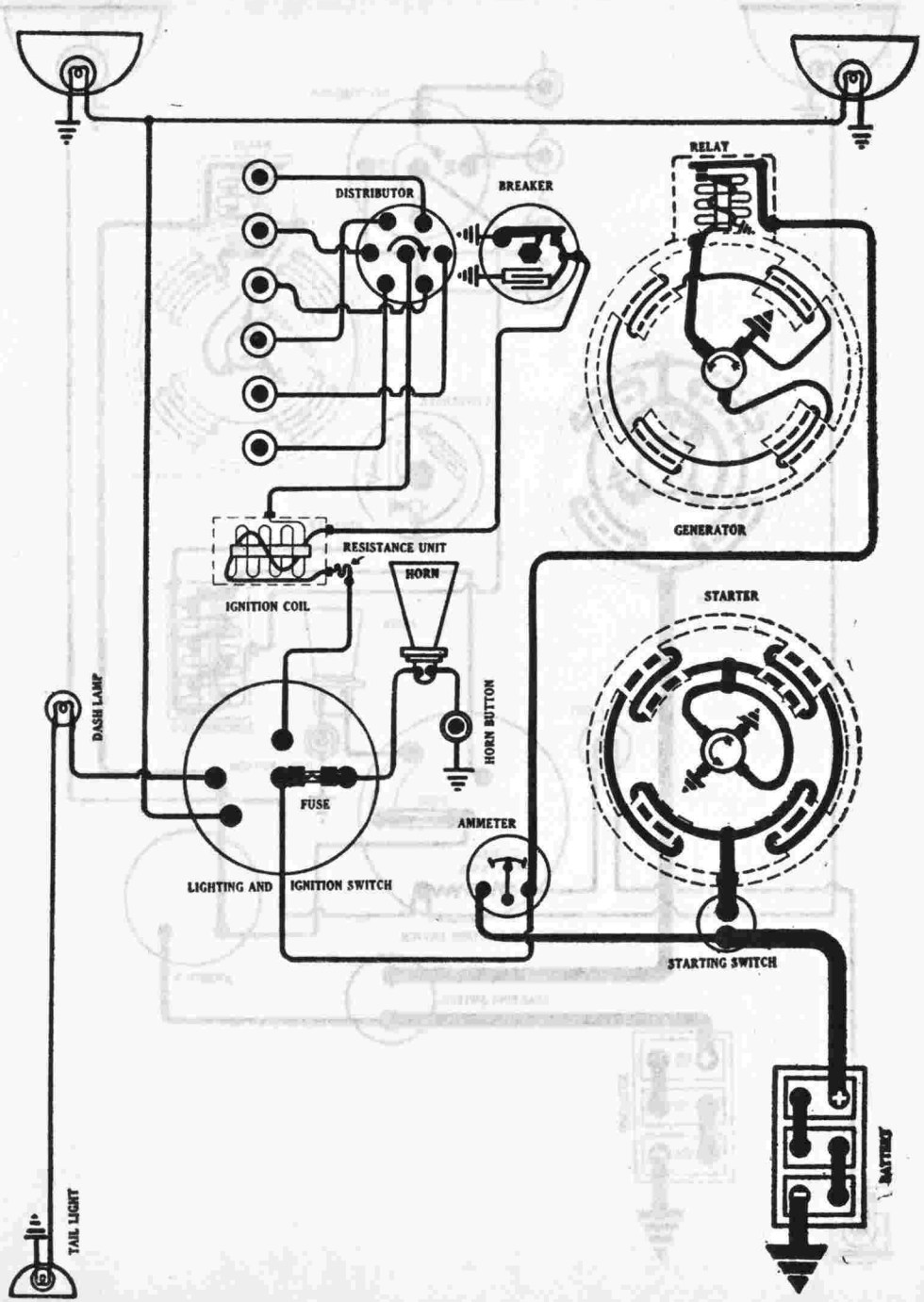
Motoring freely, generator draws 4.5 amperes at 6 volts. Shunt field current is 2.2 amperes at 6 volts.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Relay contacts close at 350 R. P. M. of the generator with a generator voltage of 7.5 volts and open at 250 R.P.M. with a discharge current of 1-2 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.015 inch, contacts closed.

LIGHTING:—Briggs and Stratton Switch Model 39320. Head lamps are 6-8 volt, 21 cp. S.C. Dash and tail lamps are connected in series. They are each 3-4 volt, 2 cp. S.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuse is 20 amperes.

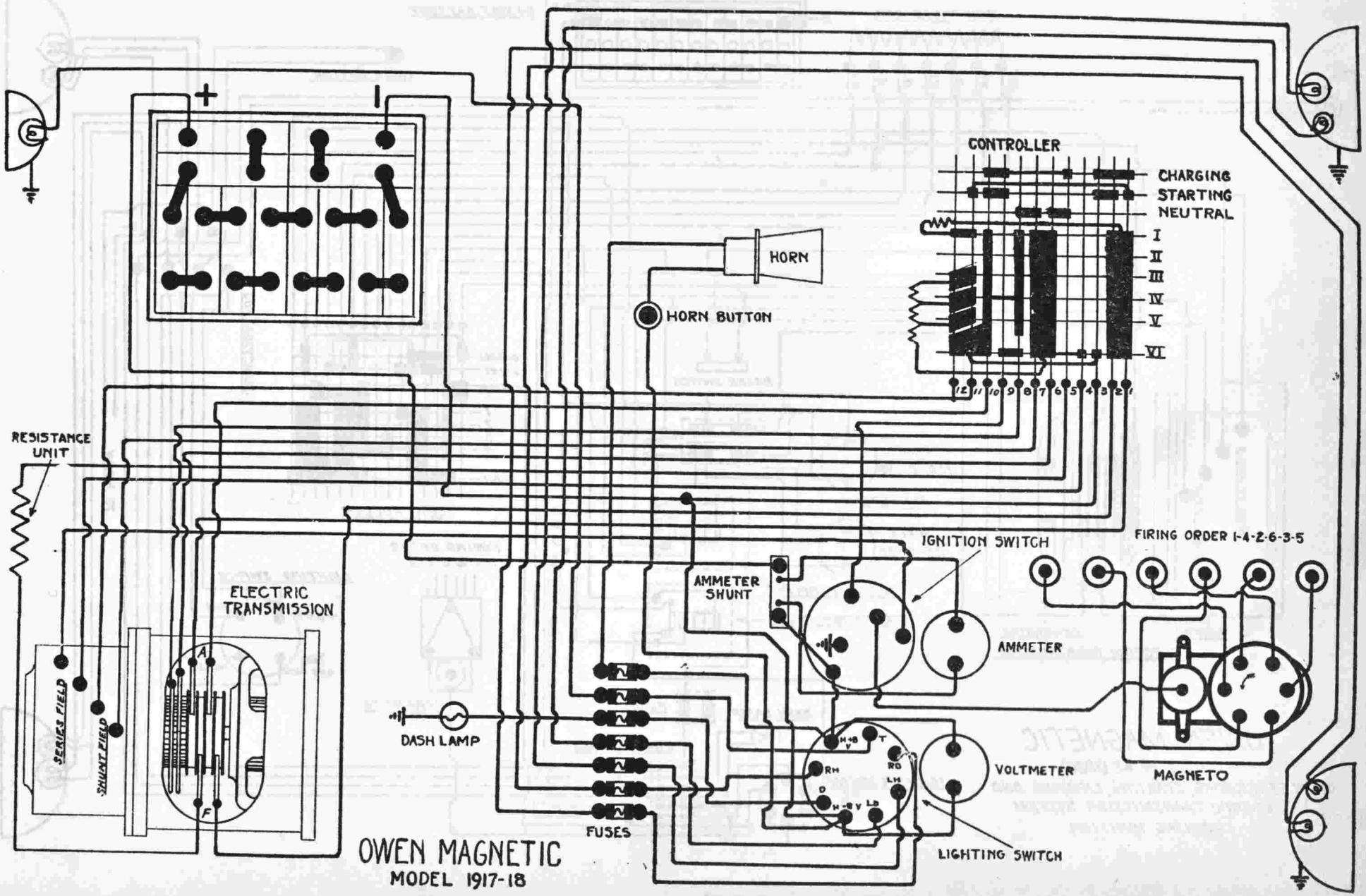


OWEN MAGNETIC

MODEL O-36 (1917-18)

OWEN GENERATING, STARTING, LIGHTING AND ELECTRICAL TRANSMISSION SYSTEM

BOSCH MAGNETO IGNITION

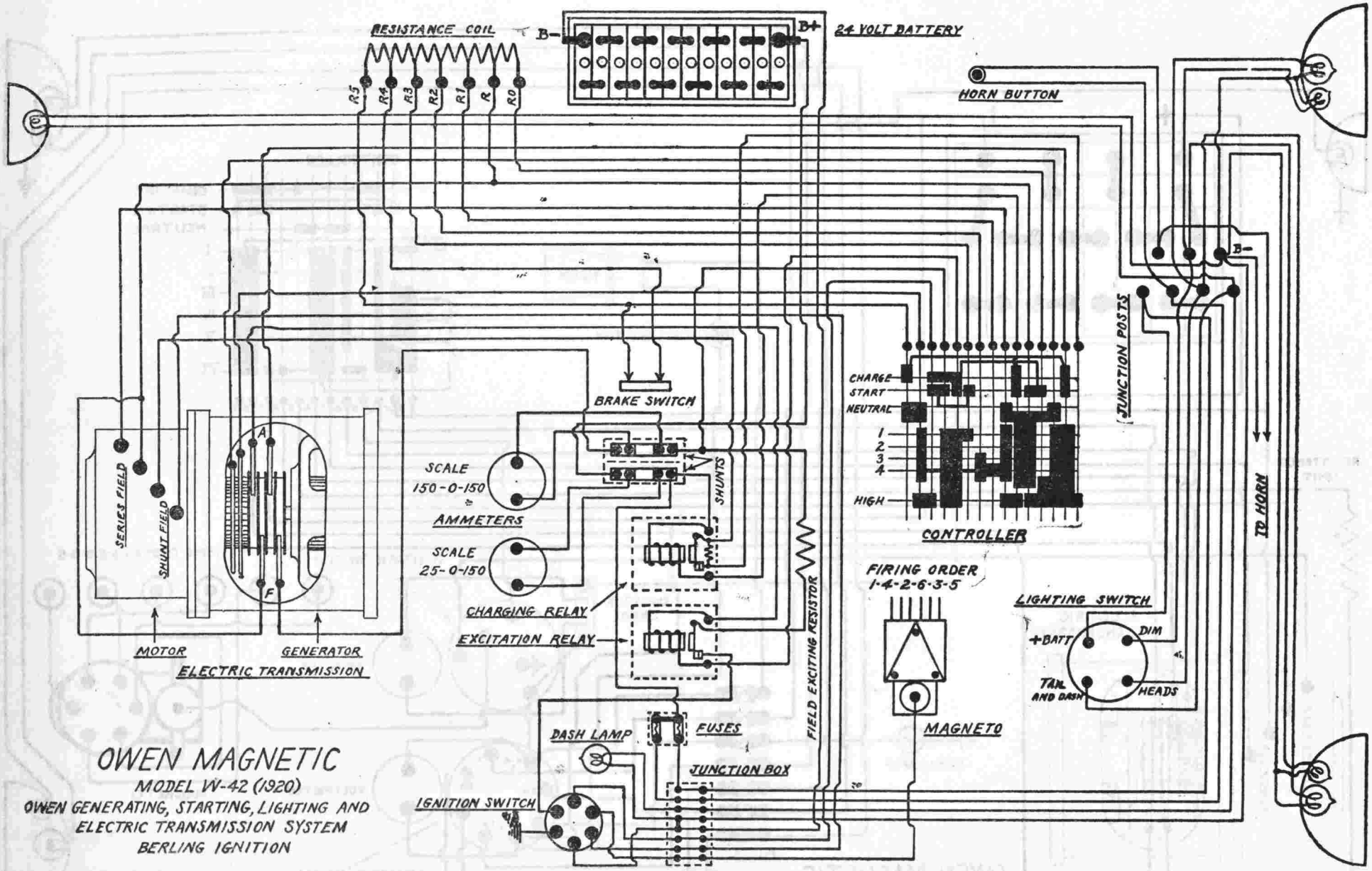


OWEN MAGNETIC

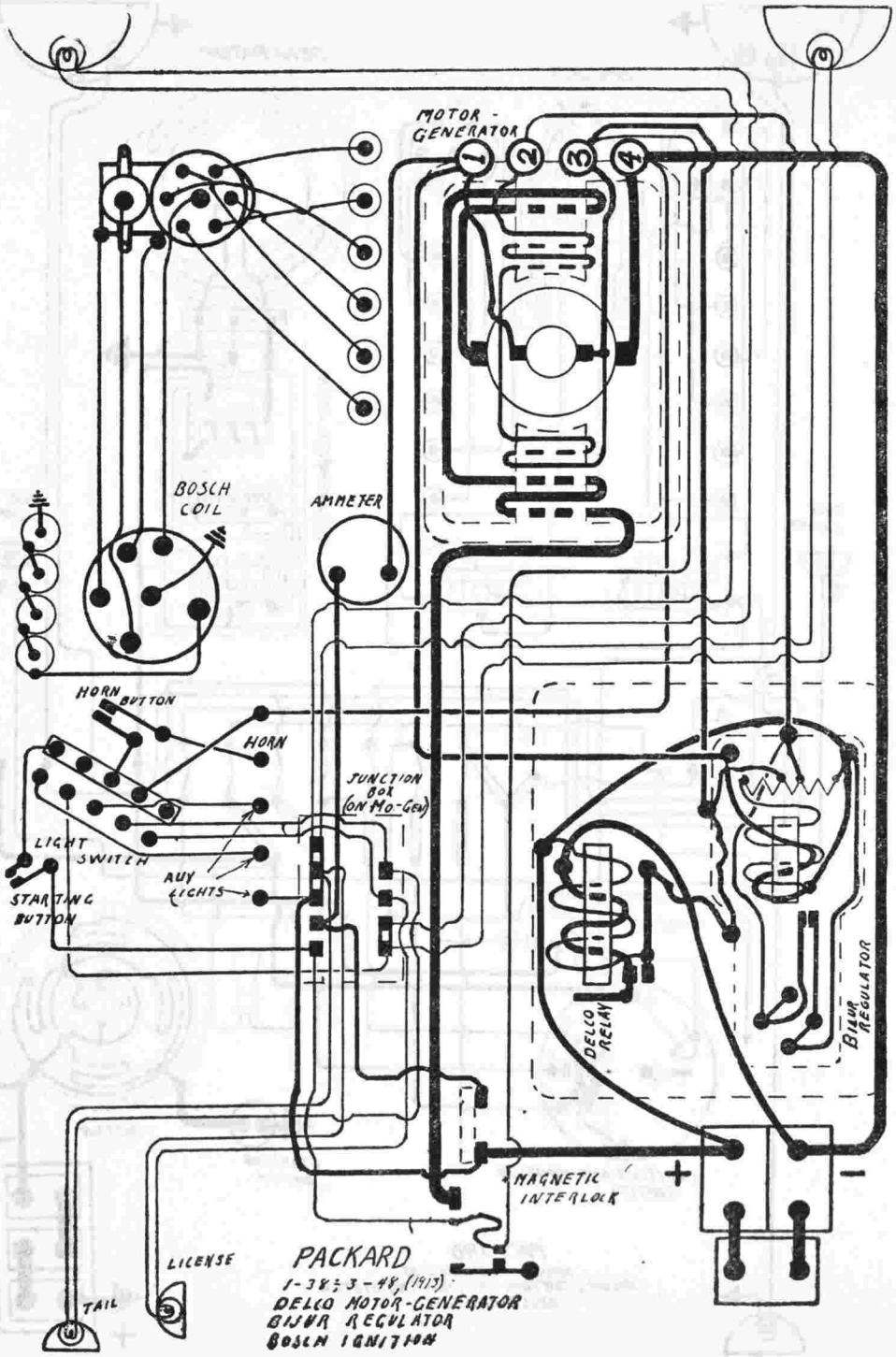
MODEL W-42 (1919-20)

OWEN GENERATING, STARTING, LIGHTING AND ELECTRIC TRANSMISSION SYSTEM

BERLING MAGNETO IGNITION



OWEN MAGNETIC
MODEL W-42 (1920)
OWEN GENERATING, STARTING, LIGHTING AND ELECTRIC TRANSMISSION SYSTEM
BERLING IGNITION



PACKARD

MODELS 1-38 AND 3-48 (1913-14)
DELCO STARTER-GENERATOR. BIJUR REGULATOR
BOSCH DUAL IGNITION

BATTERY.—Battery is 6 volt, 150 ampere-hour, or 8 volt, 100 ampere-hour. The 8-volt battery is recommended, as it gives a higher cranking speed. The two-wire system is used. A 6-volt, 40-ampere hour battery, or set of dry cells, is used to supply current for ignition when starting.

IGNITION.—Bosch Dual. Breaker contacts separate .014 to .016 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper. The magneto is further treated on Page 182.

OILING.—Put 3 or 4 drops of light engine oil in the magneto oilers every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 mlles in two weeks, these attentions must be given every 500 miles.

TIMING.—Spark should occur when the piston entering the power stroke is on top dead center, spark control lever within one inch of the fully retarded position. The marks "O" on the magneto couplings should both line up when putting the magneto in place. The leather washer which fits between the couplings has holes slightly off the center to facilitate alignment. The magneto chain gears should line up with the "O" marks on the chain links when the "O" on the upper gear is on top and the "O" on the lower gear is on the bottom. These marks so line up every 40 revolutions. Care should be taken when removing or replacing either the magneto driving shaft flange or magneto not to move the magneto shaft or gear shaft, as one complete turn will throw out the magneto timing, although the marks and holes line up. These marks should be lined up when the exhaust valve of No. 1 cylinder is open.

FIRING ORER.—The firing order is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .020 to .023 inch.

STARTER-GENERATOR.—Starter and generator are combined into one frame, but are electrically separate. Running freely, starter takes 45 amperes, armature revolving at 2100 R.P.M. Generator output regulation is by Bijur vibrating regulator. Maximum charging rate is 10 amperes, reached at 950-1000 R.P.M. of the armature or 20 miles per hour.

OILING.—Put 4 or 5 drops of light engine oil in the starter-generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 400-425 R.P.M. of the armature or 8-10 miles per hour and opens at 375-400 R.P.M of the armature or 6-8 miles per hour. Adjust the relay spring tension and air gap between the moving member and coil core so that the contacts close when the voltage of the generator reaches 6.5 to 7.75 volts, and open with a discharge current of 0-1 ampere from the battery. Resurface the contacts when necessary with fine emery cloth.

REGULATOR.—Bijur, replacing Delco Mercury Regulator. To adjust the regulator, connect a voltmeter across terminals 1 and 3 of the generator and an ammeter between the regulator terminal 5 and terminal X of the cutout. Remove the adjusting hole plug in the regulator case and insert the special toothed wrench used for adjusting the standard Bijur regulators. Regulate the spring tension until the generated voltage is 7.1 volts for the 6-volt battery or 9.3 volts for the 8-volt battery, charging current being 10 amperes in both cases, generator armature driven at 950-1000 R.P.M. If badly burned or pttted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service. Turn the reversing switch handle at the top of the regulator case through 90° every two weeks, or 500 miles of travel.

LAMPS.—Head lamps are 6-8 volt, 24 cp. Dome, tonneau, tail and side lamps are 6-8 volt, 4 cp. Dash and license-plate lamps are 3-4 volt, 4 cp.

NOTE.—Starter-generator terminals are arranged as shown in Plate No. 295A on the Model 3-48 cars. On the Model 1-38 cars, they are arranged 4, 3, 2, 1 from the engine outward.

PACKARD

SERIES 1-25, 1-35 (1915-16) 2-25, 2-35 (1916-17)
BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Battery is 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

IGNITION:—Breaker contacts should separate .015 inch to .020 inch. The right and left hand contacts should open alternately. To clean contacts, put a drop of oil in each pair of contacts, engine in operation. Run the engine until the violent sparking caused by the oil ceases. Then clean them thoroughly with gasoline.

Timing:—Breaker contacts begin to separate when piston No. 1R entering power stroke, marking "Top dead center cyl. No. 1" on the flywheel, (for Series 1.) or "O" (for Series 2.) is 7/8 inch top dead center or indicator line on flywheel housing, spark control lever and breaker assembly fully retarded. For Series 3. Right breaker begins to separate when piston No. 1R is on compression stroke, marking "SR" on flywheel is at top dead center or even to indicator line on flywheel housing. Left breaker begins to separate when piston No. 1L on compression stroke, marking "SL" is at top dead center or even to indicator line on flywheel housing. The spark control lever and breaker assembly must be fully advanced.

Firing Order.—The firing order is 1R, 6L, 4R, 3L, 2R, 5L, 6R, 1L, 3R, 4L, 5R, 2L.

Spark Plug Gaps.—Spark plug gaps should be .031 inch.

Oiling.—Put 8-10 drops of light engine oil in each of the ignition unit oilers every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles. Once a season, remove the top and lower plates at the rear of distributor housing, and repack with vaseline.

Starter.—Starter is connected to engine through a set of reduction gears and pinion meshed by the operator on the Series 1 and 2 cars, and through a set of reduction gears and a Bendix drive on the Series 3 cars.

Oiling.—Fill starter oilers with light engine oil once a month.

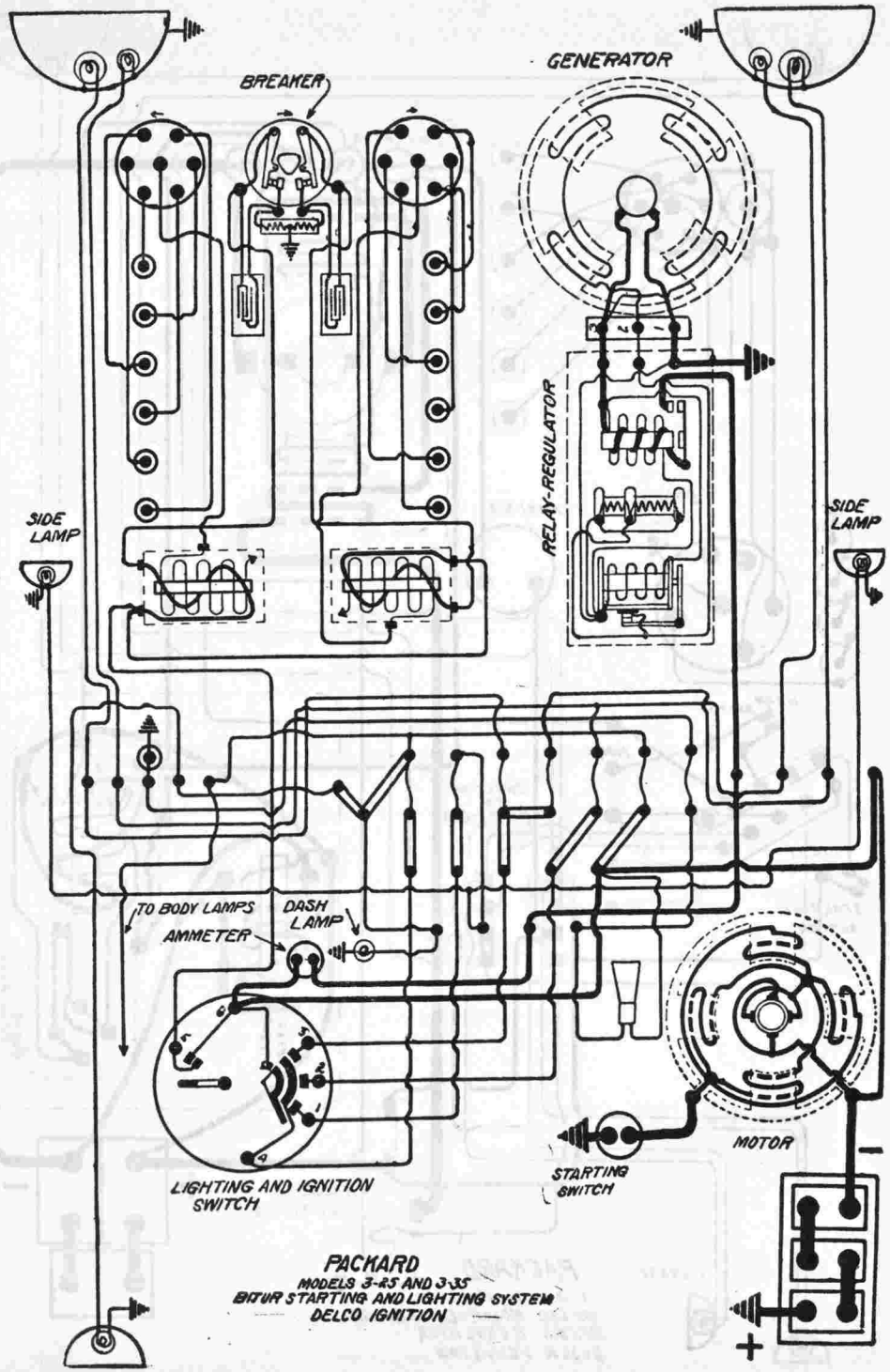
Generator.—Generator voltage regulation is by vibrating regulator, mour ed on top of generator. This regulator enables generator to supply electrical energy for lights and ignition when battery is disconnected. but car should not be driven over 20 miles per hour. There are three sockets on the top of generator into which the three split plugs of the regulator should be inserted. Every month the disconnecting plug on the regulator should be pushed in and turned around until it springs forward and locks again. This reverses the current across the contacts, tending to keep them true. The charging current will vary with the state of charge of battery. Maximum generator output should be reached at 1000-1400 R. P. M., of armature, or 20 miles per hour. Generator voltage should be 7.75-7.8 volts at this speed. Internal circuits of generaror are shown on Page 3.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Relay-Regulator.—Relay should close at 10 miles per hour and open at 7 miles per hour. Charging current should be 1 to 3 amperes at closing, and the discharge current 0 to 1 ampere at opening of relay. Relay and regulator may be adjusted through two holes provided for this purpose in the cover. On the old type regulators, this hole is provided with a brass plug. The newer type regulators have brass plugs covered with a lead seal. Latest types have holes covered with lead seal, plug being omitted. Seal is to prevent incompetent parties tampering with the adjustment. In order to make adjustments, it is necessary to remove the lead seals and take out the brass plugs with a special spanner wrench. Then adjust regulator by a small socket wrench inserted in the left hole. The right hole is for adjusting relay. Turning the nut to the right (facing hole) will raise the cut-in voltage. Turning it to the left will decrease cut-in voltage. Generator voltage should be about 6.5 volts when relay closes.

Lamps.—Head lamps are 7 volt, 24 cp. Dimmer lamps are 7 volt, 6 cp. Dash, trouble, side, tonneau and quarter lamps are 7 volt, 4 cp. Dome lamp is 7 volt, 12 cp., gas filled. Tail lamp is 7 volt, 2 cp.

Continued on next page.



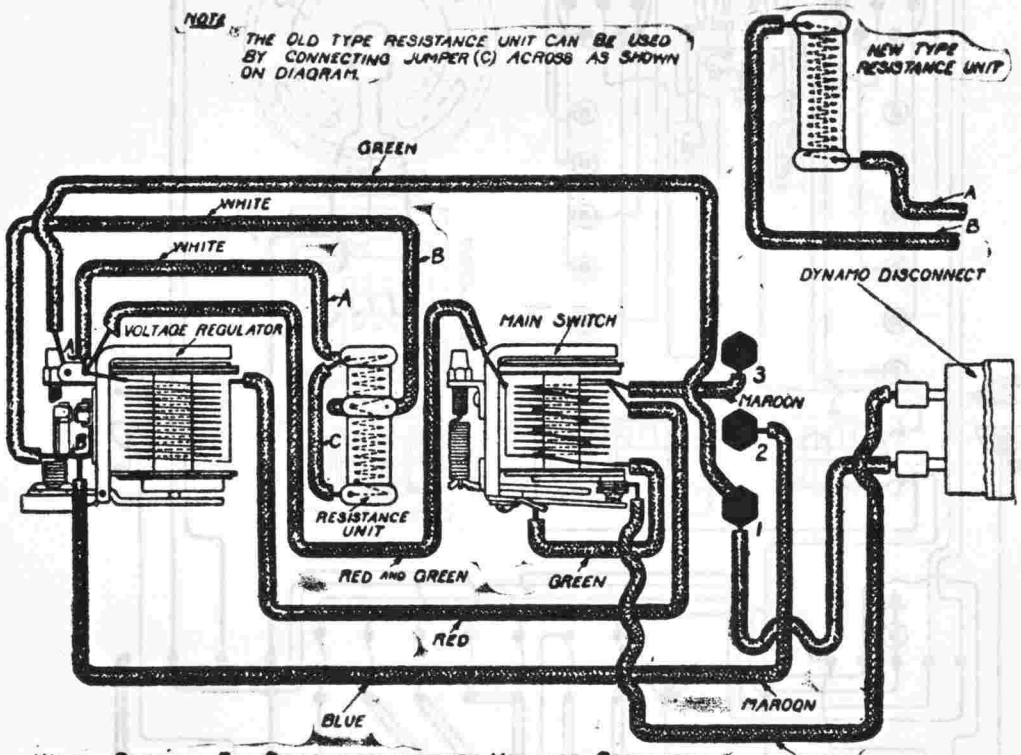
PACKARD

SERIES 1 AND 2 (1915-16-17)

BIJUR GENERATING, STARTING AND LIGHTING SYSTEM

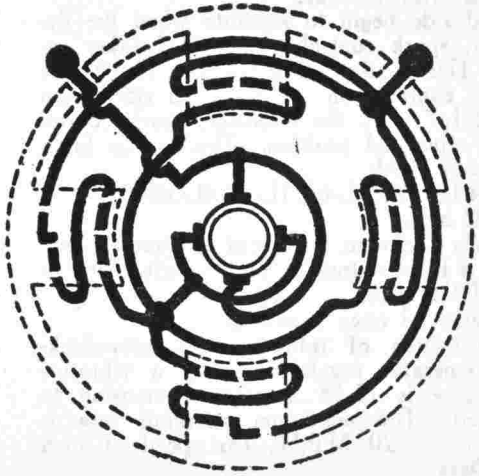
DELCO IGNITION

Continued from preceding page.



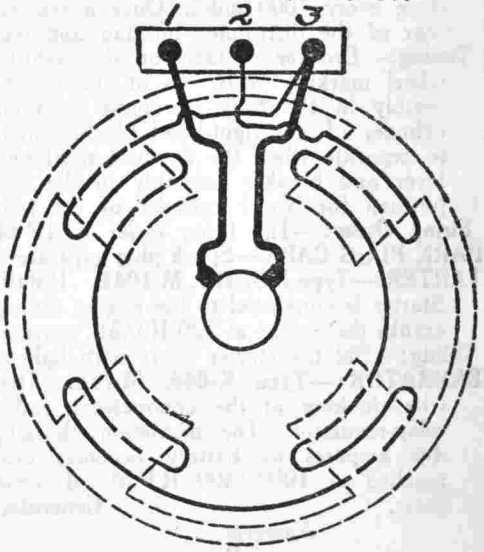
WIRING DIAGRAM FOR DEMOUNTABLE TYPE VOLTAGE REGULATOR.

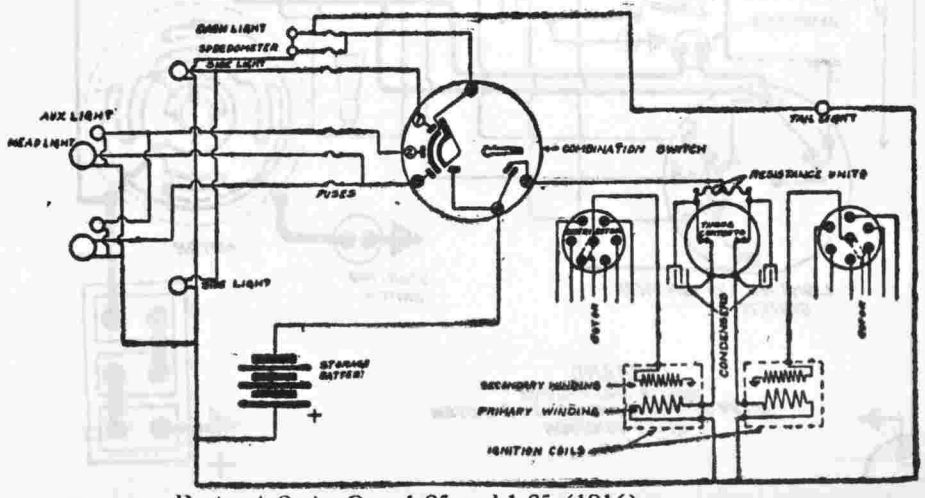
STARTER



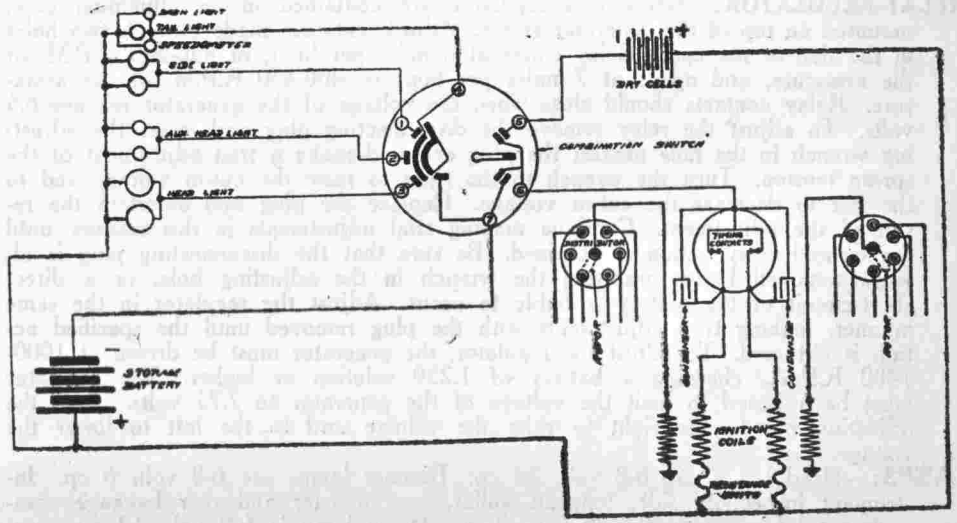
GENERATOR

CONNECTIONS TO RELAY-REGULATOR





Packard, Series One, 1-25 and 1-35 (1916)



Packard, Series Two, 2-25 and 2-35 (1917)

PACKARD

MODELS 3-25 AND 3-35 (1918-19-20)
BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type S.M.-7, 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

IGNITION:—Coils Model No. 2150. Distributor Model No. 5161. Breaker contacts separate .015 to .020 inch. To clean contacts, put a drop of oil on each pair while engine is in operation. Run the engine until violent sparking caused by the oil ceases. Stop the engine and clean the contacts thoroughly with gasoline. If condition of breaker points affects ignition, remove and resurface on a medium hard oilstone.

Oiling:—Put 8-10 drops of light engine oil in each of the ignition unit oilers every month. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles. Once a season remove the top and lower plates at the rear of the distributor housing and repack with vaseline.

Timing:—Breaker contacts on the right-hand side begin to separate when the flywheel marking "S.R." is at the indicator, spark control lever and breaker assembly in the fully advanced position. This is the firing position for No. 1 cylinder of the right-hand block. Breaker contacts on the left-hand side begin to separate when the flywheel marking "S.L." is at the indicator, spark control lever and breaker assembly in the fully advanced position. This is the firing position for No. 1 cylinder of the left-hand block.

Firing Order:—The firing order is 1R-6L-4R-3L-2R-5L-6R-1L-3R-4L-5R-2L.

SPARK PLUG GAPS.—Spark plug gaps are .032 inch.

STARTER.—Type E.D.-160, M-1041. Rotation is clockwise, looking at commutator end. Starter is connected to the engine through a Bijur automatic pinion shift. Starter cranks the engine at 120 R.P.M., current 200 amperes.

Oiling:—Fill the starter oilers with light engine oil once a month.

GENERATOR:—Type K-646, M-718. The direction of rotation is counter-clockwise, looking at the commutator end. Generator regulation is by a vibrator-relay-regulator. The maximum charging rate is 15-18 amperes, decreasing to 4-6 amperes as battery becomes charged. The maximum charging rate is reached at 1000-1400 R.P.M. of armature or 20 M.P.H., car speed at high gears.

Generator Data

Amperes	R.P.M.
0	350
Max. 15-18	750

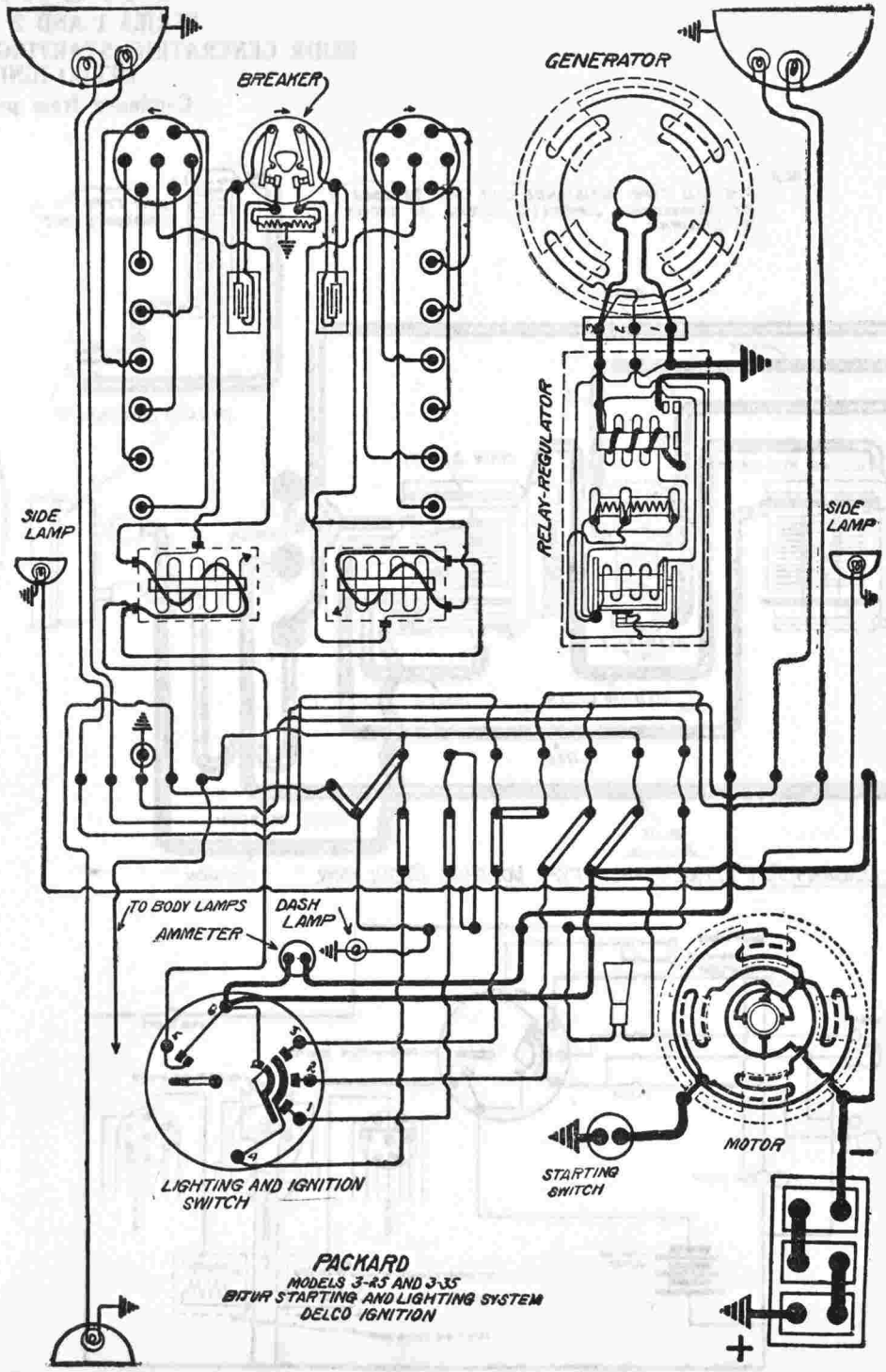
Generator motoring freely at 3-5 amperes, 6 volts. Field test—1.2-1.4 amperes, 7.75 volts, generator operating.

Oiling:—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks.

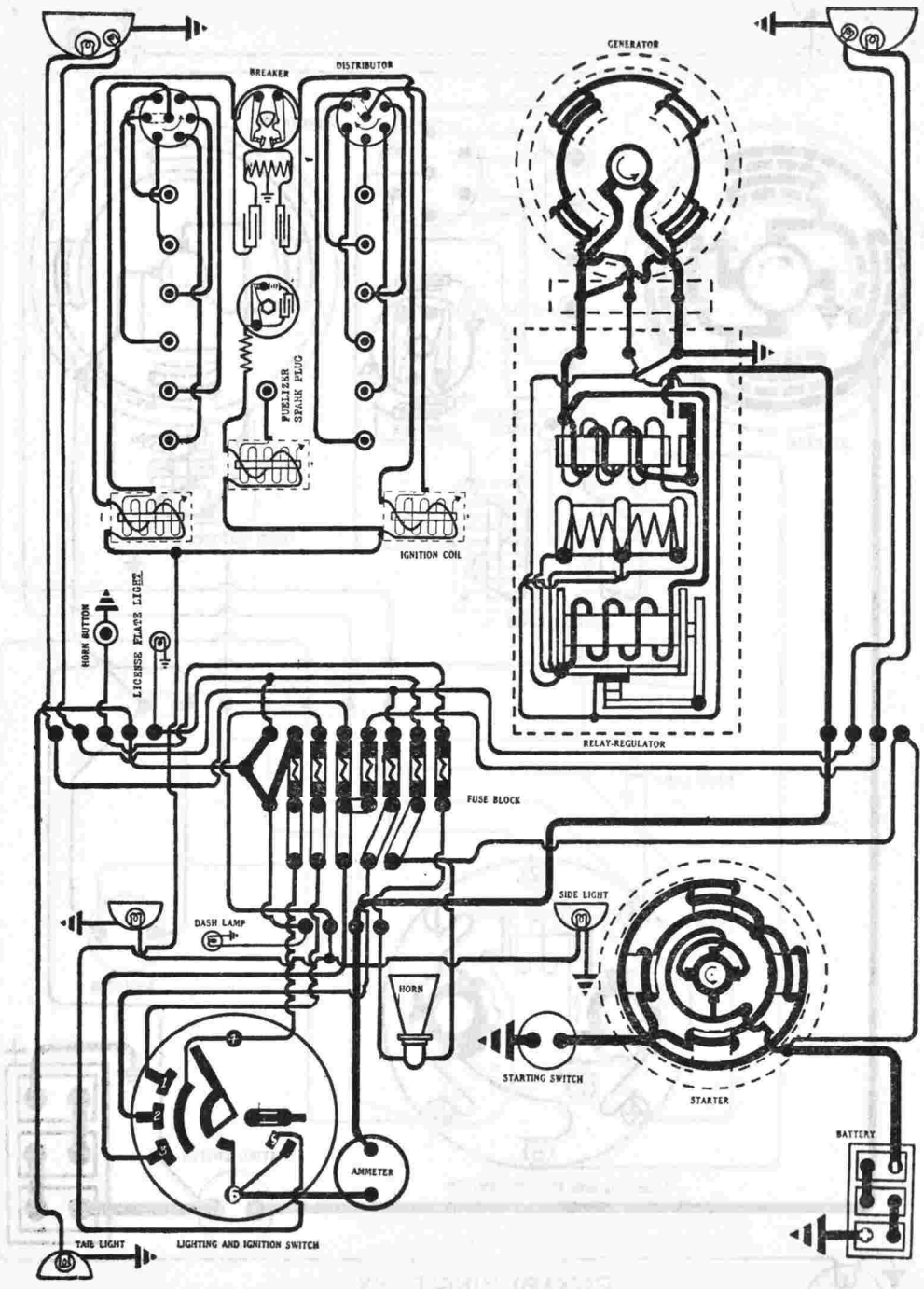
RELAY-REGULATOR:—Relay and regulator are contained in an aluminum case, mounted on top of the generator frame. Adjustments are made through two holes in the side of the case. Relay closes at 8 miles per hour, or 450-500 R.P.M. of the armature, and opens at 7 miles per hour or 400-450 R.P.M. of the armature. Relay contacts should close when the voltage of the generator reaches 6.5 volts. To adjust the relay remove the disconnecting plug and insert the adjusting wrench in the hole nearest the plug end and make a trial adjustment of the spring tension. Turn the wrench to the right to raise the cut-in voltage and to the left to decrease the cut-in voltage. Replace the plug and ascertain the result of the adjustment. Continue making trial adjustments in this manner until the desired relay action is obtained. Be sure that the disconnecting plug is always removed before inserting the wrench in the adjusting hole, or a direct short-circuit of the battery is liable to occur. Adjust the regulator in the same manner, making trial adjustments with the plug removed until the specified action is obtained. To adjust the regulator, the generator must be driven at 1000-1400 R.P.M., charging a battery of 1.250 solution or higher. The regulator must be adjusted to limit the voltage of the generator to 7.75 volts. Turn the adjusting nut to the right to raise the voltage and to the left to lower the voltage.

LAMPS:—Head lamps are 6-8 volt, 24 cp. Dimmer lamps are 6-8 volt, 6 cp. Instrument inspection, side, tonneau, pillar, rear quarter and rear baggage compartment lamps are each 6-8 volt, 4 cp. Dome lamp is 6-8 volt, 12 cp., gas-filled. Tail lamp is 6-8 volt, 2 cp. All lamps have a single contact base.

FUSES:—Fuses are 10 amperes.



BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION



BATTERY.—Willard, Type SMW-7, 6 volts, 120 ampere-hours capacity. Starting capacity—90 amperes for 20 minutes. Lighting capacity—5 amperes for 17 hours. The positive (+) terminal is grounded.

IGNITION.—Coils Model No. 2150. Distributor Model No. 5161. Breaker contacts separate .015 to .020 inch. To clean contacts, put a drop of oil on each pair while engine is in operation. Run the engine until the violent sparking caused by the oil ceases. Stop the engine and clean the contacts thoroughly with gasoline. If condition of breaker points affects ignition, remove and resurface on a medium hard oilstone.

OILING.—Put 8-10 drops of light engine oil in each of the ignition unit oilers every month. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles. Once a season remove the top and lower plates at the rear of the distributor housing and repack with vaseline.

TIMING.—Breaker contacts on the right-hand side begin to separate when the flywheel marking "S.R." is at the indicator, spark control lever and breaker assembly in the fully advanced position. This is the firing position for No. 1 cylinder of the right-hand block. Breaker contacts on the left-hand side begin to separate when the flywheel marking "S.L." is at the indicator, spark control lever and breaker assembly in the fully advanced position. This is the firing position for No. 1 cylinder of the left-hand block.

FIRING ORDER.—The firing order is 1R, 6L, 4R, 3L, 2R, 5L, 6R, 1L, 3R, 4L, 5R, 2L.

Spark Plugs.—Spark plug diameter is 7/8 inch, gaps separate .030 inch.

STARTER.—Types ED-160, M-800, M-1041. The direction of rotation looking at commutator end is counter-clockwise. Starter is connected to engine by a Bijur automatic pinion shift. Motor running freely at 6800 R.P.M., taking 60 amperes, 5.8 volts. Cranking engine at 120 R.P.M., requiring 175-225 amperes, 5 volts. Lock torque—16.5 pound-feet, taking 665 amperes, 3.6 volts.

OILING.—Fill the starter oilers with light engine oil once a month.

GENERATOR.—Types K-646, M-718, M-718-A, M-1426. The direction of rotation is counter-clockwise, looking at commutator end. Generator regulation is by a vibrator-relay-regulator. The maximum charging rate is 15-18 amperes, decreasing to 4-6 amperes as battery becomes charged. The maximum charging rate is reached at 1000-1400 R.P.M. of armature or 20 miles per hour, car speed at high gears.

Generator Test Datas

Amperes	R.P.M.
0	350
Max. 15-18	750

Generator motoring freely at 3-5 amperes, 6 volts. Field test—1.2-1.4 amperes, 7.75 volts, generator operating.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY-REGULATOR.—Relay and regulator are contained in an aluminum case, mounted on top of the generator frame. Adjustments are made through two holes in the side of the case. Relay closes at 8 miles per hour, or 450-500 R.P.M. of the armature, and opens at 7 miles per hour or 400-450 R.P.M. of the armature. Relay contacts should close when the voltage of the generator reaches 6.5 volts. To adjust the relay remove the disconnecting plug and insert the adjusting wrench in the hole nearest the plug end and make a trial adjustment of the spring tension. Turn the wrench to the right to raise the cut-in voltage and to the left to decrease the cut-in voltage. Replace the plug and ascertain the result of the adjustment. Continue making trial adjustments in this manner until the desired relay action is obtained. Be sure that the disconnecting plug is always removed before insertng the wrench in the adjusting hole, or a direct short-circuit of the battery is liable to occur. Adjust the regulator in the same manner, making trial adjustments with the plug removed until the specified action is obtained. To adjust the regulator, the generator must be driven at 1000-1400 R.P.M., charging a battery of 1.250 solution, or higher. The regulator must be adjusted to limit the voltage of the generator to 7.75 volts. Turn the adjusting nut to the right to raise the voltage and to the left to lower the voltage.

LAMPS.—Head lamps are 6-8 volt, 24 cp. Dimmer lamps are 6-8 volt, 6 cp. Instrument, inspection, side, tonneau, pillar, rear quarter and rear baggage compartment lamps are each 6-8 volt, 4 cp. Dome lamp is 6-8 volt, 12 cp., gas-filled. Tail lamp is 6-8 volt, 2 cp. All lamps have a single contact base.

FUSES.—Fuses are 10 ampere.

PACKARD

MODEL 1-16 (1920-21-22)

ATWATER KENT GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Willard, Type SJRG, 6 volt, 111 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model No. 2150. Distributor Model No. 5228. Breaker contacts separate .015 to .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone. Both sets of contacts must separate at the same instant. Ignition consumes approximately 6 amperes of which is not indicated on ammeter.

Oiling.—Put 4 or 5 drops of light engine oil in the distributor oiler every month, or 1000 miles.. Remove distributor head, wipe clean with cloth, apply small quantity of gun oil and wipe with a clean cloth, and apply a minute quantity of vaseline to the cam. This must be done every 2500 miles.

Timing.—Breaker contacts begin to separate when the marking on the flywheel, "Upper D.C. Cylinder 1 and 6," has 1½ inches to travel before reaching center line of motor, spark control lever and breaker assembly in fully advanced position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—The spark plug gaps are .030 inch.

Fuelizer Plug Gap.—The fuelizer plug gap is ⅛ inch.

STARTER.—Form 6324. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 150 R.P.M., taking 175 amperes at 5 volts. Lock torque is 14 pound-feet, current being 500 amperes at 4 volts.

Oiling.—Put 5 or 6 drops of light engine oil in the two starter oilers each month. If the car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

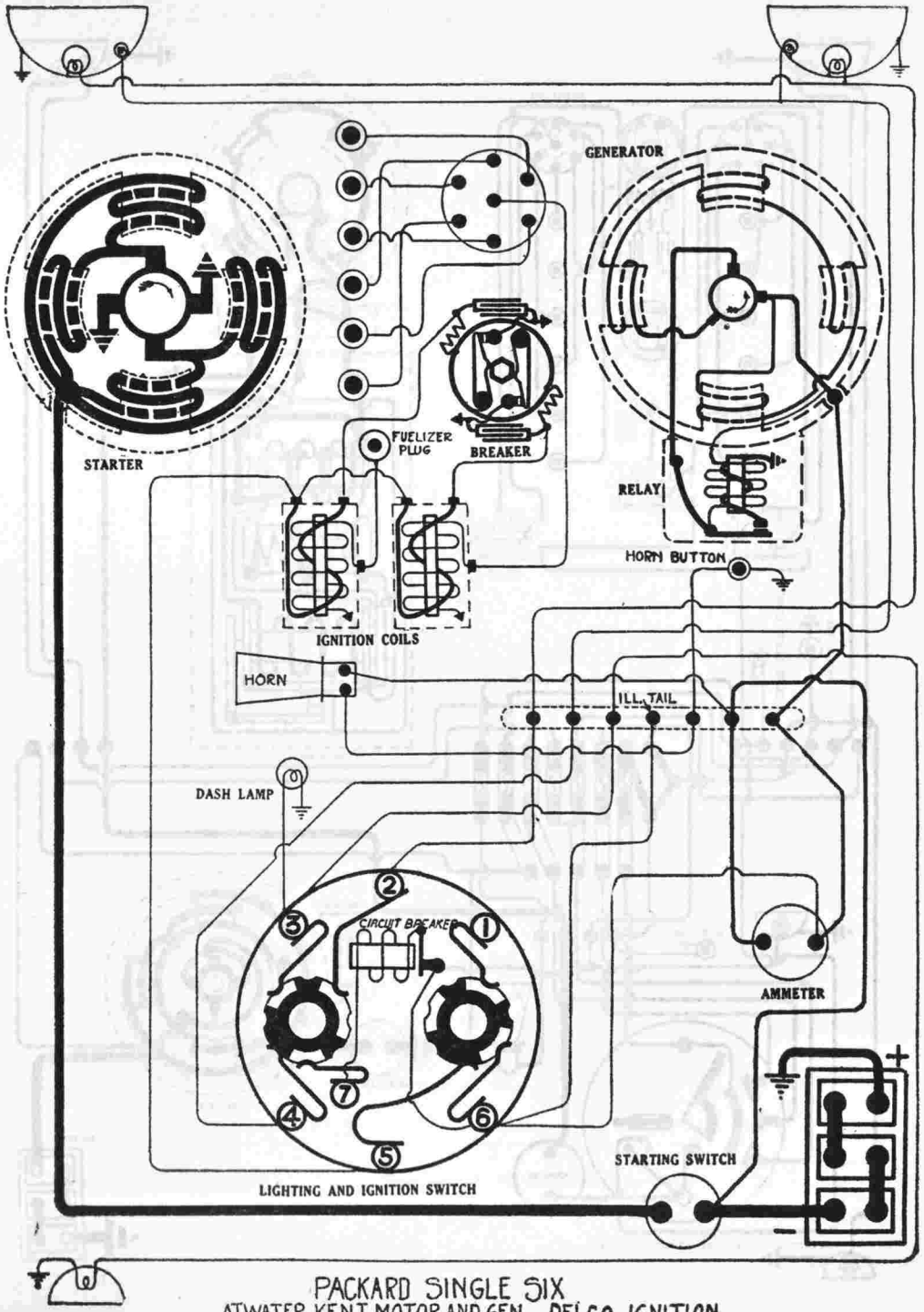
GENERATOR.—Form 5418. Generator current regulation is by the third brush system. Direction of rotation is counter-clockwise, looking at the commutator end. The maximum charging rate is 12-14 amperes, reached at approximately 20 miles per hour. To adjust charging rate, loosen stud which holds the third brush in place,, and loosen screw on outside end of generator. Move third brush in a counter-clockwise direction, looking at the commutator end, to increase the charging rate, and in a clockwise direction to decrease the charging rate. Tighten both screws.

Oiling.—Put 5 or 6 drops of light engine oil in the generator oiler once each month. If the car is driven more than 1000 miles in a month, this oiling must be done every 1000 miles.

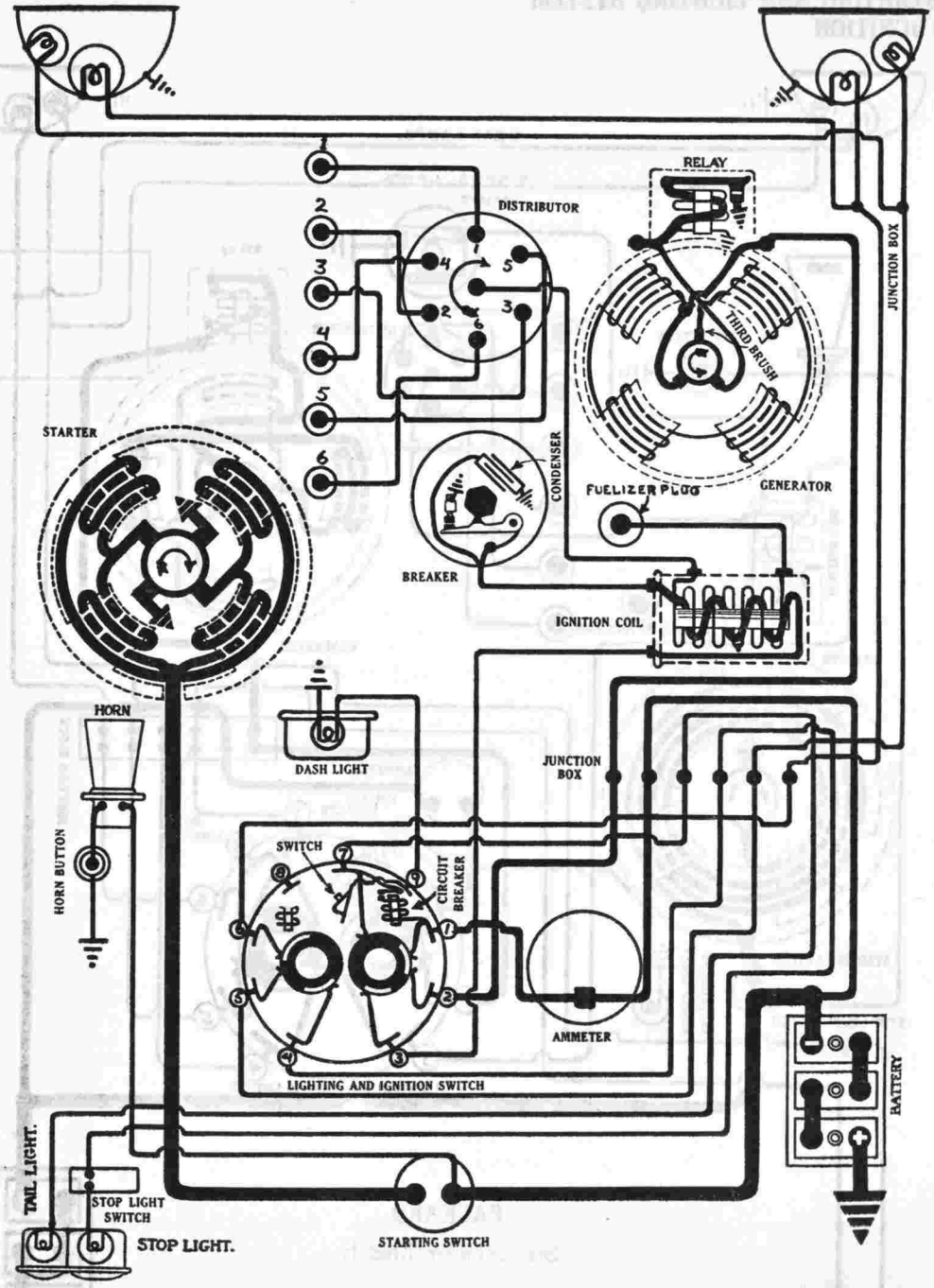
RELAY.—Relay is mounted on the generator frame. Relay closes at 8 to 10 miles per hour and opens at 6 to 8 miles per hour. Relay contacts separate .018 to .020 inch. The air gap between the coil core and the relay armature is .034 to .040 inch. Clean relay contacts by drawing unglazed paper between them. If badly worn or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 7 volt, 24 cp. Dimmer lamps are 7 volt, 6 cp. Dash and tail lamps are 7 volt, 2 cp. Dome lamps used on closed bodies are 7 volt, 8 cp. All are single contact.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start the vibrator, but 3-5 amperes will cause it to continue.



PACKARD SINGLE SIX
ATWATER KENT MOTOR AND GEN., DELCO IGNITION



PACKARD

MODELS 1-26, 1-33 (1923), 2-26, 2-33 (1924)
ATWATER KENT GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Willard, Type SJRG. 6 volt. 111 ampere-hour. The positive (+) terminal is grounded.

IGNITION:—Coil Model No. 2175. Distributor Model No. 5248. Breaker contacts separate .015 to .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone. Both sets of contacts must separate at the same instant. Ignition consumes approximately 6 amperes of which is not indicated on ammeter.

Oiling:—Put 4 or 5 drops of light engine oil in the distributor oiler every month, or 1000 miles. Remove distributor head, apply small quantity of gun oil. Wipe with a clean cloth, and then apply a minute quantity of vaseline to the cam. This must be done every 2500 miles.

Timing:—Breaker contacts begin to separate when the marking on the flywheel, "Upper D.C. Cylinder 1 and 6," has 1 9/16 inch to travel before reaching center line of motor, spark control lever and breaker assembly in fully advanced position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plug Gaps:—The spark plug gaps are .030 inch.

Fuelizer Plug Gap:—The fuelizer plug gap is 1/8 inch.

STARTER:—Model 6484. Starter is connected to engine through a Bendix drive. Starter cranks the engine at 150 R.P.M., taking 175 amperes at 5 volts. Lock torque is 16 pound-feet, current being 500 amperes at 4 volts.

Oiling:—Put 5 or 6 drops of light engine oil in the two starter oilers each month. If the car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

GENERATOR.—Model 5870. Generator current regulation is by the third brush system. maximum charging rate in 9-11 amperes on ammeter, reached at approxmately 20 miles per hour. To adjust charging rate, loosen stud which holds the third brush in place, and loosen screw on outside end of generator. Move third brush in a counter-clockwise direction, looking at commutator end, to increase the charging rate; move in a clockwise direction to decrease the charging rate. Tighten both screws.

Oiling:—Put 5 or 6 drops of light engine oil in the generator oiler once each month. If the car is driven more than 1000 miles in a month, this oiling must be done every 1000 miles.

RELAY:—Relay is mounted on the generator frame. Relay closes at 8 to 10 miles per hour and opens at 6 to 8 miles per hour. Relay contacts separate .018 to .020 inch. The air gap between the coil core and the relay armature is .034 to .040 inch. Clean relay contacts by drawing unglazed paper between them. If badly worn or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 7 volts, 21 cp. Dimmer lamps are 7 volts, 4 cp. Dash and tail lamps are 7 volts, 2 cp. Dome lamps used on closed bodies are 7 volts, 6 cp. All lamps are of the single contact type.

CIRCUIT BREAKER:—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start the vibrator, but 3-5 amperes will cause it to continue.

PACKARD

MODELS 2-26, 2-33 (1924), 3-26, 3-33 (1925) SIX
MODELS 1-36, 1-43 (1923-24), 2-36, 2-43 (1925) EIGHT
OWEN-DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Prest-O-Lite, (Six) Type 613-SHC. 6 volt. 112.5 ampere-hour. The starting capacity is 130 amperes for 20 minutes. The lighting capacity is 5 amperes for 22.5 hours. **(Eight) Type 617-SHC,** 6 volt, 160 ampere hour. The starting capacity is 170 amperes for 20 minutes. The lighting capacity is 5 amperes for 32 hours. The positive (+) terminal is grounded.

IGNITION:—Delco Coil Model No. 2175 (Six and Eight). Delco Distributor Model No. 5249 (Six) and 5260 (Eight). Breaker contacts separate .020-.025 inch on the Six and .015-.020 inch on the Eight. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine flat jeweler's file or on a medium hard oilstone. The tension of the breaker arm spring should be 16-20 ounces. The distributor is of the combined manual and automatic advance type. Manual advance is 40°. Automatic advance begins at 580 R.P.M. and reaches a maximum of 19-23° at 2000 R.P.M.

Oiling:—Put 8 or 10 drops of light engine oil in each of the two oilers on the side of the distributor housing every two weeks or each 500 miles. Place a small bit of heavy grease, the size of a match head, on the face of the breaker cam. Wipe out the distributor head and polish the rotor track with a bit of grease, removing all excess with a clean cloth.

Timing:—Breaker contacts begin to separate when Piston No. 1 on compression stroke reach a position 2 inches before top dead center (measured on the flywheel) when the flywheel marking "Upper D.C. Cylinder 1 & 6" is two inches before the dead center mark on the housing on the six cylinder car, and 1⅝ inches before top dead center (measured on the flywheel) when the flywheel marking "Upper D.C. Cylinder 1 & 8" is 1⅝ inches before the dead center mark on the housing on the eight cylinder car. The spark control lever and breaker assembly should be in fully advanced position.

Firing Order:—The firing order is (Six) 1-5-3-6-2-4 and (Eight) 1-3-2-5-8-6-7-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are 1/32 inch. Fuelizer spark plug gap is ⅛ inch. A cutout switch connected to the throttle lever short circuits the fuelizer spark plug on the Eight at high speeds. This device is not used on the Six.

STARTER: — Model DE-524 (Six & Eight) and DG-646 (Eight). Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The starter is a six pole, two brush motor having but a single field coil. The field coil is so constructed that it winds around each pole in turn, each pole being surrounded by a 'U' shaped section of the coil.

Starter Data
Model DE-524.

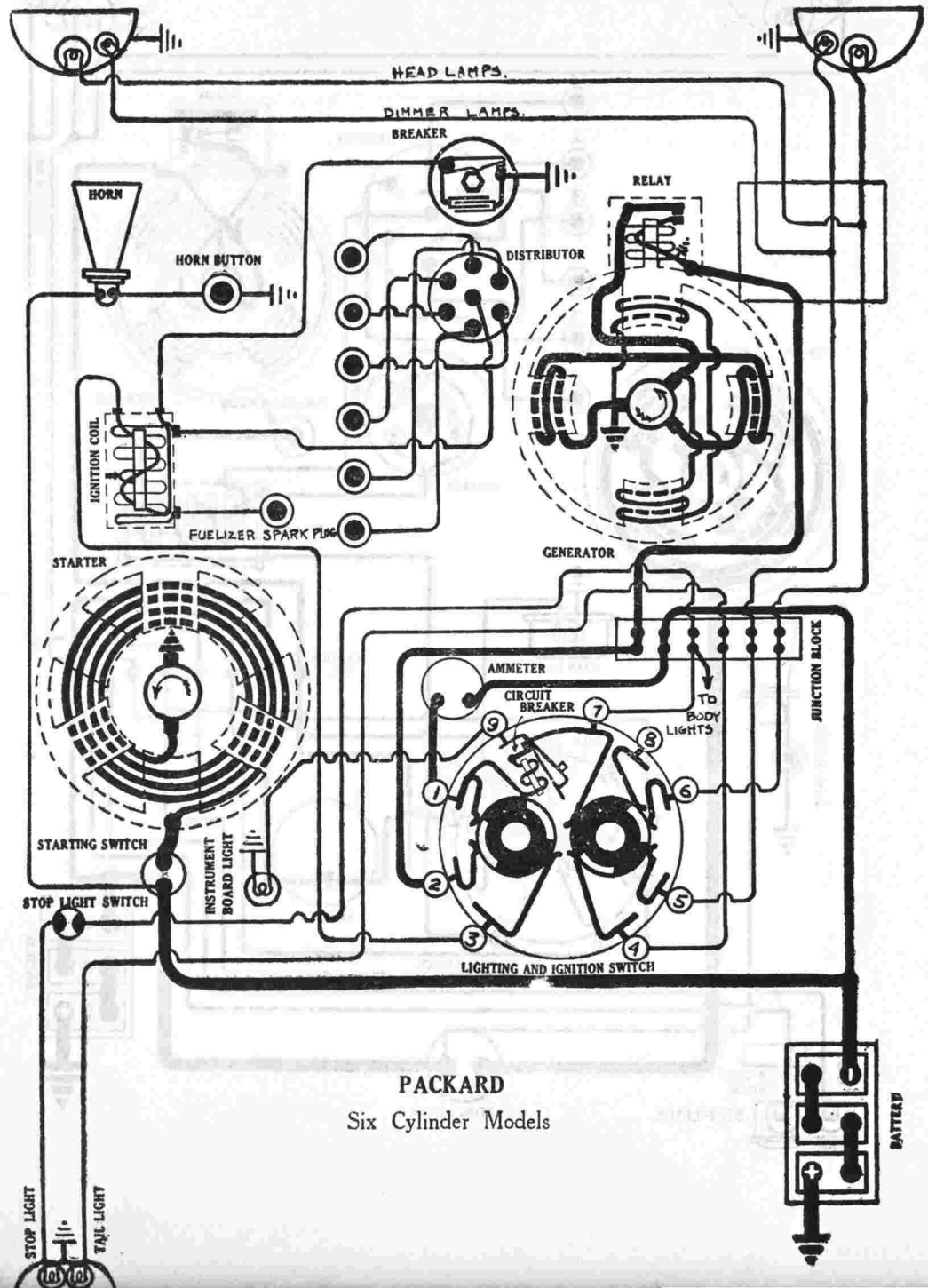
Torque	R. P. M.	Volts	Amperes
0 lb. ft.	6000	6.0	60
3. „	1500	5.5	200
18. „	Lock.	3.5	650

Model DG-646.

Torque	R. P. M.	Volts	Amperes
0 lb. ft.	6000	6.0	50
10.5 „	500	4.5	350
25.0 „	Lock.	3.5	620

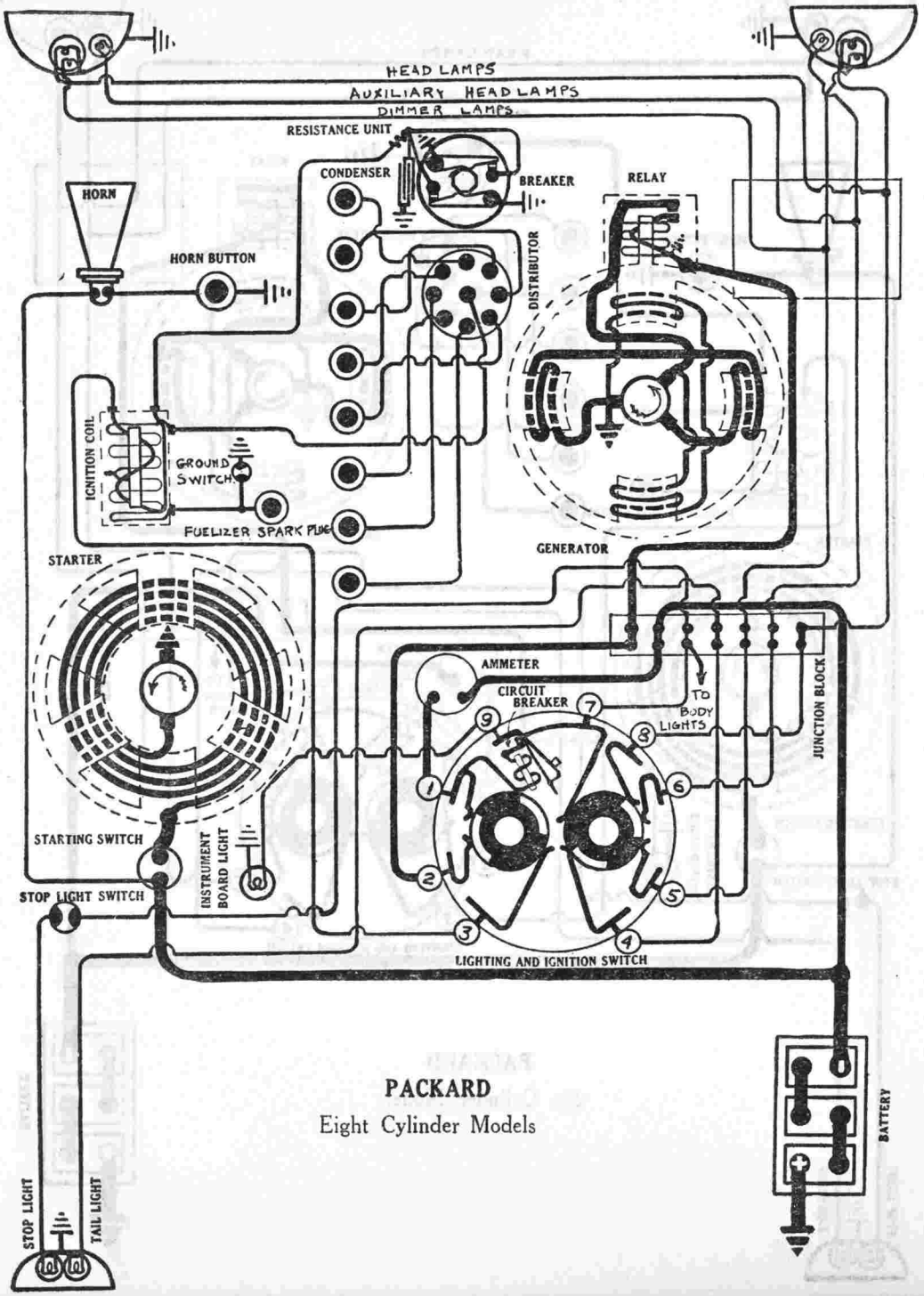
Oiling: — Put 4 or 5 drops of light machine oil in the oilhole on the commutator end plate every month or each 1000 miles. The drive end of the motor is fitted with oilless bronze bushings which require no attention.

Continued on Next Page



PACKARD
Six Cylinder Models

Continued from preceding page.



PACKARD

Eight Cylinder Models

GENERATOR:—Model CE-523. Generator current regulation is by the third brush system. The generator is equipped with two shunt fields, each wound on two field coils. The light shunt field is connected between one main brush and the third brush and regulates the output. The heavy shunt field is connected between the third brush and the other main brush. The battery is connected across the same brushes as the light shunt field. The direction of rotation is counter-clockwise, looking at the commutator end. The light shunt field draws 2 amperes at 6 volts. The heavy shunt field draws 75 amperes at 6 volts.

Generator Data

Amperes	Volts	R.P.M.
0	6.2	385-400
9	6.8	550-600
16	7-4	800-900
8	7.0	3500

To adjust the generator output, loosen the screw in the center of the knurled nut on the generator end plate. Turn the nut to the left to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Raising the third brush does not render the generator inoperative and it should never be run in this position. Two brushes must be raised—any two will do. If the generator cuts in late and does not generate over 7 amperes at peak, a short probably exists in the armature or the light shunt field is open. If the generator cuts in late and the charging rate continues to increase above 2000 R.P.M. the heavy shunt field is probably open. If the output exceeds 11 amperes at 3000 R.P.M. but does not exceed the peak output, the heavy shunt field is probably shorted. The drive end bearing for the Model CE generator is in the engine. Before this machine can be run on the test bench a special bearing must be bolted on. This is Part No. 22196 and can be secured from the Owen-Dyneto Corporation.

Oiling:—The drive end of the generator is oiled by splash from the gear case. Put 4 or 5 drops of light machine oil in the oiler on the commutator end of the generator every month or each 1000 miles.

RELAY:—The relay is mounted on top of the generator. Relay contacts close at 385-400 R.P.M. of the generator when the voltage reaches 6.2 volts and open with a discharge current of 0-2 amperes.

LIGHTING: — Delco Combination Switch Model 1229 (Six) Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volts, 6 cp. Dome lamp is 6-8 volt, 8 cp. Dash and tail lamps are 6-8 volt, 2 cp.

Delco Combination Switch Model 1251 (Eight) Head lamps are 6-8 volt, 32 cp. Auxiliary head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 2 cp. (In head lamp bulbs). Dome lamp is 6-8 volt, 6 cp. Dash, tail and tonneau lamps are each 6-8 volt, 2 cp. All lamps have single contact base.

CIRCUIT BREAKER:—A vibrating circuit breaker mounted in the back of the switch takes the place of fuses. It requires a current of 25-30 amperes to start this device vibrating. While vibrating the current is 10-15 amperes.

MODELS 326-333 SIX AND 236-243 EIGHT (1926)
OWEN DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY: — Prest-O-Lite, (Six) Type 613-SHC. 6 volt, 112.5 ampere-hour. The starting capacity is 130 amperes for 20 minutes. The lighting capacity is 5 amperes for 22.5 hours. **(Eight) Type 617-SHC.** 6 volt, 160 ampere hour. The starting capacity is 170 amperes for 20 minutes. The lighting capacity is 5 amperes for 32 hours. The positive (+) terminal is grounded.

IGNITION:—Delco Coil Model No. 2187 (six and eight), Delco Distributor Model No. 5249 (six) and 5260 (eight). Breaker contacts separate .020-.025 inch on the Six and .015-.020 inch on the Eight. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine flat jeweler's file or on a medium hard oilstone. The tension of the breaker arm spring should be 16-20 ounces. The distributor is of the combined manual and automatic advance type. Manual advance is 40°. Automatic advance begins at 580 R.P.M. and reaches a maximum of 19-23° at 2000 R.P.M.

Mounting:—Distributor is mounted on top of the engine. To remove distributor, disconnect manual advance rod and remove manual advance stop screw. Then lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the two oilers on the side of the distributor housing every two weeks or each 500 miles. Place a small bit of heavy grease, the size of a match head, on the face of the breaker cam. Wipe out the distributor head and polish the rotor track with a bit of grease, removing all excess with a clean cloth.

Timing:—Breaker contacts begin to separate when piston No. 1 on compression stroke reaches a position 2 inches before top dead center (measured on the flywheel) when the flywheel marking "Upper D.C. Cylinder 1 & 6" is two inches before the dead center mark on the housing on the six cylinder car, and 1⅝ inches before top dead center (measured on the flywheel) when the flywheel marking "Upper D.C. Cylinder 1 & 8" is 1⅝ inches before the dead center mark on the housing on the eight cylinder car. The spark control lever and breaker assembly should be in fully advanced position.

Firing Order:—The firing order is (Six) 1-5-3-6-2-4 and (Eight) 1-3-2-5-8-6-7-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are 1/32 inch. Fuelizer spark plug gap is ⅛ inch. A cutout switch connected to the throttle lever short circuits the fuelizer spark plug on the Eight at high speeds. The device is not used on the Six.

STARTER:—Model DH (Six). Model DM (Eight). Starter is connected to the engine through a Bendiv drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter is a six pole, two brush machine having a single field coil. The field coil is so constructed that it winds around three sides of each pole alternating from one pole to the next so that each field pole is surrounded by a "U" shaped section of the coil.

Starter Data

Model DH

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	6	60
25 "	Lock	3.5	650

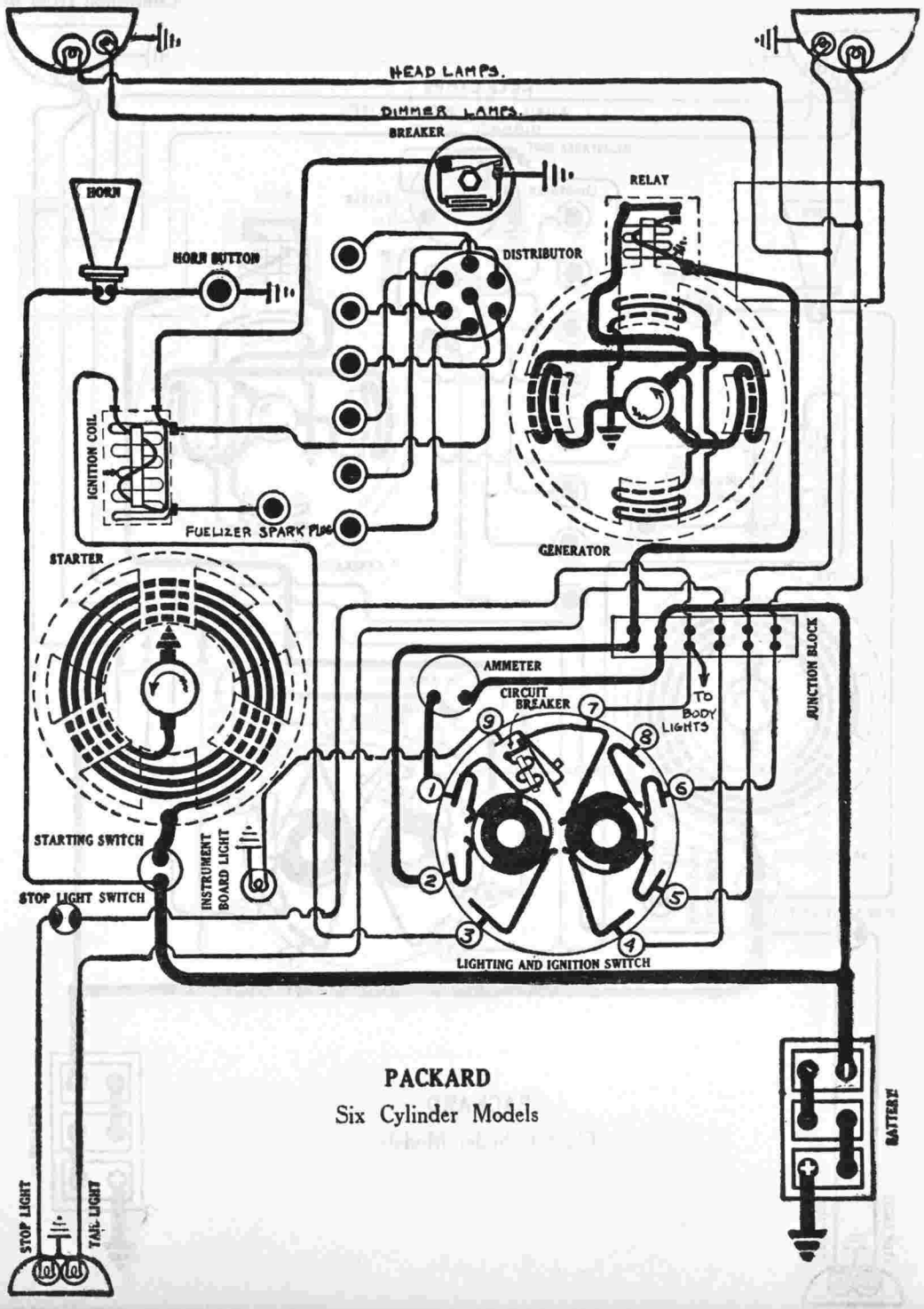
Model DM

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	6	50
35 "	Lock	3.5	650

Mounting:—Starter is mounted at left of engine by a standard sleeve mounting. To remove starter, remove the large pilot mounting screw and slide starter forward. Then lift from place.

Oiling:—Starter bearings are fitted with oilless bushings. They require no attention.

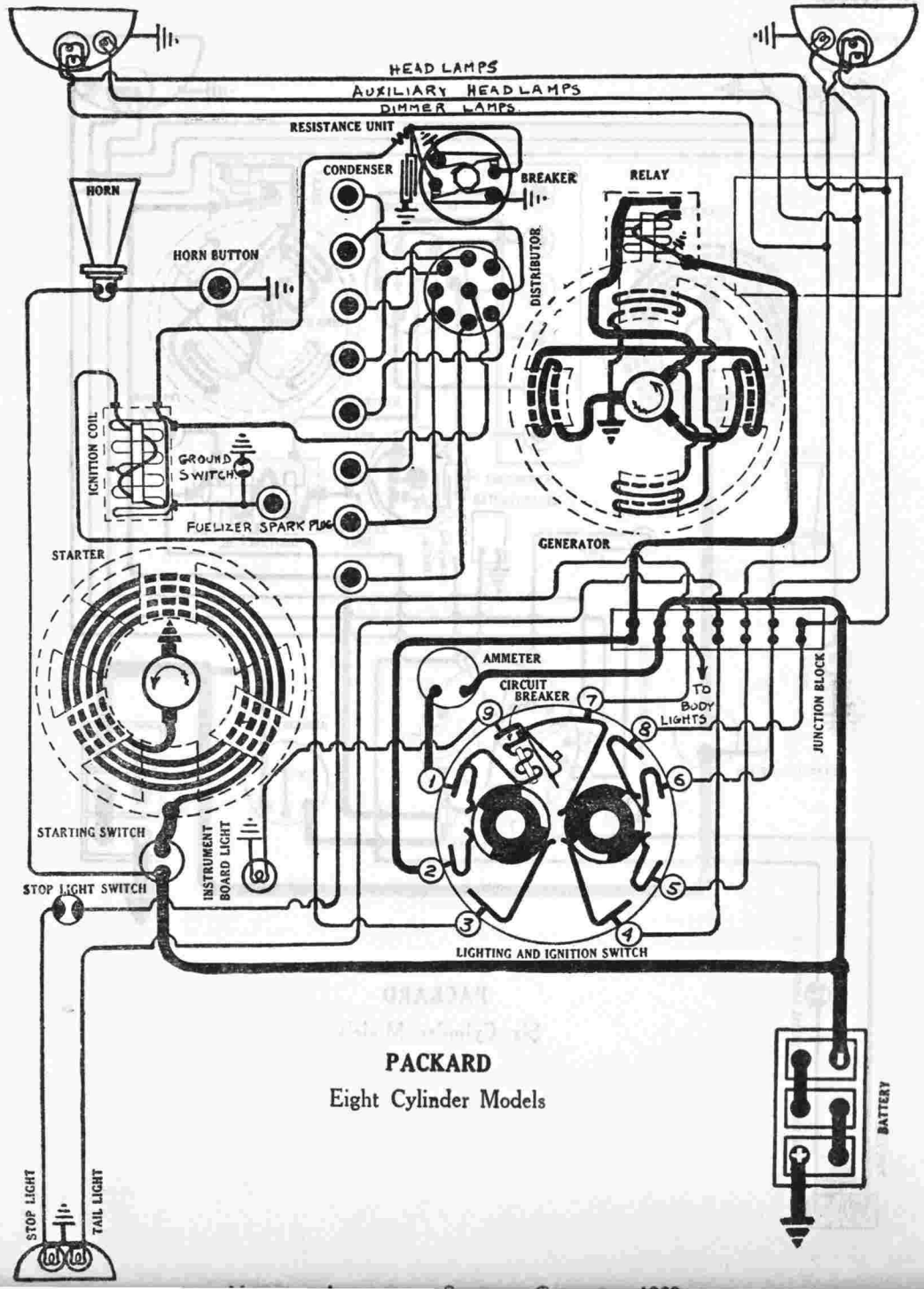
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PACKARD
Six Cylinder Models

MODELS 326-333 SIX AND 236-243 EIGHT (1926)
OWEN DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

Continued from preceding page.



PACKARD

Eight Cylinder Models

GENERATOR:—Models CE-523 and CG-678. Current regulation is by the third brush system. The generator is equipped with two shunt fields, each wound on two field coils. The light shunt field is connected between one main brush and the third brush and regulates the output. The heavy shunt field is connected between the third brush and the other main brush. The battery is connected across the same brushes as the light shunt field. The direction of rotation is counter-clockwise, looking at the commutator end. The light shunt field draws 2 amperes at 6 volts. The heavy shunt field draws 75 amperes at 6 volts.

Generator Data

Amperes	Volts	R.P.M.
0	6.2	385-400
9	6.8	550-600
16	7.4	800-900
8	7.0	3500

To adjust the generator output, loosen the screw in the center of the knurled nut on the generator end plate. Turn the nut to the left to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Raising the third brush does not render the generator inoperative and it should never be run in this position. Two brushes must be raised, any two will do. If the generator cuts in late and does not generate over 7 amperes at peak, a short probably exists in the armature or the light shunt field is open. If the generator cuts in late and the charging rate continues to increase above 2000 R.P.M. the heavy shunt field is probably open. If the output exceeds 11 amperes at 3000 R.P.M. but does not exceed the peak output, the heavy shunt field is probably shorted. The drive end bearing for the Model CG generator is in the engine. Before this machine can be run on the test bench a special bearing must be bolted on. This is Part No. 22196 and can be secured from the Owen-Dyneto Corporation.

Mounting:—Generator is flange mounted on the right of the engine. To remove generator, remove three flange mounting screws and pry the generator to the rear. Care must be taken not to remove the bronze plate between the generator and the chain case. Insert a screw-driver between the generator and the plate and slide the generator to the rear. Then lift from place.

Oiling:—The drive end of the generator is oiled by splash from the gear case. Put 4 or 5 drops of light machine oil in the oiler on the commutator end of the generator every month or each 1000 miles.

RELAY:—The relay is mounted on top of the generator. Relay contacts close at 385-400 R.P.M. of the generator when the voltage reaches 6.2 volts and open with a discharge current of 0-2 amperes.

LIGHTING:—Delco Cominbation Switch Model 1229 (Six). Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 6 cp. Dome lamp is 6-8 volt, 8 cp. Dash and tail lamps are 6-8 volt, 2 cp.

Delco Combination Switch Model 1251 (Eight). Head lamps are 6-8 volt, 32 cp. Auxiliary head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 2 cp. (In head lamp bulbs). Dome lamp is 6-8 volt, 6 cp. Dash, tail and tonneau lamps are each 6-8 volt, 2 cp. All lamps have single contact base.

CIRCUIT BREAKER:—A vibrating circuit breaker mounted in the back of the switch takes the place of fuses. It requires a current of 25-30 amperes to start this device vibrating. While vibrating the current is 10-15 amperes.

PACKARD

MODELS 3-26, 3-33 SIX AND 2-36, 2-43 EIGHT (LATE 1926)
OWEN-DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION.

BATTERY.—Prest-O-Lite, (Six) Type 613-SHK. 6 volt. 112.5 ampere hour. The starting capacity is 130 amperes for 20 minutes. Lighting capacity is 5 amperes for 22.5 hours. **(Eight) Type 617-SHK.** 6 volt, 160 ampere hour. The starting capacity is 170 amperes for 20 minutes. Lighting capacity is 5 amperes for 32 hours. The positive (+) terminal is grounded.

IGNITION.—Delco Coil Model No. 2187 (six and eight) Delco Distributor Model No. 5249 (Six) and 5260 (Eight). Breaker contacts separate .020-.025 inch on the Six and .015-.020 inch on the Eight. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine flat jeweler's file or on a medium hard oilstone. The tension of the breaker arm spring should be 16-20 ounces. The distributor is of the combined manual and automatic advance type. Manual advance is 40°. Automatic advance begins at 580 R.P.M. and reaches a maximum of 19-23° at 2000 R.P.M.

Mounting.—Distributor is mounted on top of the engine. To remove distributor, disconnect manual advance rod and remove manual advance stop screw. Then lift distributor from place.

Oiling: — Put 8 or 10 drops of light engine oil in each of the two oilers on the side of the distributor housing every two weeks or each 500 miles. Place a small bit of heavy grease, the size of a match head, on the face of the breaker cam. Wipe out the distributor head and polish the rotor track with a bit of grease, removing all excess with a clean cloth.

Timing: — Breaker contacts begin to separate when Piston No. 1 on compression stroke reaches a position 2 inches before top dead center (measured on the flywheel) when the flywheel marking "Upper D. C. Cylinder 1 & 6' is two inches before the dead center mark on the housing on the six cylinder car, and 1⅝ inches before top dead center (measured on the flywheel) when the flywheel marking Upper D. C. cylinder 1 & 8 is 1⅝ inches before the dead center mark on the housing on the eight cylinder car. The spark control lever must be in the fully advanced position.

Firing Order: — The firing order is (Six) 1-5-3-6-2-4 and (Eight) 1-3-2-5-8-6-7-4

Spark Plugs: — Spark plug diameters are ⅞ inch. Gaps are 1/32 inch. Fuelizer spark plug gap is ⅛ inch. A cutout switch connected to the throttle lever short circuits the fuelizer spark plug on the Eight at high speeds. This device is not used on the Six.

STARTER.—Model DH (Six), Model DM (Eight). Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter is a six pole, two brush machine having a single field coil. The field coil is so constructed that it winds around three sides of each coil alternating from one pole to the next so that each field pole is surrounded by a "U" shaped section of the coil.

Starter Data

Model DH

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	6	60
25 lb. ft.	Lock	3.5	650

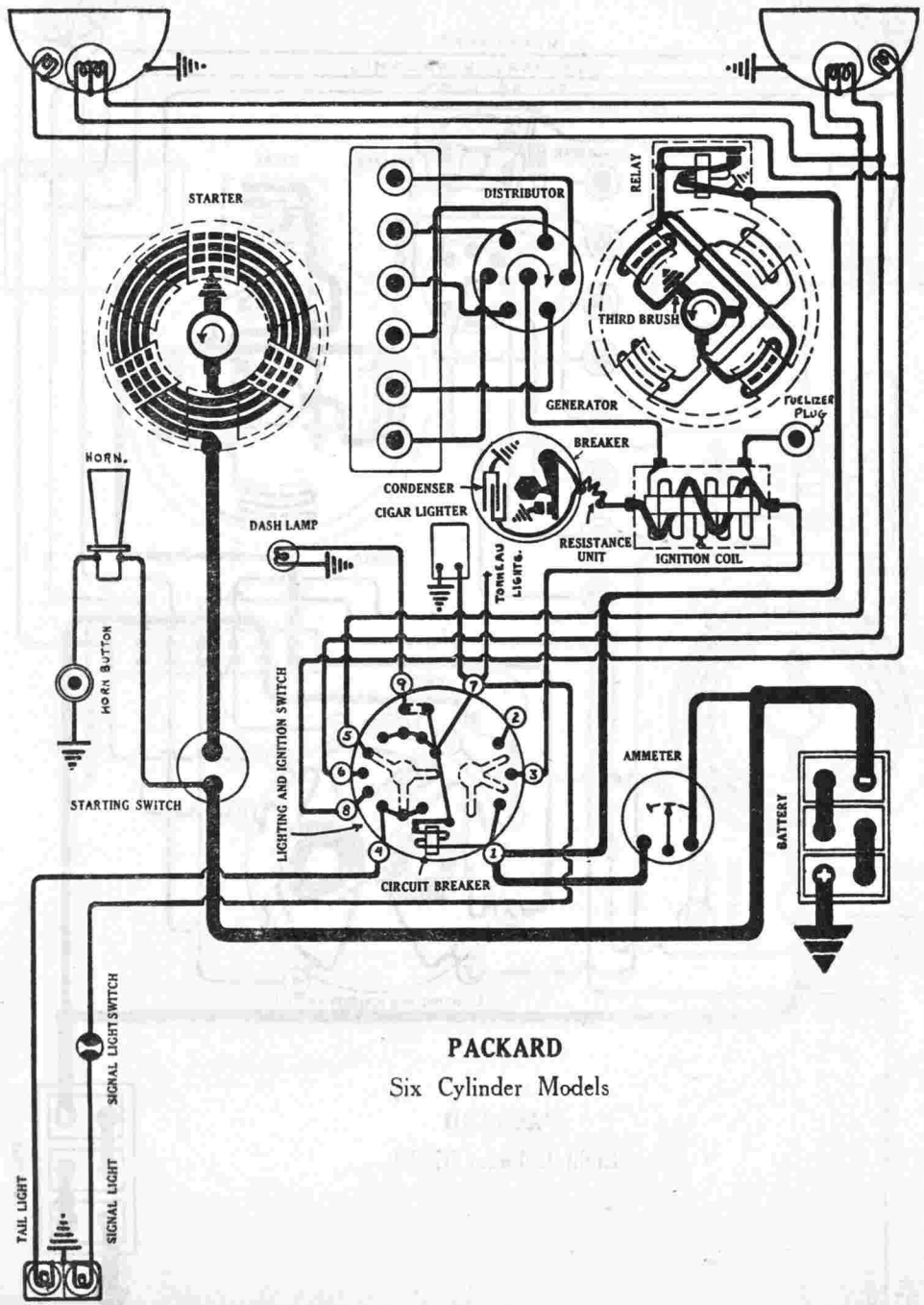
Model DM

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	6	50
35 lb. ft.	Lock	3.5	650

Mounting.—Starter is mounted at left of engine by a standard sleeve mounting. To remove starter, remove the large pilot mounting screw and slide the starter forward. Then lift from place.

Oiling.—Starter bearings are fitted with oilless bushings. They require no attention.

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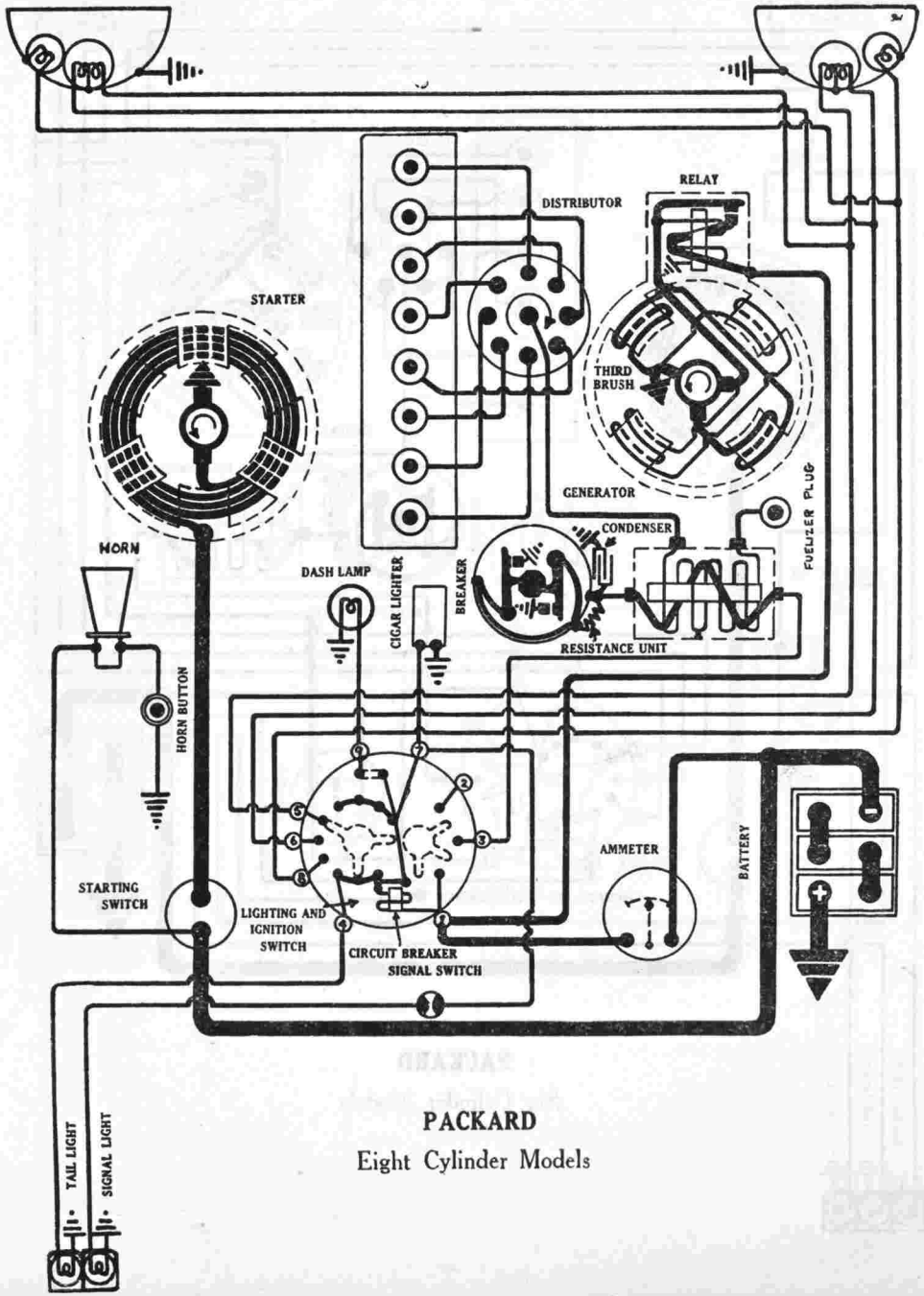
PACKARD

Six Cylinder Models

PACKARD

MODELS 3-26, 3-33 SIX AND 2-36, 2-43 EIGHT (LATE 1926)
OWEN-DYNETO GENERATING, STARTING AND LIGHTING SYSTEM.
DELCO IGNITION.

Continued from preceding page.



PACKARD

Eight Cylinder Models

GENERATOR.—Model CG-678. Generator current regulation is by the third brush System. The generator is equipped with two shunt fields, each wound on two field coils. The light shunt field is connected between one main brush and the third brush and regulates the output. The heavy shunt field is connected between the third brush and the other main brush. The battery is connected across the same brushes as the light shunt field. The direction of rotation is counter-clockwise, looking at the commutator end. The light shunt field draws 2 amperes at 6 volts. The heavy shunt field draws 75 amperes at 6 volts.

Generator Data.

Amperes.	Volts.	R. P. M.
0	6.2	385-400
9	6.8	550-600
16	7.4	800-900
8	7.0	3500

To adjust the generator out put loosen the screw in the center of the knurled nut on the generator end plate. Turn the nut to the left to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Raising the third brush does not render the generator inoperative and it should never be run in this position. Two brushes must be raised any two will do. If the generator cuts in late and does not generate over 7 amperes at peak, a short probably exists in the armature or the light shunt field is open. If the generator cuts in late and the charging rate continues to increase above 2000 R.P.M. the heavy shunt field is probably open. If the output exceeds 11 amperes at 3000 R.P.M. but does not exceed the peak output, the heavy shunt field is probably shorted. The drive end bearing for the Model CG generator is in the engine. Before this machine can be run on the test bench a special bearing must be bolted on. This is Part No. 22196 and can be secured from the Owen-Dyneto Corporation.

Mounting.—Generator is flange mounted on the right of the engine. To remove generator, remove three flange mounting screws and pry the generator to the rear. Care must be taken not to remove the bronze plate between the generator and the chain case. Insert a screw-driver between the generator and the plate and slide the generator to the rear. Then lift from place.

Oiling.—Drive end of the generator is oiled by splash from the gear case. Put 4 or 5 drops of light machine oil in the oiler on the commutator end of the generator every month or each 1000 miles.

RELAY: —The relay is mounted on top of the generator. Relay contacts close at 385-400 R. P. M. of the generator when the voltage reaches 6.2 volts and open with a discharge current of 0-2 amperes.

LIGHTING.—Delco Combination Switch Model No. 1278. Head lamps are 6-8 volt, 21 and 2 cp. double filament bulb. The 2 cp. filament is used for dimming. Auxiliary head lamps are 6-8 volt, 21 cp. Dome lamp is 6-8 volt, 6 cp. Dash, tail and tonneau lamps are each 6-8 volt, 2 cp. All lamps except main head lamps are single contact base.

CIRCUIT BREAKER: —A vibrating circuit breaker mounted in the back of the switch takes the place of fuses. It requires a current of 25-30 amperes to start this device vibrating. While vibrating the current is 10-15 amperes.

PACKARD

MODELS 4-26, 4-33 SIX AND 3-36, 3-43 EIGHT (1927)
OWEN-DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Prest-O-Lite, (Six) Type 613-SHK, 6 volt, 112.5 ampere hour. The starting capacity is 130 amperes for 20 minutes. Lighting capacity is 5 amperes for 22.5 hours. **(Eight) Type 617-SHK,** 6 volt, 160 ampere hour. The starting capacity is 170 amperes for 20 minutes. Lighting capacity is 5 amperes for 32 hours. The positive (+) terminal is grounded.

IGNITION.—Six. Coil Model 2195. Distributor Model 4009. Breaker contacts separate .020-.0275 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file or on a medium hard oilstone. The tension of the breaker arm spring is 16-20 ounces. Distributor is of the semi-automatic type. Manual advance is 40°. Automatic advance begins at 700 R.P.M. and reaches a maximum of 16-20° at 2200 R.P.M. The breaker uses a single set of contacts with a six sided cam. To set timing, crank engine until piston No. 1 reaches the firing position. Then loosen lock screw in center of breaker cam and rotate the cam until the breaker contacts begin to separate.

IGNITION.—Eight. Coil Model 2195. Distributor Model 4008. Breaker contacts separate .0225-.0275 inch. They are made of tungsten. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. The tension of the breaker arm spring should be 16-20 ounces. Distributor is of the semi-automatic type. Manual advance is 40°. Automatic advance begins at 700 R.P.M. and reaches a maximum of 16-20° at 2200 R.P.M. Breaker uses two sets of contacts with breaker arms set at an angle of 45° on a four sided cam. Breaker contacts open alternately at intervals of 45° corresponding to 90° of crankshaft rotation. To set timing, crank engine until piston No. 1 reaches firing position. Then loosen locking screw in center of breaker cam and rotate cam until one set of breaker contacts begin to separate. Make certain that the rotor button is under the segment connected to the spark plug in cylinder No. 1. Tighten the screw. Check the second set of contacts to make certain that they open after 90° of crankshaft travel. To adjust second set of contacts loosen the two small screws on the breaker plate and turn the adjusting collar until proper position is reached.

Mounting:—Distributor is mounted on top of the engine. To remove distributor, disconnect manual advance rod and remove manual advance stop screw. Then lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks. Once each month place a small bit of heavy grease on the face of the breaker cam under the fiber bumper of the contact arm.

Timing:—Breaker contacts begin to separate when piston No. 1 on compression stroke reaches a position 2 inches before top dead center (measured on the flywheel) when the flywheel marking "Upper D.C. Cylinder 1 & 6" is two inches before the dead center mark on the housing on the six cylinder car, and 1⅝ inches before top dead center (measured on the flywheel) when the flywheel marking "Upper D.C. Cylinder 1 & 8" is 1⅝ inches before the dead center mark on the housing on the eight cylinder car. The spark control lever must be in the fully advanced position.

Firing Order:—The firing order is (Six) 1-5-3-6-2-4 and (Eight) 1-3-2-5-8-6-7-4.

Spark Plugs:—Spark plug diameters are ⅞-18 S.A.E. Standard. Gaps are 1/32 inch.

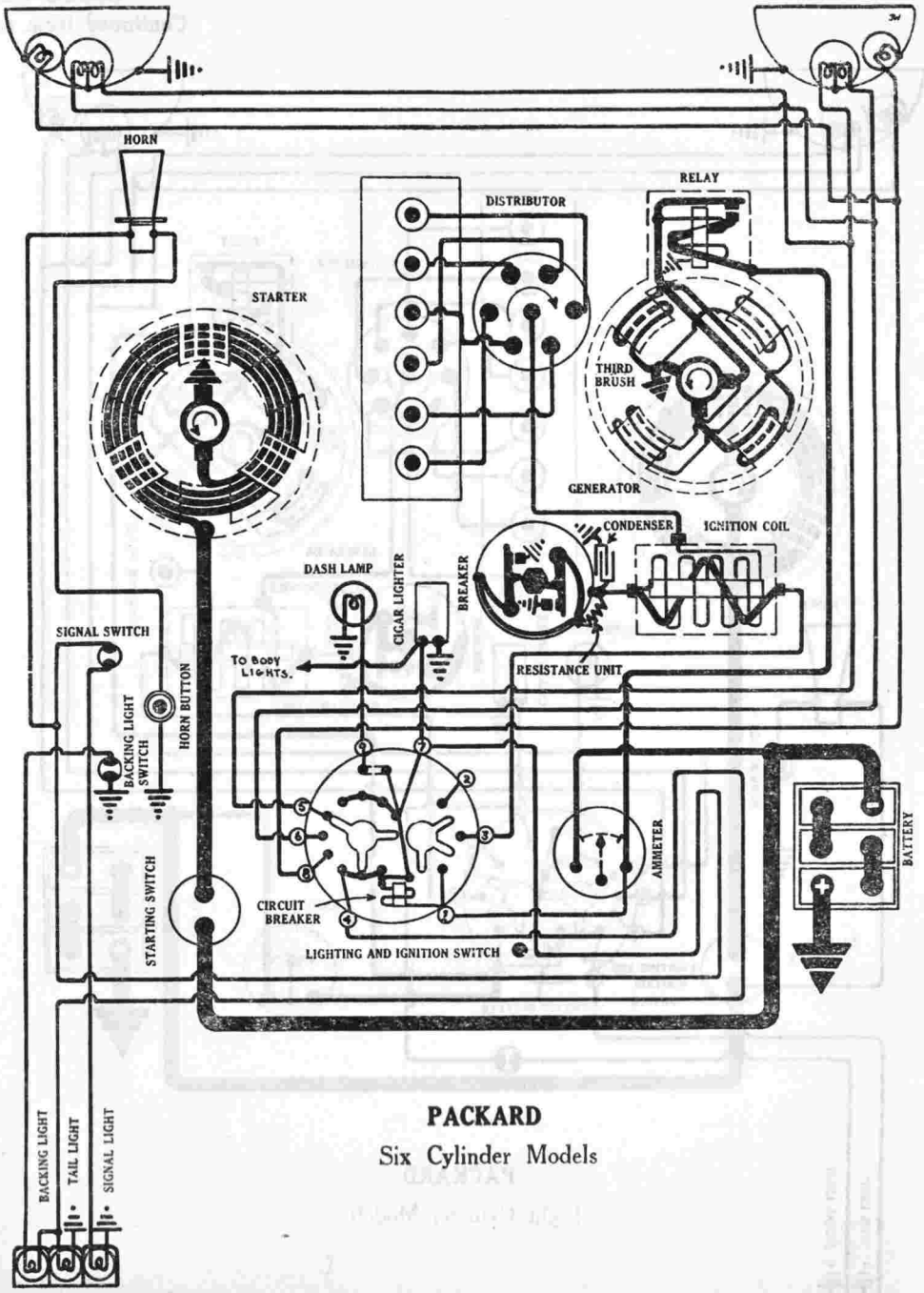
STARTER:—Model DH (Six), Model DM (Eight). Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter is a six pole, two brush machine having a single field coil. The field coil is so constructed that it winds around three sides of each coil alternating from one pole to the next so that each field pole is surrounded by a "U" shaped section of the coil.

Starter Data

Model DH

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	6	60
25 "	Lock	3.5	650

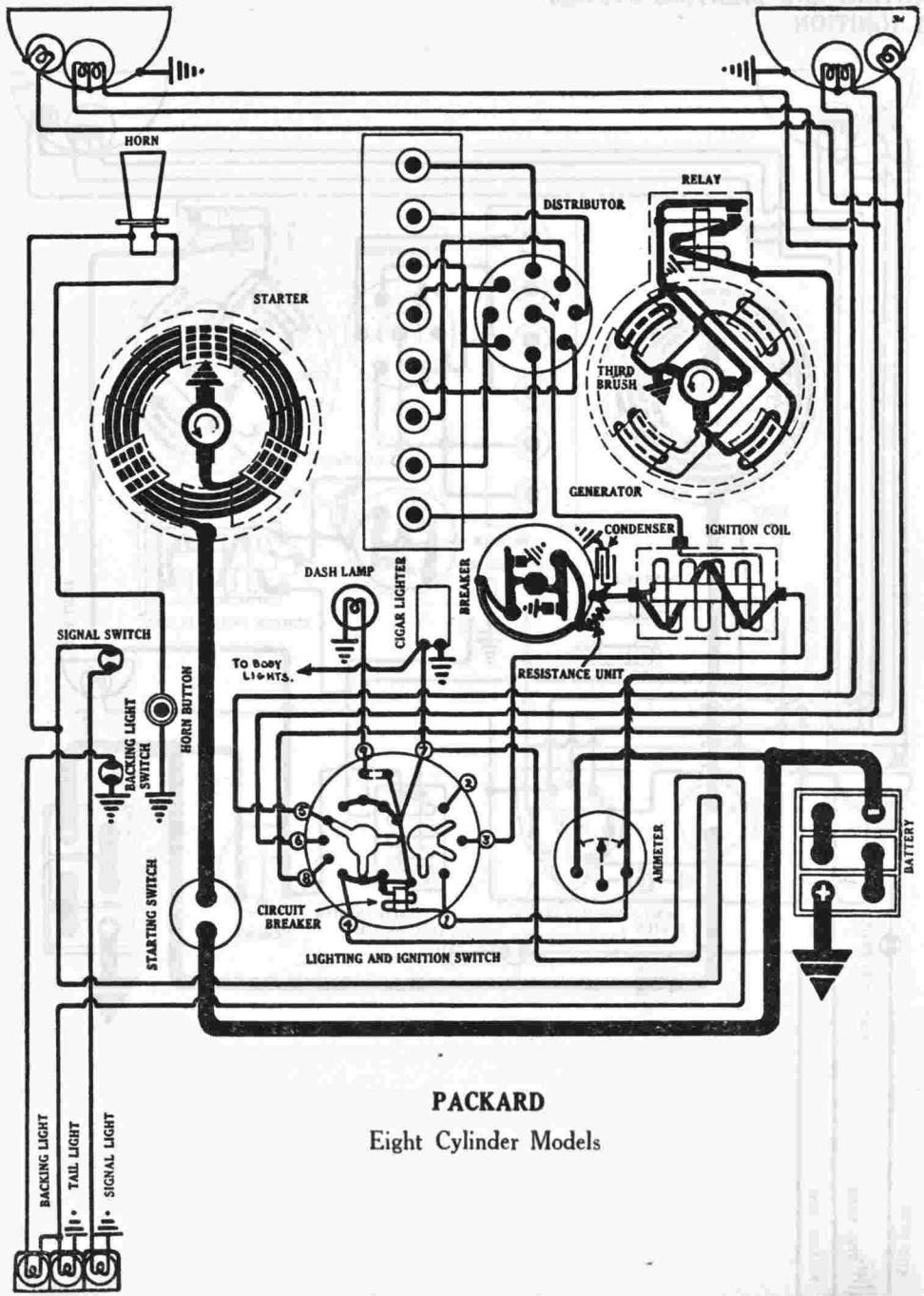
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PACKARD

Six Cylinder Models

Continued from preceding page



PACKARD

Eight Cylinder Models

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	6	50
35 lb. ft.	Lock	3.5	650

Mounting:—Starter is mounted at left of engine by a standard sleeve mounting. To remove starter, remove the large pilot mounting screw and slide the starter forward. Then lift from place.

Oiling:—Starter bearings are fitted with oilless bushings. The require no attention.

GENERATOR:—Model CG-678. Generator current regulation is by the third brush system. The generator is equipped with two shunt fields, each wound on two field coils. The light shunt field is connected between one main brush and the third brush and regulates the output. The heavy shunt field is connected between the third brush and the other main brush. The battery is connected across the same brushes as the light shunt field. The direction of rotation is counter-clockwise, looking at the commutator end. The light shunt field draws 2 amperes at 6 volts. The heavy shunt field draws 75 amperes at 6 volts.

Generator Data

Amperes	Volts	R.P.M.
0	6.2	385-400
9	6.8	550-600
16	7.4	800-900
8	7.0	3500

To adjust the generator output, loosen the screw in the center of the knurled nut on the generator end plate. Turn the nut to the left to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Raising the third brush does not render the generator inoperative and it should never be run in this position. Two brushes must be raised, any two will do. If the generator cuts in late and does not generate over 7 amperes at peak, a short probably exists in the armature or the light shunt field is open. If the generator cuts in late and the charging rate continues to increase above 2000 R.P.M. the heavy shunt field is probably open. If the output exceeds 11 amperes at 3000 R.P.M. but does not exceed the peak output, the heavy shun field is probably shorted. The drive end bearing for the Model CG generator is in the engine. Before this machine can be run on the test bench a special bearing must be bolted on. This is Part No. 22196 and can be secured from the Owen-Dyneto Corporation.

Mounting:—Generator is flange mounted on the right of the engine. To remove generator, remove three flange mounting screws and pry the generator to the rear. Care must be taken not to remove the bronze plate between the generator and the chain case. Insert a screw driver between the generator and the plate and slide the generator to the rear. Then lift from place.

Oiling:—Drive end of the generator is oiled by splash from the gear case. Put 4 or 5 drops of light machine oil in the oiler on the commutator end of the generator every month or each 1000 miles.

RELAY:—The relay is mounted on top of the generator. Relay contacts close at 385-400 R.P.M. of the generator when the voltage reaches 6.2 volts and open with a discharge current of 0-2 amperes.

LIGHTING:—Delco Combination Switch Model No. 1307. Head lamps are 6-8 volt, 21 and 2 cp. double filament bulb. The 2 cp. filament is used for dimming. Auxiliary head lamps are 6-8 volt, 21 cp. Dome lamp is 6-8 volt, 6 cp. Dash, tail and tonneau lamps are each 6-8 volt, 2 cp. All lamps except main head lamps are single contact base.

Ignition Switch.—When the switch is unlocked, the ignition lever snaps to the "On" position. The key may then be removed. When the ignition is cut off by turning the switch to the "Off" position, the switch automatically locks.

CIRCUIT BREAKER:—A vibrating circuit breaker mounted in the back of the switch takes the place of fuses. It requires a current of 25-30 ampers to start this device vibrating. While vibrating the current is 10-15 amperes.

PACKARD

MODELS 5-26, 5-33 (1927-28)
OWEN-DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type A-613-SH. Starting capacity is 130 amperes for 20 minutes. Lighting capacity is 5 amperes for 22.5 hours. The positive (+) terminal is grounded. Battery is mounted in special compartment built in right front fender.

IGNITION:—Coil Model 552-A. Distributor Model 656-J. Breaker contacts separate .020-.024 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 40° (engine). Automatic advance starts at 600 R.P.M. and reaches a maximum of 20° (engine) at 2200 R.P.M. of the crankshaft. Breaker has two sets of contacts operating on a three sided cam opening alternately at intervals of 60° corresponding to 120° of crankshaft rotation. This firing interval must be accurately set (see Timing). Breaker arm spring tension is 17-21 ounces.

Mounting:—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and manual advance rod. Then remove advance stop screw and lift distributor from place.

Oiling:—Fill the grease cup under the distributor head and turn down two turns every two weeks or each 500 miles. Place a small bit of vaseline on the face of the breaker cam every 1000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 2 inches before top dead center (on the flywheel) with the spark control lever in the fully advanced position. With piston No. 1 in this position the flywheel mark 'UDC Cyl. 1 & 6' will be 2 inches before the indicator on the flywheel housing. To set timing. crank engine until piston No. 1 reaches the firing position. Make certain that manual spark control lever is in the fully advanced position. If breaker contacts are not beginning to separate, loosen advance arm clamp screw and rotate distributor until contacts on stationary breaker begin to separate. Tighten the clamp screw. Use special Delco-Remy Part No. 820751 to check second set of breaker contacts mounted on movable plate. Place the synchronizing gauge on the cam placing the clamp on the flat side of the cam with slot in shaft toward left side of gauge. Turn shaft in clockwise direction until graduations on left scale are near slot in distributor housing. Continue to turn shaft and note reading on scale opposite the edge of the slot when stationary set of contacts separate. Continue to rotate shaft until same reading on the other scale is opposite the slot in the distributor. If second set of contacts are not separating, loosen two lockscrews on mounting plate and turn eccentric adjusting screw until contacts separate. Tighten the two lockscrews. Use a test lamp or the dash ammeter to note instant the contacts separate. The contact gap must be kept within the limit of .020-.024 inch. This must be checked after setting timing.

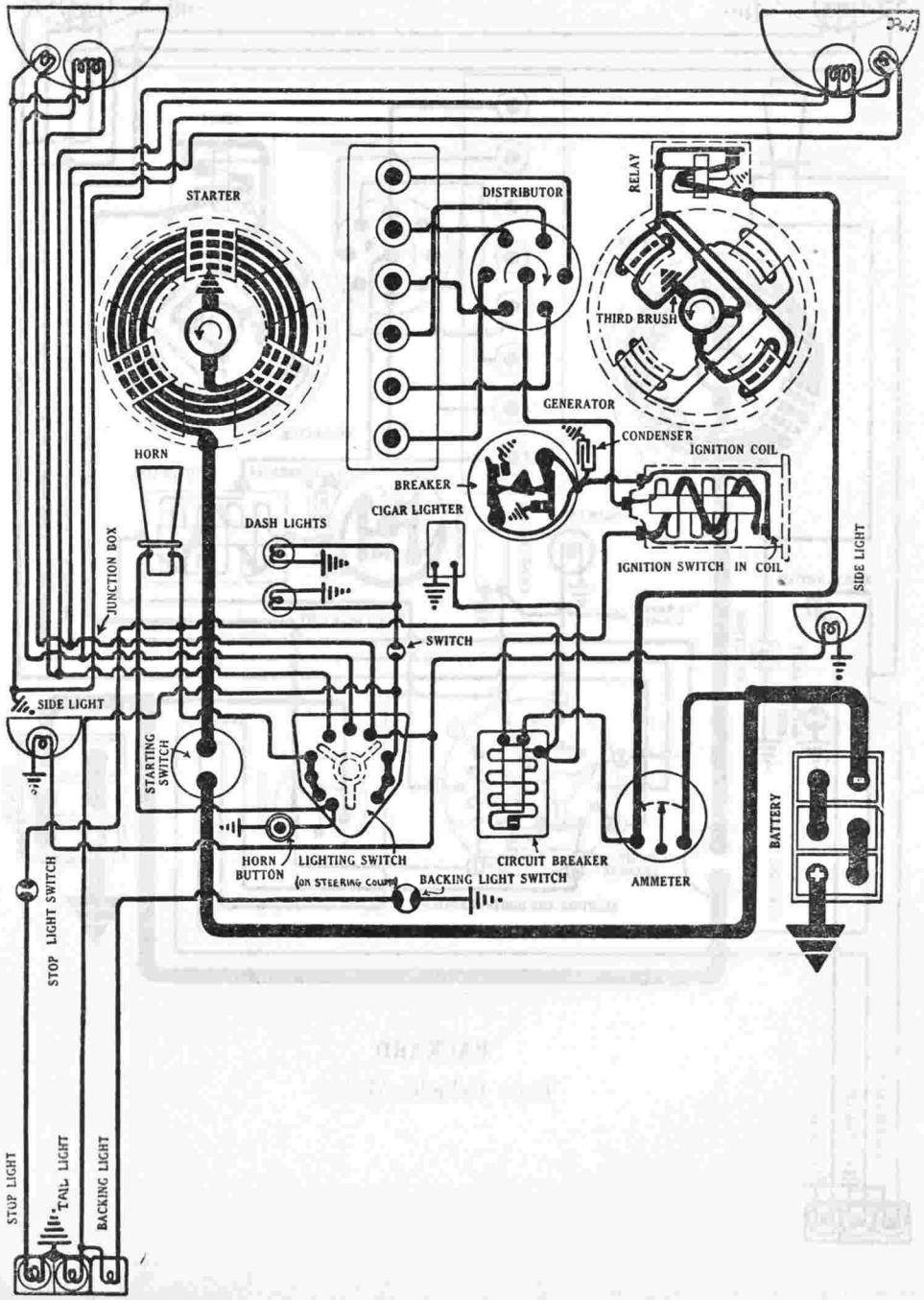
Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are 1/32 inch.

STARTER:—Model DH-695. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The starter is a six pole, two brush machine having one field coil which is so constructed that it winds around three sides of each pole alternating from one to the next so that each pole is surrounded by a 'U' shaped section of the coil.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	6	60
25 "	Lock	3.5	650



PACKARD

MODELS 5-26, 5-33 (1927-28)
OWEN-DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

Mounting:—Starter is mounted at left of engine by a standard sleeve mounting. To remove starter, disconnect starter cable and remove large pilot mounting screw. Slide starter forward and lift from place.

Oiling:—Starter bearings have oilless bearings. They require no attention.

GENERATOR:—Model CG-678. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field in conjunction with special compensating field. The generator has two shunt fields each wound on two field poles. The light shunt field is connected between one main brush and the third brush and regulates the output. The heavy shunt field is connected between the third brush and the other main brush. The battery is connected between the same brushes as the light shunt field. Maximum charging rate of 16 amperes is reached at 800-900 R.P.M.

Generator Data

Amperes	Volts	R.P.M.
0	6.2	385-400
9	6.8	550-600
16	7.4	800-900
8	7.0	3500

The light shunt field draws 2 amperes at 6 volts. Heavy shunt field draws 75 amperes at 6 volts. Generator motoring draws 5.5 amperes at 6 volts. To adjust generator output, loosen the screw in the center of the knurled nut on the generator endplate, and turn the nut to the right to increase the charging rate and to the left to decrease the charging rate. Tighten the screw after making the adjustment. Raising the third brush does not render the generator inoperative and it should never be run this way. Two brushes must be raised. If the generator is to be run with the battery disconnected, remove the relay cover and connect the two screws holding the relay to the generator frame. If the generator cuts in late and does not produce over 7 amperes at peak, a short exists in the armature or the light shunt field is open. If the generator cuts in late and the output continues to increase at speeds over 2000 R.P.M. the heavy shunt field is open. If the output exceeds 11 amperes at 3000 R.P.M. but does not exceed the peak, the heavy shunt field is shorted. The drive end bearing for the generator is in the engine and the machine must not be run on the bench until a special bearing is bolted on. This is Owen-Dyneto Part No. 22196.

Mounting:—Generator is flange mounted at right of engine. To remove generator, remove three flange mounting screws and pry the generator to the rear, using a screwdriver to separate the generator from the bronze plate which must be left in the engine. Be careful not to disturb the plate or the timing chain will be disturbed, making it necessary to set valve timing of the engine.

Oiling:—Drive end bearing of the generator is oiled by splash from the chain case. Put 4 or 5 drops of light engine oil in the commutator end bearing every month or each 1000 miles.

RELAY:—Relay is mounted on top of the generator. Relay closes at 385-400 R.P.M. when the voltage of the generator reaches 6.2 volts and opens with a discharge current of 0-2 amperes. Relay contacts separate .015 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING:—Delco-Remy Switch Model 1317. Lighting switch is mounted at base of steering column. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp filament instead of dimming. Auxiliary head lamps (in head lamps) are 6-8 volt, 3 cp. D.C. Dome lamp is 6-8 volt, 3 cp. S.C. Dash, tail and tonneau lamps are 6-8 volt, 3 cp. S.C. Stop and backing lamps are each 6-8 volt, 21 cp. S.C.

CIRCUIT BREAKER:—Model 5773. A vibrating circuit breaker is mounted on the dash. It begins to operate at 20-30 amperes limiting the current to 12-15 amperes. Circuit breaker contacts separate .012-.030 inch.

PACKARD

MODELS 4-36, 4-33 (1927-28)
OWEN-DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type A-617-SH, 6 volt. Starting capacity is 170 amperes for 20 minutes. Lighting capacity is 5 amperes for 32 hours. The positive (+) terminal is grounded. Battery is mounted in special compartment built in right front fender.

IGNITION:—Coil Model 552-A. Distributor Model 4030. Breaker contacts separate .0225-.0275 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 40° (flywheel). Automatic advance begins at 700 R.P.M. (engine) and reaches a maximum of 20° (flywheel) at 2200 R.P.M. of the crankshaft. The breaker has two sets of contacts mounted at an angle of 45° operating on a four sided cam and opening alternately at intervals of 45° corresponding to 90° of crankshaft rotation. This firing interval must be accurately set (see Timing). Breaker arm spring tension is 16-20 ounces.

Mounting:—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and manual advance control rod. Then remove manual advance stop screw and lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oilers on the side of the distributor housing every two weeks or each 500 miles. Place a small bit of heavy grease on the face of the breaker cam every month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 1⅝ inches (on the flywheel) before top dead center with the spark control lever in the fully advanced position. With piston No. 1 in this position the flywheel mark 'UDC- Cyl. 1 & 8' will be 1⅝ inches before the indicator on the flywheel housing. To set timing, crank engine until piston No. 1 reaches firing position. Make certain that the spark control lever is fully advanced. If breaker contacts are not beginning to separate, loosen manual advance arm clamp screw and rotate distributor until contacts mounted on stationary plate begin to separate. Tighten the clamp screw. Check the second set of contacts with Delco-Remy Part No. 822572. This is a special gauge which fits on the shaft in place of the regular firing cam. Turn gauge so that bumper of stationary set of contacts fits in notch. If bumper of second set of contacts does not rest in notch, loosen two lockscrews on mounting plate and shift plate until proper setting is reached. Tighten the lockscrews.

Firing Order:—The firing order is 1-3-2-5-8-6-7-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are 1/32 inch.

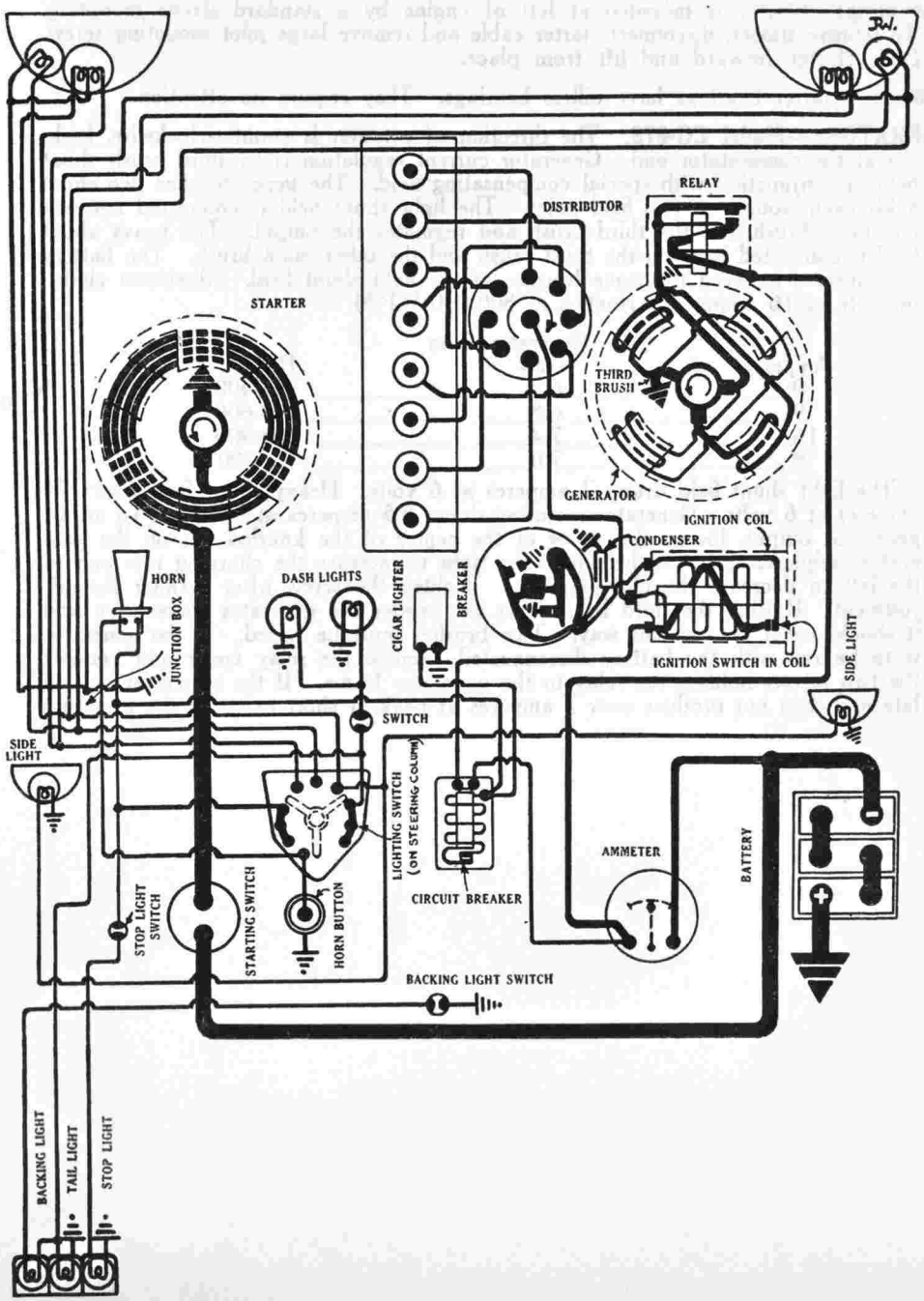
STARTER:—Model DM. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The starter is a six pole two brush machine with one field coil which is so constructed that it winds around three sides of each pole alternately so each pole is surrounded by a 'U' shaped section of the coil.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	6	50
35 "	Lock	3.5	650

Mounting:—Starter is mounted at left of engine on forward side of flywheel housing by sleeve mounting. To remove starter, disconnect starter cable and remove large pilot mounting screw. Then slide starter forward and lift from place.

Oiling:—Starter bearings are fitted with oilless bushings. They require no attention.



PACKARD

MODELS 4-36, 4-33 (1927-28)
OWEN-DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

GENERATOR:—Model CG-678. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field with special compensating field. The generator has two shunt fields. A light shunt field is connected between the negative main brush and the third brush across which the battery is connected. The heavy shunt field is connected between the third brush and the positive main brush. The maximum charging rate is 16 amperes reached at 800-900 R.P.M.

Generator Data

Amperes	Volts	R.P.M.
0	6.2	385-400
9	6.8	550-600
16	7.4	800-900
8	7.0	2500

The light shunt field draws 2 amperes at 6 volts. The heavy shunt field draws 75 amperes at 6 volts. Generator motoring draws 5.5 amperes at 6 volts. To adjust generator output, loosen the screw in the center of the knurled nut on the generator endplate and turn the nut in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Raising the third brush does not render the generator inoperative and it should never be run in this condition. Two brushes must be raised. If it is necessary to run the car with the battery disconnected, remove the relay cover and bridge the two screws which hold the relay to the generator frame with a short wire. If the generator cuts in late and does not generate more than 7 amperes at peak, the armature is shorted or the light shunt field is open. If the generator cuts in late and the output continues to increase at speeds over 2000 R.P.M. the heavy shunt field is open. If the output exceeds 11 amperes at 3000 R.P.M. but does not exceed the peak output, the heavy shunt field is shorted. The drive end bearing is in the engine and the generator must not be run on the test bench until a special bearing is bolted on. This is Owen-Dyneto Part No. 22196.

Mounting:—Generator is flange mounted at the right of the engine on the rear of the timing chain case. To remove generator, remove three flange mounting screws and pry generator to the rear, using a screwdriver to separate generator from bronze plate. The bronze plate must be left in the engine or the timing chain will be disturbed, making it necessary to retime the valves.

Oiling:—The drive end bearing is oiled by splash from the chain case. Put 4 or 5 drops of light engine oil in the commutator end oiler every month or each 1000 miles.

RELAY:—Relay is mounted on top of the generator. Relay closes at 385-400 R.P.M. when the generator voltage reaches 6.2 volts and opens with a discharge current of 0-2 amperes. Relay contacts separate .015 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING:—Delco-Remy Switch Model 1317. Lighting switch is mounted at base of steering column. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Auxiliary lamps (in head lamps) are 6-8 volt, 3 cp. D.C. Dome lamp is 6-8 volt, 3 cp. S.C. Dash, tail and tonneau lamps are each 6-8 volt, 3 cp. S.C. Stop and backing lamps are each 6-8 volt, 21 cp. S.C.

CIRCUIT BREAKER:—Model 5773. A vibrating circuit breaker is mounted on the dash. It cuts in at 20-30 amperes and operates with 12-15 amperes flow across a dead short circuit. Circuit breaker contacts separate .010-.030 inch.



PACKARD

MODELS 526-533 (1928)
OWEN-DYNETO GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite. Type A-613-SH. Starting capacity (20 minute rate) is 130 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22½ hours. The positive (+) terminal is grounded. Battery is mounted in special compartment built in right front fender.

IGNITION:—Coil Model 552-A. Distributor Model 656-J. Breaker contacts separate .020-.024 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 40 degrees (engine). Automatic advance starts at 600 R.P.M. and reaches a maximum of 20 degrees (engine) at 2200 R.P.M. of the crankshaft. Breaker has two sets of contacts operating on a three sided cam opening alternately at intervals of 60 degrees corresponding to 120 degrees of crankshaft rotation. This firing interval must be accurately set (see Timing). Breaker arm spring tension is 17-21 ounces.

Mounting:—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and manual advance rod. Then remove advance stop screw and lift distributor from place.

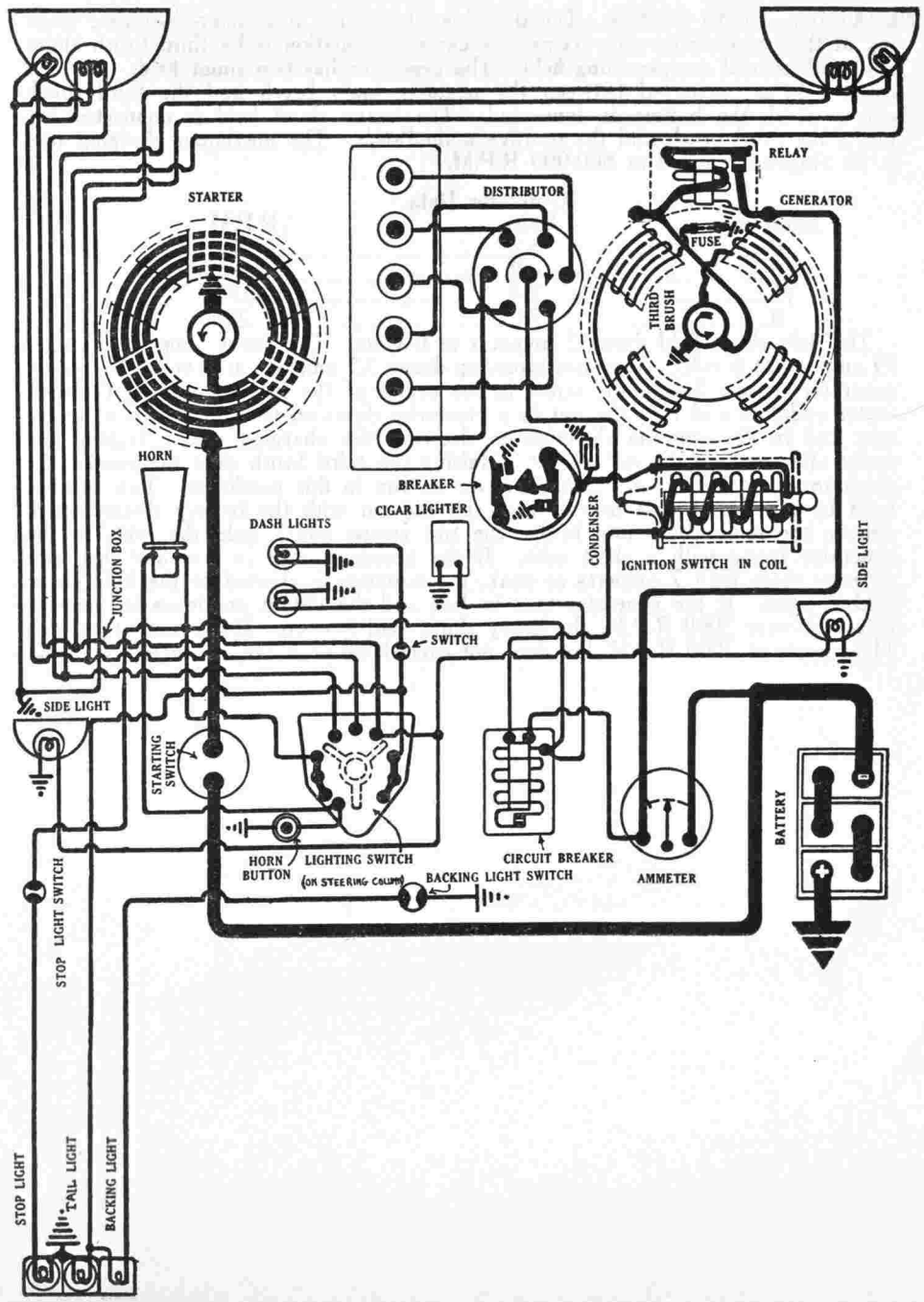
Oiling:—Fill the grease cup under the distributor head and turn down two turns every two weeks or each 500 miles. Place a small bit of vaseline on the face of the breaker cam every 1000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 2 inches before top dead center (on the flywheel) with the spark control lever in the fully advanced position. With piston No. 1 in this position the flywheel mark "UDC Cyl. 1 & 6" will be 2 inches before the indicator on the flywheel housing. To set timing, crank engine until piston No. 1 reaches the firing position. Make certain that manual spark control lever is in the fully advanced position. If breaker contacts are not beginning to separate, loosen advance arm clamp screw and rotate distributor until contacts on stationary breaker begin to separate. Tighten the clamp screw. Use special Delco-Remy Part No. 820751 to check second set of breaker contacts mounted on movable plate. Place the synchronizing gauge on the cam placing the clamp on the flat side of the cam with slot in shaft toward left side of gauge. Turn shaft in clockwise direction until graduations on left scale are near slot in distributor housing. Continue to turn shaft and note reading on scale opposite the edge of the slot when stationary set of contacts separate. Continue to rotate shaft until same reading on the other scale is opposite the slot in the distributor. In second set of contacts are not separating, loosen two lockscrews on mounting plate and turn eccentric adjusting screw until contacts separate. Tighten the two lockscrews. Use a test lamp or the dash ammeter to note instant the contacts separate. The contact gap must be kept within the limit of .020-.024 inch This must be checked after setting timing.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are ⅞ inch Special, Type Z. Gaps .025 inch.

STARTER:—Model DH-695. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The starter is a six pole, two brush machine having one field coil which is so constructed that it winds around three sides of each pole alternating from one to the next so that each pole is surrounded by a "U" shaped section of the coil.



PACKARD

MODELS 526-533 (1928)
OWEN-DYNETO GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	6	60
25 "	Lock	3.5	650

Mounting:—Starter is mounted at left of engine by a standard sleeve mounting. To remove starter, disconnect starter cable and remove large pilot mounting screw. Slide starter forward and lift from place.

Oiling:—Starter bearings are fitted with oilless bushings. They require no attention.

GENERATOR:—Model CD-777. Generator is a four pole straight shunt field generator with third brush control. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, turn the slotted screw on generator frame to shift third brush. Turn the screw in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. With standard car setting, the maximum charging rate is 16 amperes at 8 volts reached at 1000 R.P.M.

Generator Data (cold)

Amperes	Volts	R.P.M.
0	6.4	450
9	7.2	750
16	8	1000
7	7	3500

Motoring generator draws 7 amperes at 6 volts. Shunt flield current is 4 amperes at 6 volts. Brush spring tension is 3 lbs. A five ampere field fuse is located on the commutator end plate of the generator. The generator drive end bearing is located in the engine.

Mounting:—Generator is mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and remove 3 flange mounting cap screws. Pry generator to the rear being careful not to disturb plate between generator and chain case which carries generator bearing and drive sprocket. If this is removed the timing of the valves will be disturbed. The generator must not be run on the test stand without bolting a special bearing on the drive end. This can be secured from the Owen-Dyneto Corporation and is their part No. 22196.

Oiling:—Drive end bearing of the generator is oiled by splash from the chain case. Put 4 or 5 drops of light engine oil in the commutator end bearing every month or each 1000 miles.

RELAY:—Type 20058. Relay is mounted on top of the generator. Relay closes at 385-400 R.P.M. when the voltage of the generator reaches 6.2 volts and opens with a discharge current of 0-2 amperes. Relay contacts separate .015 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING:—Delco-Remy Switch, Model 1317. Lighting switch is mounted at base of steering column. Headlights are 6-8 volt, 21-21 cp. (double filament-double contact). Auxiliary head lights are 6-8 volt, 6 cp. S.C. Dome light is 6-8 volt, 6 cp. S.C. Dash, tail and tonneau lights are 6-8 volt, 3 cp. S.C. Stop and backing lights are each 6-8 volt, 21 cp. S.C.

CIRCUIT BREAKER:—Delco-Remy Model 410-C. A vibrating vircuit breaker is mounted on the dash. It begins to operate at 20-30 amperes limiting the current to 2-15 amperes. Circuit breaker contacts separate .012-.030 inch.

PACKARD

MODEL 433 (1928)
OWEN-DYNETO GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite. Type A-617-SH. 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 170 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 32 hours. Battery is mounted in special compartment built in right front fender.

IGNITION:—Coil Model 553-A. Distributor Model 4033. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 40 degrees (on flywheel). Automatic advance begins at 700 R.P.M. (engine) and reaches a maximum of 20 degrees (flywheel) at 2000 R.P.M. of the crankshaft. The breaker has two sets of contacts mounted at an angle of 135 degrees on a four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. Each set of contacts control one coil and fire the plugs in four cylinders. The firing interval must be accurately set to secure proper performance. See Timing. Breaker arm spring tension is 17-21 ounces.

Mounting:—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and manual advance control rod. Then remove manual advance stop screw and lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oilers on the side of the distributor housing every two weeks or each 500 miles. Place a small bit of heavy grease on the face of the breaker cam every month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position of 1⅝ inches (on flywheel) before top dead center with the spark control lever in the fully advanced position. With piston No. 1 in this position the flywheel mark "UDC Cyl. 1 & 8" will be 1⅝ inches before the indicator on the flywheel housing. To set timing, crank engine until piston No. 1 reaches firing position. Make certain that the spark control lever is fully advanced. If breaker contacts are not beginning to separate, loosen manual advance arm clamp screw and rotate distributor until contacts mounted on stationary plate begin to separate. Tighten the clamp screw. Check the second set of contacts with Delco-Remy tool Part No. 822965. This is a special gauge which fits on the shaft in place of the regular firing cam. Turn gauge so that bumper of stationary set of contacts fits in notch. If bumper of second set of contacts does not rest in notch, loosen two lockscrews on mounting plate and shift plate until proper setting is reached. Tighten the lockscrews.

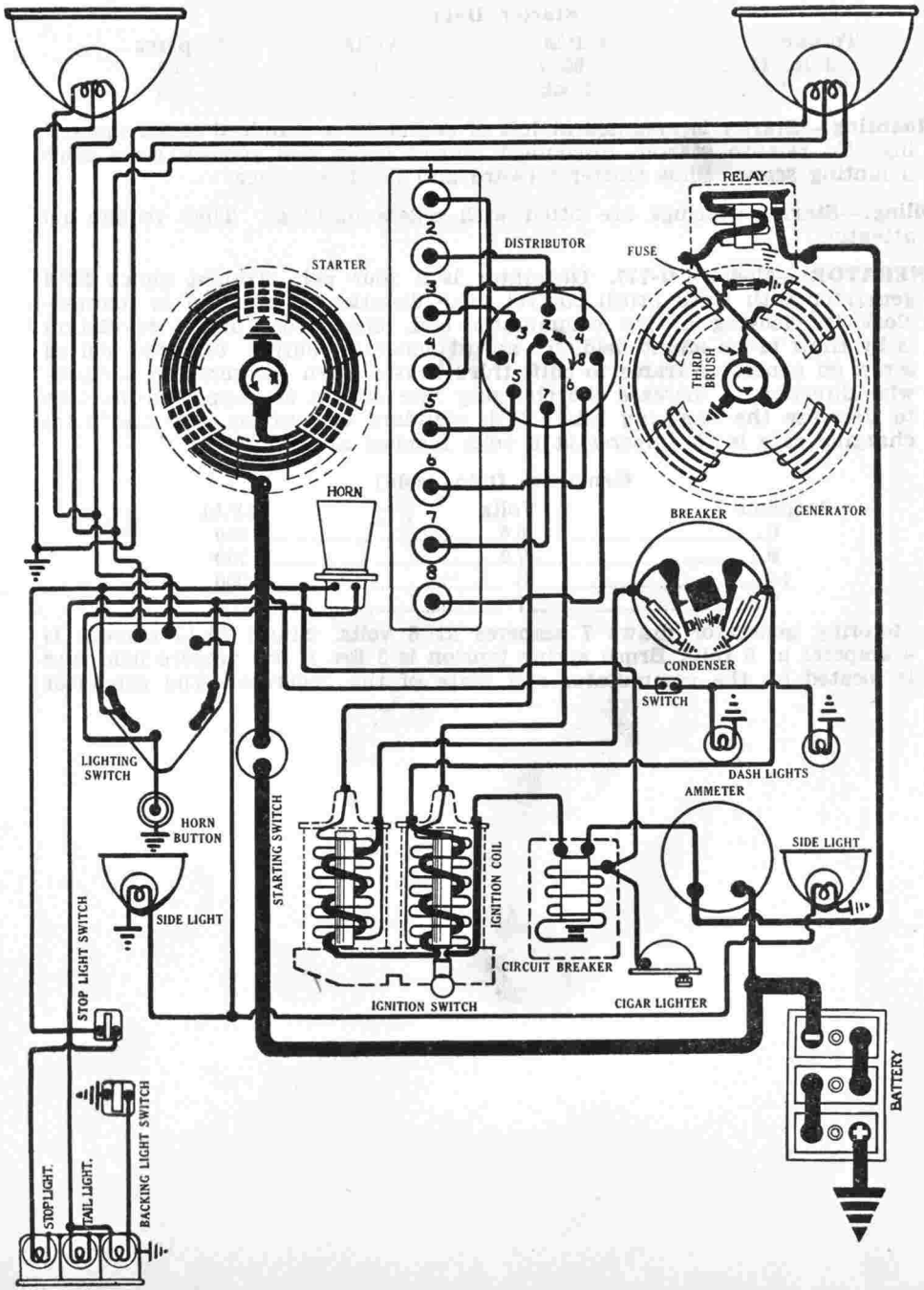
Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are ⅞ inch Special Type Z. Gaps are .025 inch.

STARTER:—Model DM-696. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The starter is a six pole two brush machine with one field coil which is so constructed that it winds around three sides of each pole alternately so each pole is surrounded by a "U" shaped section of the coil.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	6	50
35 "	Lock	3.5	650



PACKARD

MODEL 433 (1928)
OWEN-DYNETO GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

Mounting:—Starter is mounted at left of engine on forward side of flywheel housing by sleeve mounting. To remove starter, disconnect starter cable and remove large pilot mounting screw. Then slide starter forward and lift from place.

Oiling:—Starter bearings are fitted with oilless bushings. They require no attention.

GENERATOR:—Model CD-800. Generator is a four pole straight shunt field generator with third brush control. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush shunt field. To adjust generator output, turn slotted screw on generator frame to shift third brush. Turn the screw in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. With standard car setting, the maximum charging rate is 16 amperes at 8 volts reached at 1000 R.P.M.

Generator Data

Amperes	Volts	R.P.M.
0	6.4	450
9	7.2	750
16	8	1000
7	7	3500

Motoring generator draws 7 amperes at 6 volts. Shunt field current is 4 amperes at 6 volts. Brush spring tension is 3 pounds. A five ampere field fuse is located on the commutator end plate of the generator. The generator end bearing is located in the engine.

Mounting:—Generator is mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and remove 3 flange mounting cap screws. Pry generator to the rear being careful not to disturb plate between generator and chain case which carries generator bearing and drive sprocket. If this is removed the timing of the valves will be disturbed. The generator must not be run on the test stand without bolting a special bearing on the drive end. This can be secured from the Owen-Dyneto Corporation and is their part No. 22196.

Oiling:—Drive end bearing of the generator is oiled by splash from the chain case. Put 4 or 5 drops of light engine oil in the commutator end bearing every month or each 1000 miles.

RELAY:—Type 20030. Relay is mounted on top of the generator. Relay closes at 385-400 R.P.M. when the voltage of the generator reaches 6.2 volts and opens with a discharge current of 0-2 amperes. Relay contacts separate .015 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING:—Delco-Remy Switch Model 1317. Lighting switch is mounted at base of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact). Auxiliary head lights are 6-8 volt, 6 cp. S.C. Dome light is 6-8 volt, 6 cp. S.C. Dash, tail and tonneau lights are 6-8 volt, 3 cp. S.C. Stop and backing lights are 6-8 volt, 21 cp. S.C.

CIRCUIT BREAKER:—Delco-Remy Model 410-C. A vibrating circuit breaker is mounted on the dash. It begins to operate at 20-30 amperes limiting the current to 2-15 amperes. Circuit breaker contacts separate .012-.030 inch.

PAIGE

MODEL 6-46 (1915-16). SERIAL NOS. 55,000 TO 69,999
GRAY & DAVIS GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

Battery—Battery is 6 volt, 85 ampere-hour. The positive (+) terminal is grounded at the starting switch.

Ignition.—Breaker contacts should separate .020 inch to .025 inch. Should they become badly burned or pitted, affecting the ignition, resurface them with a fine, flat jeweler's file or a strip of worn No. 00 sand paper.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be .025 inch.

Oiling.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If car is driven more than 500 miles in two weeks, these attentions should be given every 500 miles.

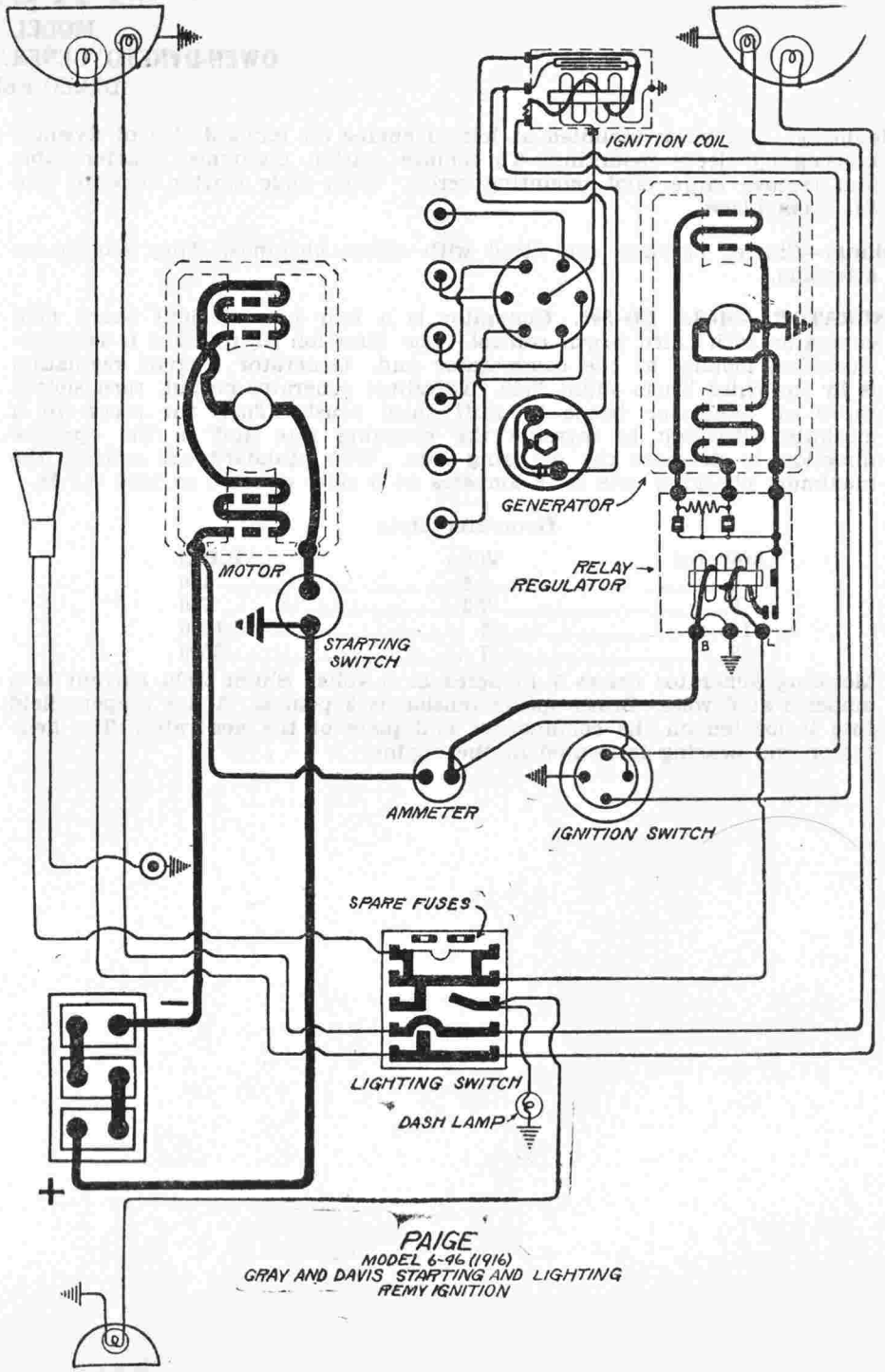
Starter.—Starter is connected to the engine through a Bendix drive. When operating freely, starter type 120 should take 35 amperes, armature revolving 2200 R. P. M., at 3 volts, 4500 R. P. M., at 5.5 volts and 5000 R. P. M., at 6 volts pressure. A variation of 25% in current reading is allowable. High current and low speed indicates damp, grounded or short circuited armature winding, field coils or commutator bars. High speed indicates damp, grounded or short circuited field coils or pole pieces loose in the frame. Starter should take about 100 amperes when delivering 1.5 pound-feet torque, armature turning at 1660 R. P. M., voltage being 5¾ volts, specific gravity of battery 1.250 or above. Brush pressure on commutator should be 2¼ pounds.

Oiling.—Put 4 or 5 drops of light engine oil in each of the starter oilers every month.

Generator.—Generator voltage regulation is by a vibrating regulator. Relay is combined with the regulator. With a 7½ lamp load generator type 210 should charge battery at 1 to 6 amperes and generator type 222, 240 and 250 at 1 to 4.5 amperes. Total generator output with a 7½ ampere lamp load should be 8.5 to 12 amperes, depending on the state of charge of battery. When operating freely as a motor, generator should take 3 amperes, armature revolving at 320 R. P. M., on type 210 and at 335 R. P. M., on types 222, 240 and 250. A variation of 10% from these amounts is allowable. Higher speed indicates damp, grounded or short circuited field coils, or pole pieces loose in the frame. Low speed and high current indicates damp, grounded or short circuited armature windings or commutator bars. Moving of the ammeter needle at low speed indicates grounded or short circuited armature coils or commutator bars. To test generator, connect together the three terminals on top of the frame, leading from field and armature to the regulator to give full field current and drive armature of types 210 at 750 R. P. M., or that of types 222, 240 or 250 at 700 R. P. M. Generator should deliver 10 amperes, 7½ ampere lamp load and battery reading 1.250 or above, in the circuit. If it will not, remove the regulator and with terminals still connected, test again. If it then delivers the required output, adjust the regulator. If it will not, test for grounded, short circuited or damp armature windings or commutator bars, or pole pieces loose in the frame and see that commutator and brushes are in good order. Shunt field of type 210 generator should take 1.09 to 1.32 amperes, that of type 222, .77 to 1.02 amperes, that of type 240, 1.54 to 2.04 amperes and that of type 250, 2.04 to 2.30 amperes.

Adjusting Regulator.—To adjust regulator, hold the upper pair of contacts apart while the lower set is adjusted until the output falls within the desired limits. Then hold the lower pair apart while the upper set is adjusted. Then allowing both sets to operate together, the desired output should result. Generator armature should be driven at 1750 R. P. M., when adjusting regulator. Clean relay contacts by drawing a piece of unglazed paper between them. If burned or pitted, resurface with a piece of well worn No. 00 sand paper, drawing a piece of unglazed paper between them to remove all grit and adjusting before again putting into service. The air gap between the regulator armature (moving member) and coil core should be .030 inch.

Lamps.—Head lamps are 6-8 volts, 15 cp. Dimmer lamps are 6-8 volts, 4 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.



PAIGE

MODEL 6-38 (1916). SERIAL NOS. 85,000 TO 89,923
GRAY & DAVIS GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

Battery.—Battery is 6 volt, 85 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate .020 inch to .025 inch. Should they become badly burned or pitted, affecting the ignition, resurface them with a fine, flat jeweler's file or a piece of worn No. 00 sand paper.

Timing.—Contacts should begin to separate when the top dead center mark "DC 1 & 6" on the flywheel is 1¼ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be .025 inch to .030 inch.

Oiling.—Refill the cup under the distributor head with soft cup grease and turn down every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If car is driven more than 500 miles in two weeks, these attentions should be given every 500 miles.

Starter.—Starter is connected to the engine through a Bendix drive. When operating free, it should take 35 amperes, armature revolving at 2200 R. P. M., with 3 volts pressure, 4500 R. P. M., at 5.5 volts pressure and 5000 R. P. M., at 6 volts pressure. A variation of 10% from these amounts is allowable, but never more. Excessive speed indicates damp, grounded or short circuited field coils. High current and low speed indicates damp, grounded or short circuited field coils or commutator bars. Brush pressure on commutator should be 2¼ pounds. When delivering 1½ pound-feet torque, motor should revolve at 1660 R. P. M., taking 100 amperes at 5¾ volts, specific gravity of battery 1.250 or above.

Oiling.—Put several drops of light engine oil in each of the starter oilers every month.

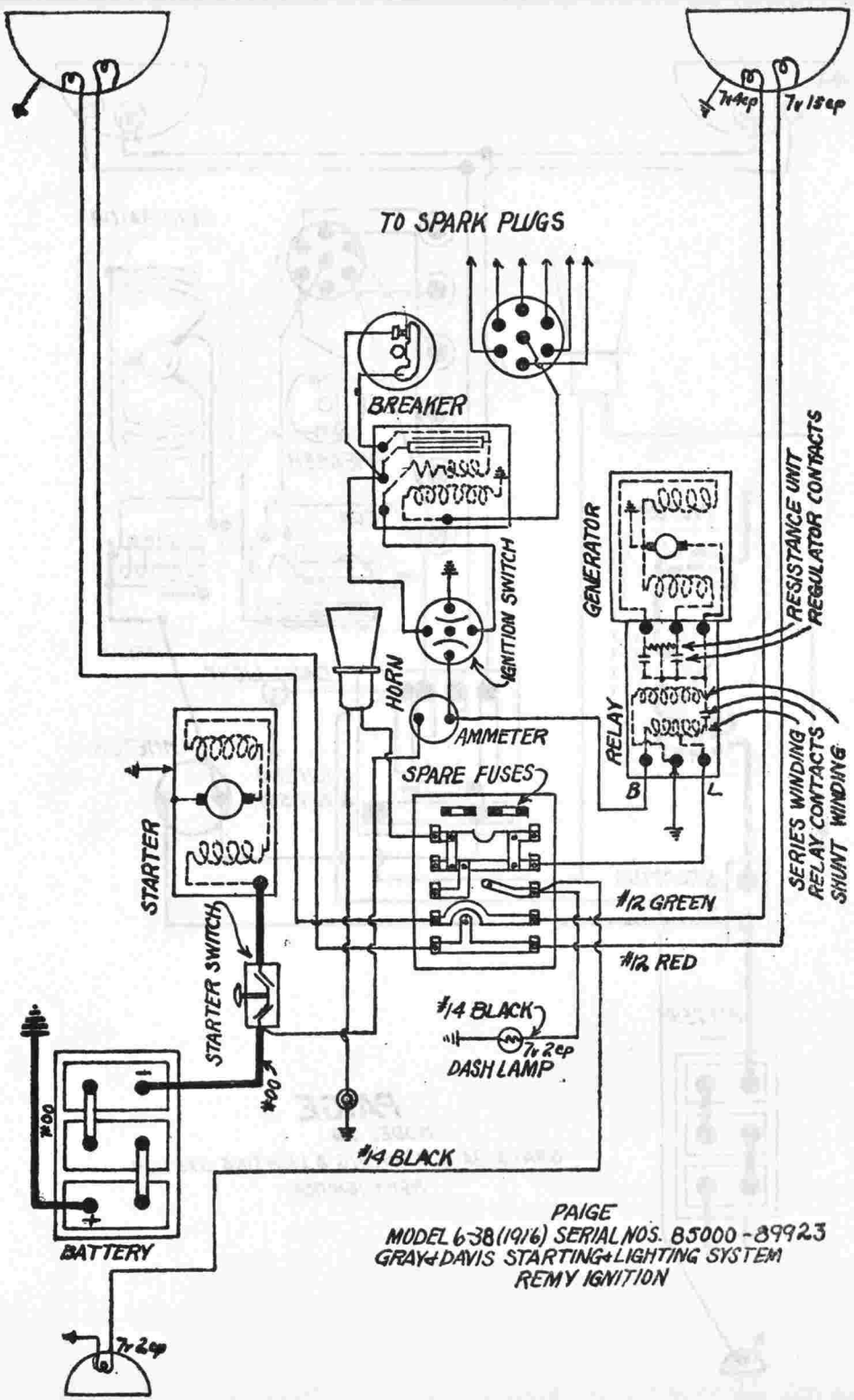
Generator.—Generator voltage regulation is by a vibrating regulator. If operated freely as a motor, generator No. 210 should take 3 amperes, armature revolving at 320 R. P. M. No. 222 should take 3 amperes, armature revolving at 350 R. P. M. A variation of 10% from these amounts is allowable, but never more. Greater speed indicates damp, grounded or short circuited field coils. Slow speed and excessive current indicates damp, grounded or short circuited armature windings or commutator bars. Periodic swinging of the ammeter needle indicates grounded armature coils or commutator bars. With a 7½ ampere lamp load, generator No. 210 should charge battery at 1 to 6 amperes and generator No. 222 at 1 to 4.5 amperes, depending on state of charge of the battery. To test generator, connect the three terminals on top of the generator leading from the armature and field to the regulator, to give full field current, and run generator No. 222 at 700 R. P. M., or No. 210 at 750 R. P. M. It should deliver 10 amperes at this speed. If it does not, remove regulator and with terminals still connected test again. If it will not then deliver the required output, test for grounded, short circuited or damp field or armature coils or commutator bars. If necessary, adjust the regulator.

Adjusting Regulator.—To adjust regulator, hold the upper contacts apart and adjust the lower set until the output falls within the desired limits. Then hold the lower set apart while the upper set is adjusted and allow both sets to operate together. The output should be the desired rate. Clean regulator contacts by drawing a piece of unglazed paper between them. If burned or pitted, resurface with a piece of well worn No. 00 sand paper, drawing a piece of unglazed paper between them, to remove all grit, and adjust, before again putting into service.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 15 cp. Dimmer lamps are 6-8 volts, 5 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.

Fuses.—Fuses are 20 ampere.



PAIGE
MODEL 6-39 (1917-18)
GRAY AND DAVIS GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Battery is 6 volt, 117 ampere-hour. The positive (+) terminal is grounded

IGNITION.—Breaker contacts should separate .020 to .025 inch. When the condition of the contacts affects the ignition, resurface with a fine flat jeweler's file or worn No. 00 sandpaper. Ignition takes 3.5 amperes, engine stopped, contacts and switch closed.

TIMING.—Contacts begin to separate when the top dead center mark on the flywheel is ½ inch before indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

STARTER.—Model No. 120. Starter is connected to the engine through a Bendix drive. When operating freely, starter current is 35 amperes at 3 volts, armature revolving 2200 R.P. M. With the same current starter runs 4500 R.P. M. at 5.5 volts, and at 5000 R.P.M. at 6 volts. The torque is 1½ pound-feet at 1660 R.P.M., with 5¾ volts. Brush pressure on commutator is 2¼ pounds.

OILING.—Put 4 or 5 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Model No. 400. Generator current regulation is by third brush.

Generator Data

Ampere Output	Generator R. P. M.	Miles Per Hour
2	450	7
4	525	8
6	590	9
8	650	10
10	710	11
12	820	13
14	1050	16
15	1400	22
12	2250	35
8	3600	55

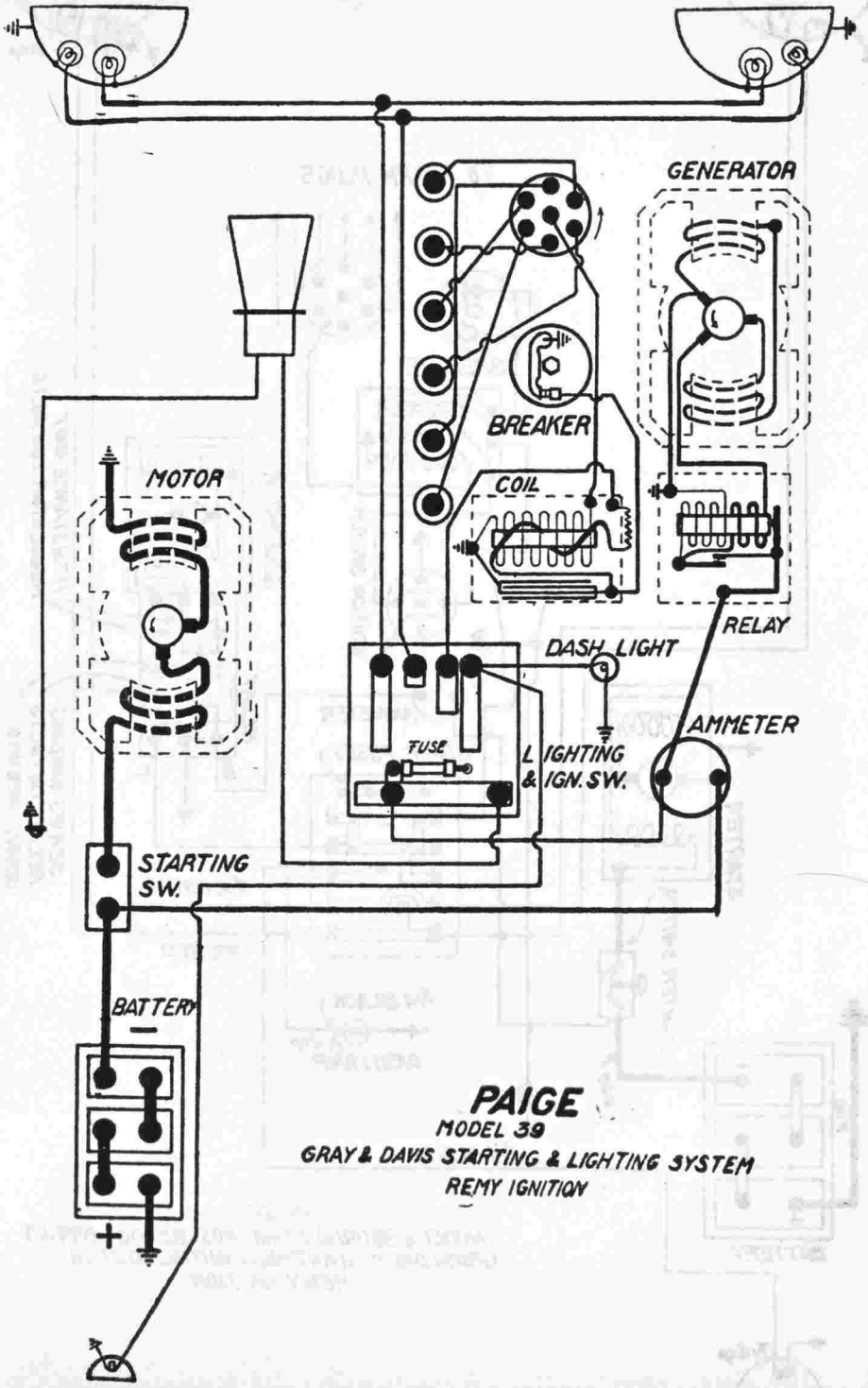
OILING.—Put 4 or 5 drops of light engine oil in each of generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 7 miles per hour and opens at 5 miles per hour. Charging current is 1 to 3 amperes at closing, and the discharge current 0 to 2 amperes at opening of relay contacts. Contacts separate .015 inch. Minimum air gap between armature (moving member) and coil core is .020 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

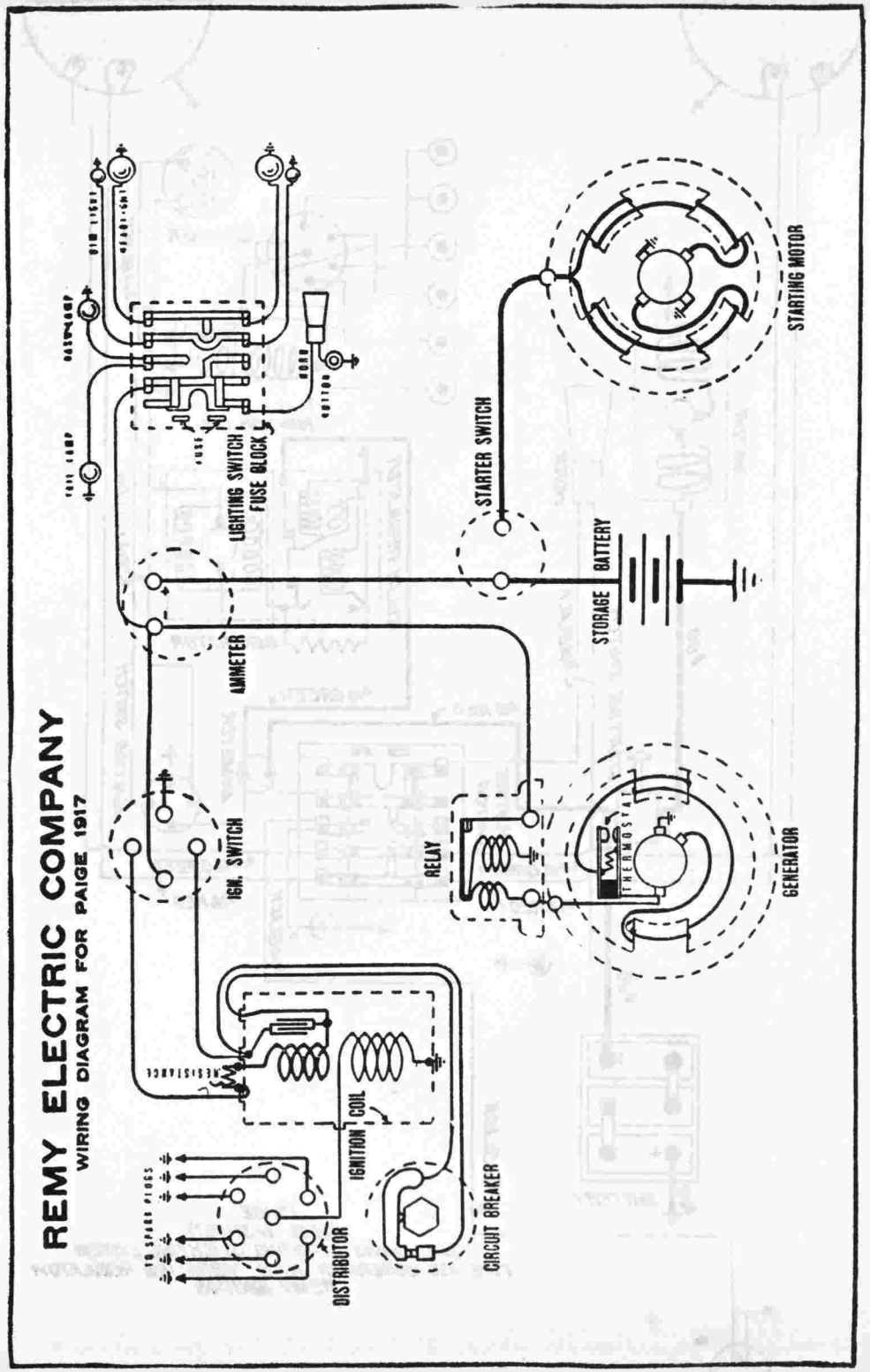
LAMPS.—Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

FUSES.—Fuse is 20 ampere.

MODEL NUMBERS.—Starter is Model 120. Generator is Model 400. Battery is Willard SL4.



PAIGE
MODEL 39
GRAY & DAVIS STARTING & LIGHTING SYSTEM
REMY IGNITION



Paige-Detroit

Model 6-51 (1917)

Remy Generating, Starting and Lighting System

Remy Ignition

Battery.—Battery is 6 volt, 110 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts should separate .020 to .025 inch. If burned or pitted, affecting the ignition, resurface them with a very fine, flat jeweler's file or a strip of worn No. 00 sand paper.

Timing.—Breaker contacts should separate when flywheel marking "DC 1-6" is 1¼ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be .030 to .032 inch.

Oiling.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions should be given every 500 miles.

Starter.—Starter is connected to the engine by a Bendix drive.

STARTER DATA, NO. 298-A

Torque	R. P. M.	Amperes	Volts
0 lb. ft.	3850	45	6.0
1 lb. ft.	1800	95	5.7
4 lb. ft.	1070	195	5.0
7 lb. ft.	660	290	4.6
9 lb. ft.	475	350	4.4
12 lb. ft.	250	425	3.9
15-17 lb. ft.	Lock	500	3.6

Oiling.—Put 5 or 6 drops of light engine oil in starter bearings every month.

Generator.—Generator current regulation is by third brush method. A thermostat located in the brush rigging of the generator cuts in a resistance at a temperature of 175° F., reducing the maximum charging rate 6 amperes. Resistance also acts as a shunt field fuse. The thermostat is intended to change the charging rate as demand of seasons or car operation requires. Never touch the thermostat points.

GENERATOR DATA, NO. 257-A

Amperes	R. P. M.	Volts
0	375- 410	6.4
1	405- 415	6.8
5	420- 570	7.2
10	650- 720	7.6
16	850- 870	8.1
19.5-20.5	1200-1500	8.2
16.2-19.2	2000	8.2
9.3-11.7	3000	7.7

Above tests made with relay in circuit and thermostat points closed, but without ignition. Operating freely as a motor, generator runs at 250 R. P. M., drawing 4.5 amperes at 5.9 volts. Shunt field takes 3.5 amperes at 6.85 volts.

Oiling.—Put 5 or 6 drops of light engine oil in generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—Relay should close at 6-8 miles per hour and open at 5-7 miles per hour. Gap between relay contacts should be .012 to .015 inch. Air gap between relay armature (moving member) and coil core should be .012 to .015 inch. Clean relay contacts by drawing unglazed paper between them. It badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are 6-8 volt, 2 cp.

Fuses.—Fuses are 20 ampere.

Model Numbers.—Generator is No. 257-A. Starter is No. 298-A. Ignition coil is

Paige

Model 6-51 (1917)

Gray and Davis Starting and Lighti ng System (Type 250 Generator with Vibrator Regulator) Remy Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate .020 inch to .025 inch. Should they become badly burned or pitted, affecting the ignition, resurface them with a fine, flat jeweler's file or a piece of worn No. 00 sand paper.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in fully retarded position.

Firing Order.—Firing order should be 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—The spark plug gaps should be .025 inch.

Oiling.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions should be given every 500 miles.

Starter.—Starter is Type 120. It is connected to the engine through a Bendix drive. Starter should run at 2200 R. P. M., when taking 35 amperes at 3 volts pressure. It should run at 4500 R. P. M., with the same current under 5.5 volts, and at 5000 R. P. M., with 6 volts. It should deliver 1½ pound-feet torque, when running at 1600 R. P. M., and drawing 100 amperes. Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current. Minimum pressure of motor brushes on commutator should be 2¼ pounds.

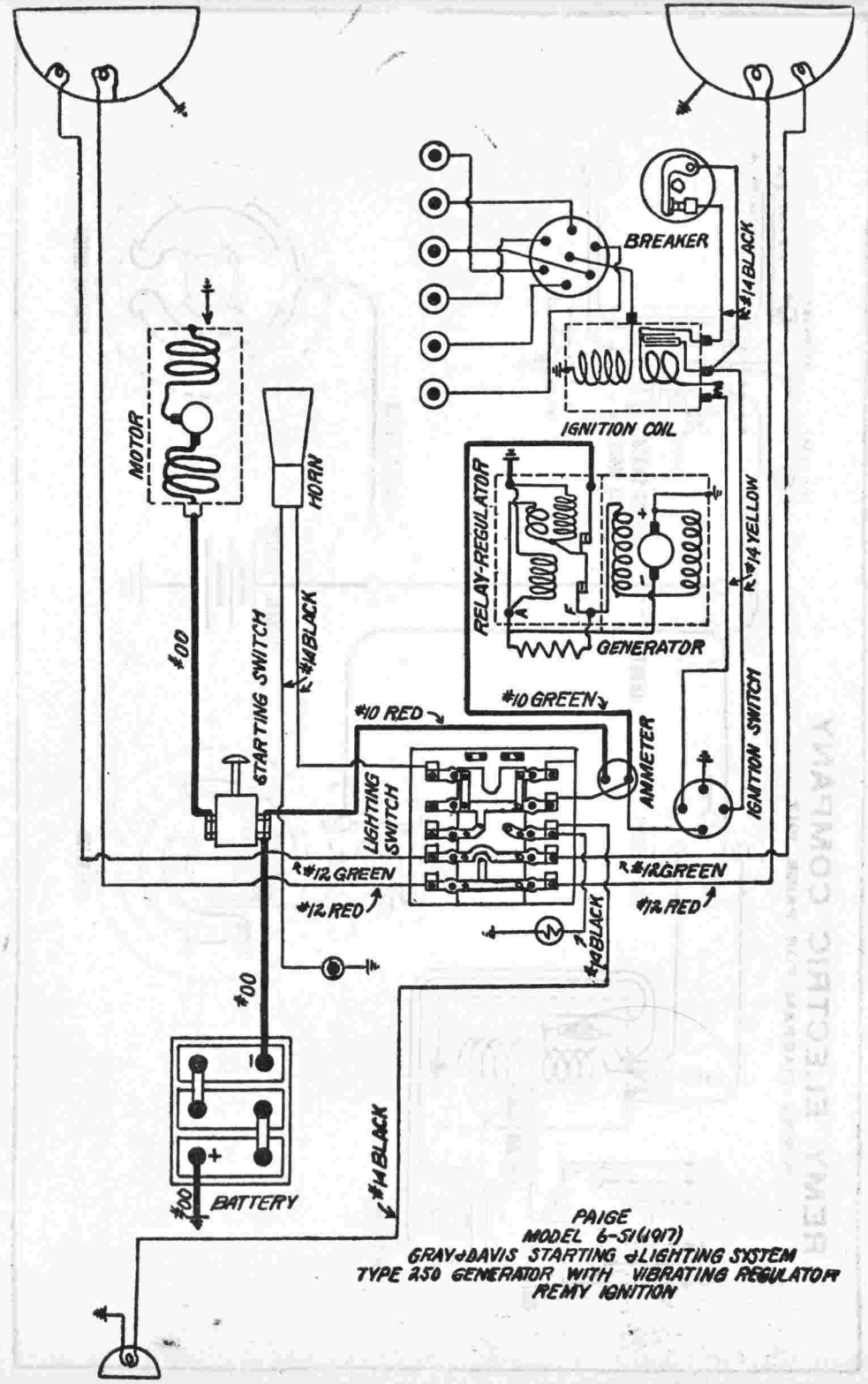
Oiling.—Put 4 or 5 drops of light machine oil in each of the starter bearings oilers every month.

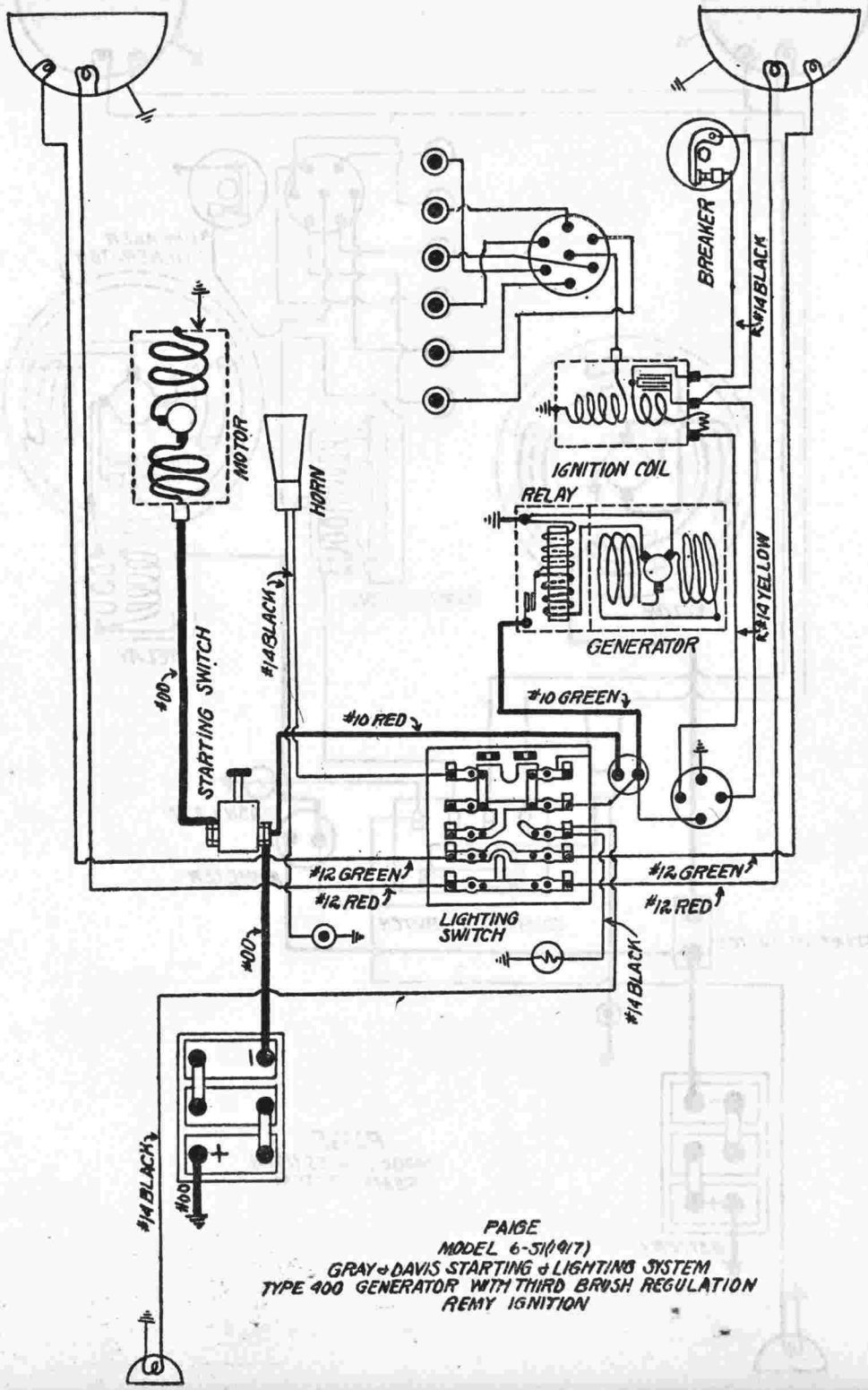
Generator.—Type 250 generator is used. Voltage regulation is by vibrating regulator Normal maximum output should be 10 amperes at 700 R. P. M. With a 7½ ampere. lamp load the charging current to battery should be 1-4.5 amperes. The total output, with 7½ ampere lamp load, should be 8.5 to 11 amperes. Charging rate will vary with condition of battery, being highest when battery is discharged and decreasing as the specific gravity rises. When operating freely as a motor, the generator should run at 335 R. P. M., drawing 3 amperes at a pressure of 6 volts. Shunt field should take 2.04 to 2.30 amperes at 6 volts.

Oiling.—Put 4 or 5 drops of light machine oil in each of the generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay-Regulator.—Relay is combined with regulator. Relay should close at 12 miles per hour. Charging current should be 9 amperes at closing. Relay contacts should separate .015 inch. Relay is adjustable by means of a knurled screw, which increases or decreases air gap. Regulator is adjusted in the same manner, by means of a screw at the opposite end of the relay-regulator. Turn to the right to increase the air gap and the maximum output of generator. Turn to the left to decrease the air gap and output. Minimum air gap between regulator armature (moving member) and coil core should be .045 inch. Clean relay-regulator contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a strip of worn No. 00 sand paper, and then draw a piece of unglazed paper between them to remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.





Paige

Model 6-51 (1917)

Gray and Davis Starting and Lighting System (Type 400 Generator with Third Brush Regulation) Remy Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts separate .020 inch to .025 inch. Should they become badly burned or pitted, affecting the ignition, resurface them with a fine, flat jeweler's file, or a piece of worn No. 00 sand paper.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be .025 inch.

Oiling.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions should be given every 500 miles.

Starter.—Starter is Type 120. It is connected to the engine through a Bendix drive. Starter should run at 2200 R. P. M., when taking 35 amperes at 3 volts pressure. It should run at 4500 R. P. M., with the same current under 5.5 volts, and at 5000 R. P. M., with 6 volts. It should deliver 1½ pound-feet torque, when running at 1600 R. P. M., and drawing 100 amperes. Cold engine, heavy oi, tight bearings or other obstructions, or damp, grounded or short circuited windings willl cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current. Pressure of motor brushes on commutator should be 2¼ pounds.

Oiling.—Put 4 or 5 drops of light machine oil in each of the starter bearing olers every month.

Generator.—Type 400 generator is used. Current regulation is by third brush method.

Amperes	Generator Data, Type 400	R. P. M.
2		480
4		530
6		590
8		650
10		720
12		820
14		1060
14.8		1400
14		1700
12		2400

Generator is driven at 1½ times engine speed. Position of third brush is adjustable by means of a rack and pinion movement operated by turning a screw accessible through an opening in the end plate. Turn screw to the right (clockwise) to increase the charging rate, or to the left (anti-clockwise) to decrease the charging rate.

Oiling.—Put 4 or 5 drops of light machine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—Relay should close when voltage of generator reaches 6.25 to 7.25 volts, and open when reverse current reaches 0 to 2 amperes. Relay contacts should separate .015 inch. Minimum air gap between armature (moving member) and coil core should be .020 inch. Clean relay contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a strip of well worn No. 00 sand paper, and then draw a piece of unglazed paper between them, to remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

PAIGE

MODEL 6-55 (1918-19)

Remy Generating, Starting and Lighting System
Remy Ignition

Battery.—Battery is 6 volt, 117 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts separate .020 inch to. 025 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper.

Timing.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .025 to .030 inch.

Oiling.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Starter.—Starter is connected to engine through a Bendix drive.

STARTER DATA. MODEL 306-A

Torque	R. P. M.	Amperes	Volts
1 lb. ft.	1850	110-115	5.3-5.5
2 lb. ft.	1400	158-165	5.1-5.3
3 lb. ft.	1150	200-210	4.9-5.1
4 lb. ft.	850	238-250	4.6-4.8
5 lb. ft.	700	275-285	4.4-4.6
15 lb. ft.	Lock	550-575	3.3-3.4

Oiling.—Put several drops of light engine oil in each of starter bearings every month.

Generator.—Generator current regulation is by third brush method. A thermostat located in the brush rigging of the generator, cuts in a resistance at a temperature of 175° F., reducing the maximum charging rate 6 amperes. Resistance also acts as a shunt field fuse. The thermostat is intended to change the charging rate as demand of seasons or car operation requires. Never touch the thermostat points.

GENERATOR DATA. MODEL 257-B

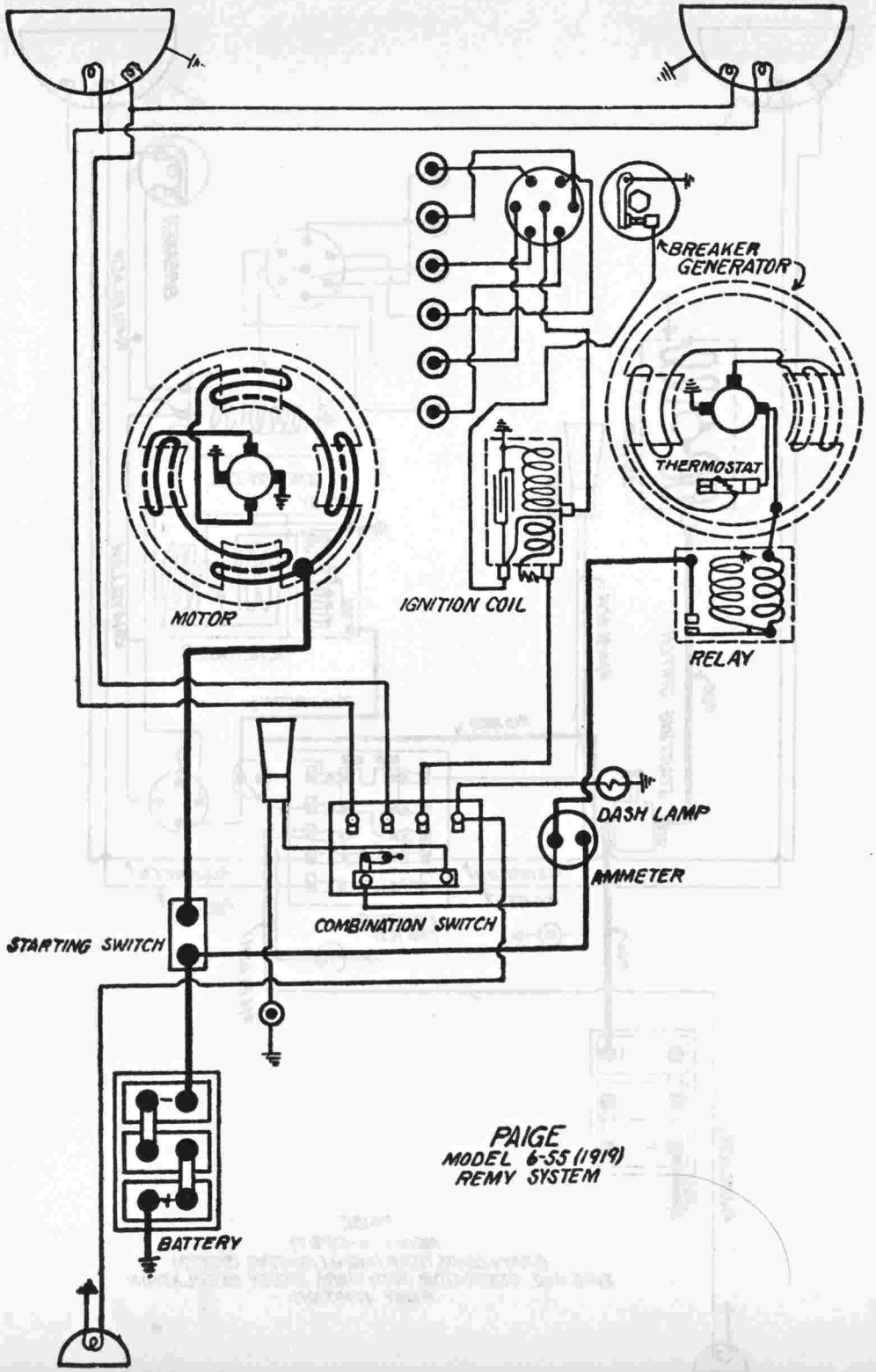
Amperes	R. P. M.	Volts
0	375- 410	6.4
1	405- 415	6.8
5	420- 570	7.2
10	650- 720	7.6
16	850- 870	8.1
19-20	1200-1500	8.25
16-19	2000	8.2
9-12	3000	7.7

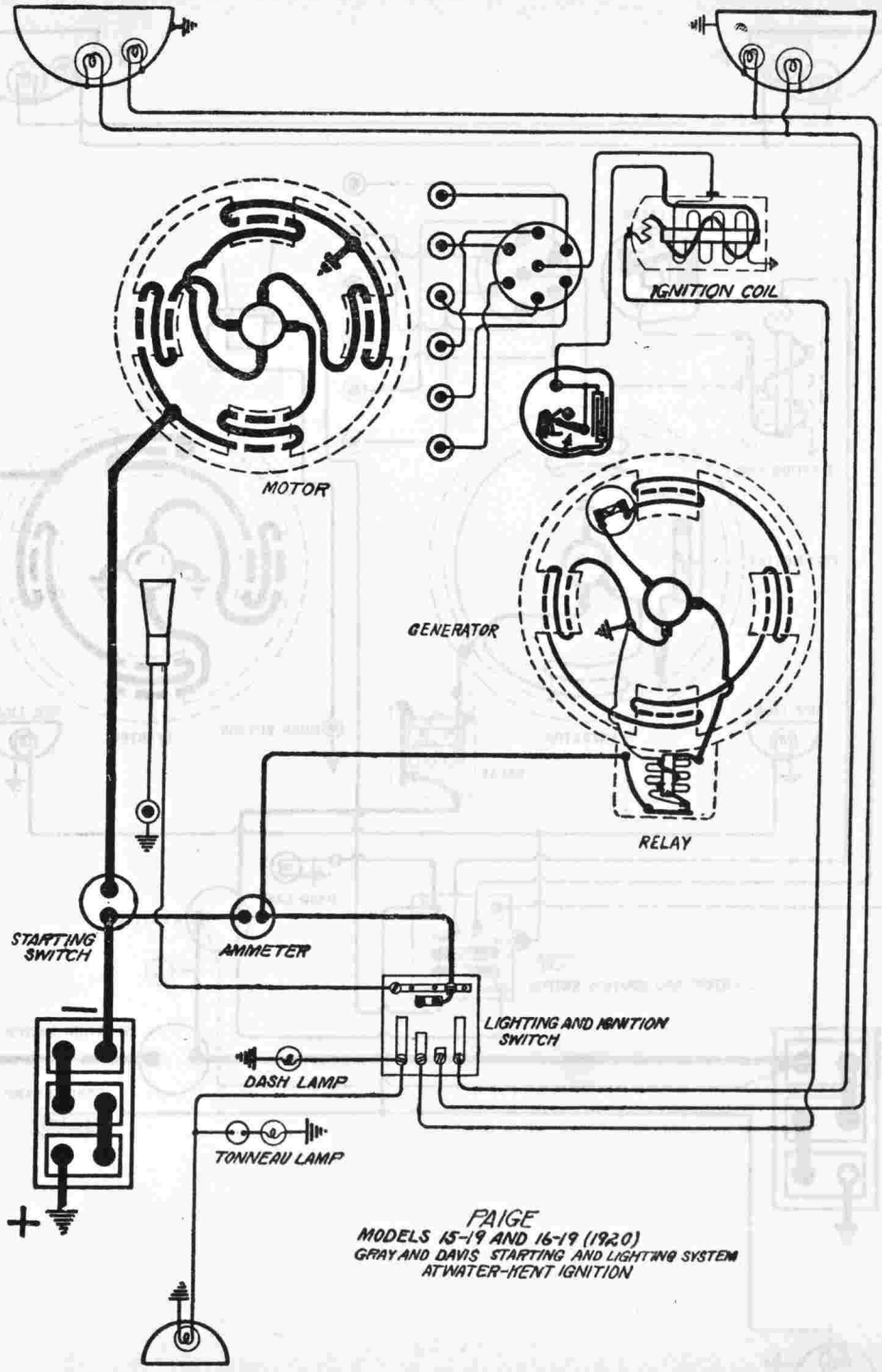
When operated freely as a motor, generator takes 4.5 amperes, at 5.9 volts, armature turning at 250 R. P. M. Shunt field takes 3.5 amperes at 6.85 volts.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—Relay closes at 8-10 miles per hour, or 400 R. P. M., of armature. Charging current is .5 to 1.5 amperes at closing, and the discharge current 0 to 1 ampere at opening of relay contacts. Clean relay contacts by drawing unglazed paper between them If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service. Relay contacts separate .012 inch to .015 inch. Air gap between relay armature and coil core is .012 inch to .015 inch.

Lamps.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash lamp





PAIGE
MODELS 15-19 AND 16-19 (1920)
GRAY AND DAVIS STARTING AND LIGHTING SYSTEM
ATWATER-KENT IGNITION

PAIGE-DETROIT

MODEL 16-19 (1920) SERIAL NOS. 115001 UP
MODEL 15-19 (1920) SERIAL NOS. 195001 UP
GRAY AND DAVIS GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY.—Willard, 6 volt, 108.5 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type CC. Breaker contacts separate .006 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

SPRK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model No. 502 or 700. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 120 R.P.M., taking 125 amperes. Lock torque is 12 pound-feet, current being 450 amperes.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

OILING.—Remove the distributor cap every two weeks and put 4 or 5 drops of light engine oil in the oil hole exposed. Put a small amount of vaseline on the cam, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the flywheel marking "T.C. 1-6" is 1¼ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 2, 6, 2, 4.

GENERATOR.—Model No. 605 or 606. Generator current regulation is by third brush system. Maximum current output is 12-18 amperes, reached at 10-12 miles per hour. Charging rate is varied by adjusting the third brush setting. Adjustment is made by turning the pinion screw located at the bottom of the rear cover plate, between the fuse and the relay. Turn this screw to the right to increase the charging rate, and to the left to decrease the charging rate.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on generator frame. Relay closes at 8-10 miles per hour or 500-550 R.P.M. of the armature, and opens at 6-8 miles per hour, or 450-500 R.P.M. of the armature. Charging current is 1-3 amperes at closing, and the discharge current 0-2 amperes at opening of relay contacts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Generator fuse is 5 ampere.

PAIGE

MODELS 15-19, 17-20, 6-42 (1921)
MODELS 6-44 AND 6-66 (1922)
REMY GENERATING, STARTING, AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY:— Willard, (15-19 & 17-20) Type SJRN-4 (6-44) Type SJWN-4 (6-66) Type SJRG-4, 6 volt 111 ampere-hour. The positive (+) terminal is grounded

IGNITION.—Type CA. Breaker contacts separate .006 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Put 5 or 6 drops of light engine oil in eacht of the starter oilers every month.

Timing.—Breaker contacts begin to separate when the flywheel marking "T.C. 1-6' is 1¼ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .025 inch.

STARTER:—(15-19 & 6-44) No. 721-A (17-20 & 6-66) No. 705-C. The direction of rotation is counter-cockwise, looking at the commutator end. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 190 R.P.M. taking 160-210 amperes at 5 volts.

Starter Data

	No Load Test			Lock Torque		
Model	Volts	Amperes	R.P.M.	Volts	Amperes	Torque
721-A	5	60	6000	3.15	570	16 ft. lbs.
705-C	5	75	3000	3	600	22 ft. lbs.

The brush tension is 1 to 1¼ pounds.

Oiling.—Remove the distributor cap every two weeks and put 4 or 5 drops of light engine oil in the oil hole exposed. Put a small amount of vaseline on the cam, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

GENERATOR.—Model No. 913-E. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system.

Generator Data

Gold Test			Hot Test	
Amperes	Volts	R.P.M.	Amperes	R.P.M.
7	7.1	825	6-9	1450
19-21	8.3-8.8	1800		
18.5 Max		2500		

The fields draw 4.85 amperes at 6 volts. The brush tension is 14 to 18 ounces. Charging rate is varied by adjusting third brush setting. Third brush is moved by turning a small screw exposed in the commutator end plate. Move the third brush in the direction of armature rotation to increase the charging rate, and in the opposite direction to decrease the charging rate. Reseat the brush after adusting position.

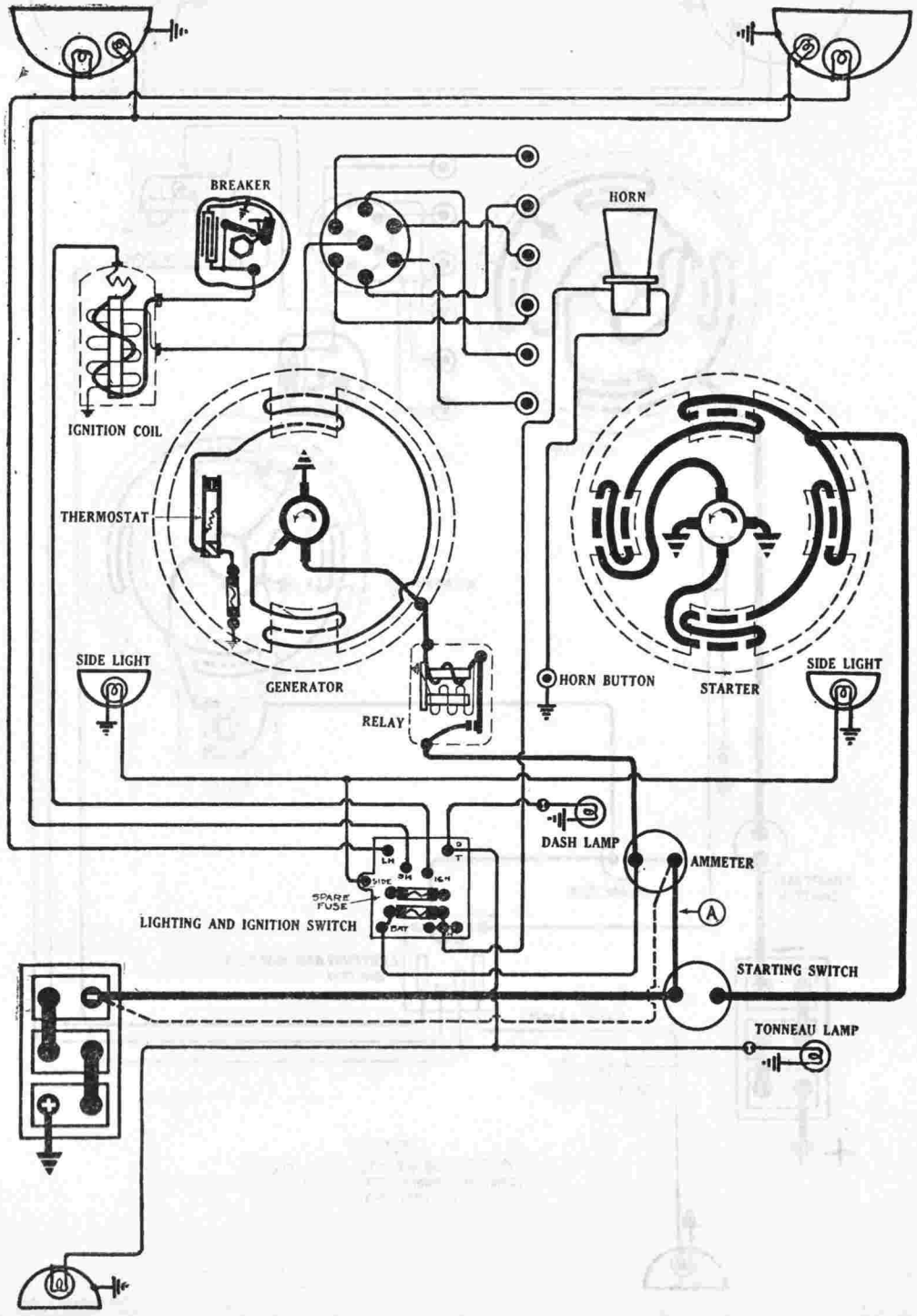
Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

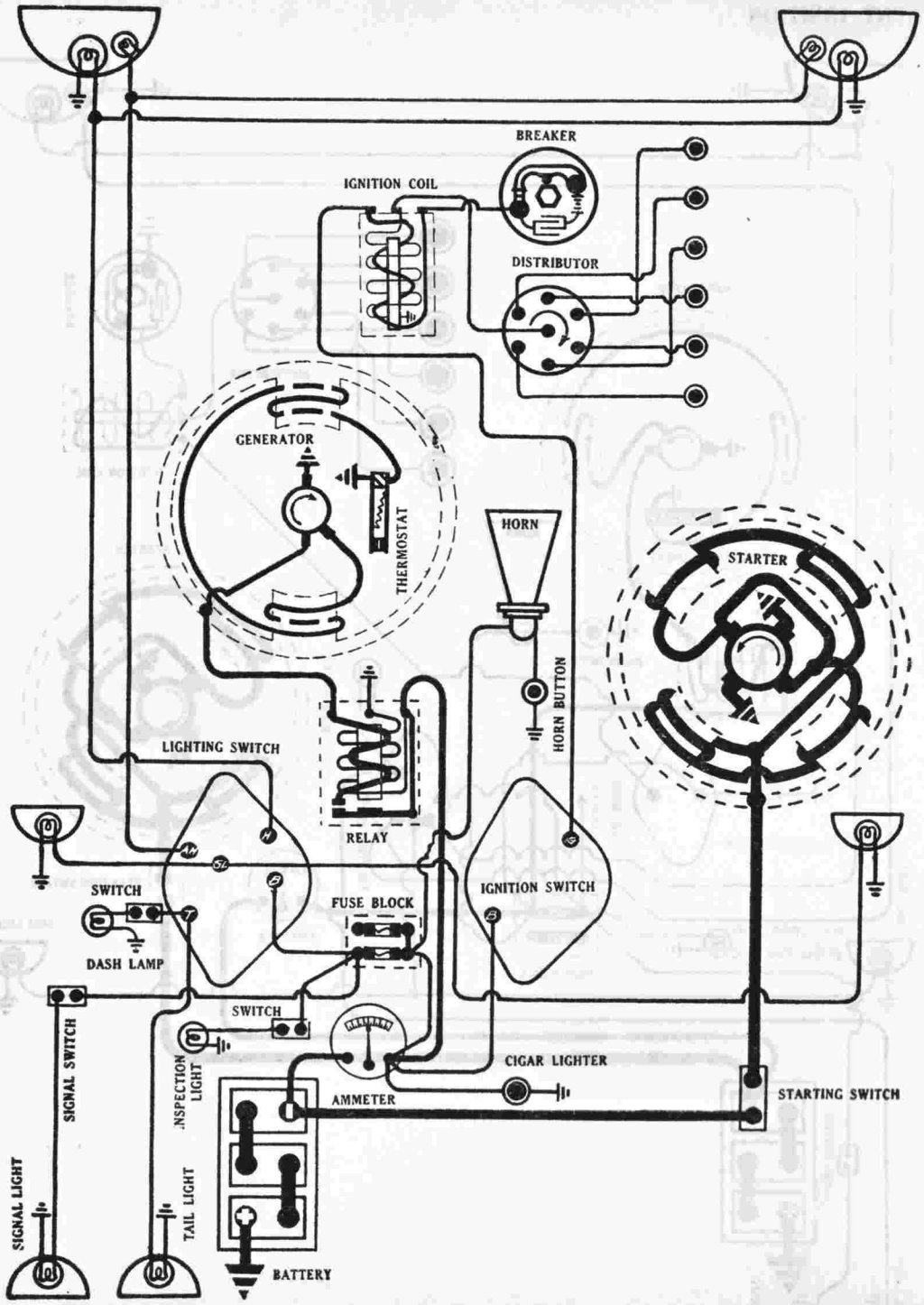
RELAY.—Model No. 263-C. Relay is mounted on the dash. Relay closes when the voltage of the generator reaches 7.0 to 7.4 volts and opens when there is a discharge of 0 to 2 amperes. Relay contacts separate .012 to .015 inch. Air gaps between the relay armature and coil core is .012 to .015 inch, contacts closed. Clean Relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Generator field fuse is 5 ampere. Lighting circuit fuse is 20 amperes.

SPECIAL NOTE:—On Model 6-66 the connection is shown by dotted line (____ ____) from ammeter to negative (—) pole of the battery.





PAIGE

MODEL 19-22 SERIES 6-70 (1923)

REMY GENERATING, STARTING AND LIGHTING SYSTEM

ATWATER KENT IGNITION

BATTERY.—Westinghouse, Type 6-WO-17, 6 volt, 155 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model N-7. Distributor Type RA. The breaker contacts separate .015 inch. When the condition of the contact points affects the ignition, remove and scrape with a penknife or resurface on a medium hard oilstone.

Oiling.—Fill oil cup under breaker head with light eylinder oil every two weeks. Apply a small amount of vaseline on the breaker cam once every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

Timing.—Breaker contacts begin to separate when piston No. 1 is on power stroke, mark "IN-OP-6" on the flywheel is opposite the indicator. Spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—The spark gaps are .020-.025 inch.

STARTER.—Model No. 722-A. The starter is connected to the engine through a set of reduction gears and Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The starter is mounted by means of an S.A. E. barrel type mounting.

Starter Test Data

Volts	Amperes	R.P.M. (of Bendix)	Torque
5	70	2500	0 lb. ft.
3.15	570	Lock	28 lb. ft.

The brush tension is 20-28 ounces.

Oiling.—Fill oil cup at each end of starter with light engine oil every two weeks. If the car is driven more than 500 miles in two weeks, this attention must be given every 500 miles.

GENERATOR.—Model No. 923-A. The direction of rotation is clockwise, looking at commutator end. The current is regulated by means of a third brush and a thermostat. A fuse is mounted on the commutator end bearing. Generator is driven at 1.2 times engine speed. The field current is 4.5 amperes, 6 volts.

Generator Test Data

	Cold Test			Hot Test	
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7.0-7.3	675			
19-21	8.3-8.8	1650			
10-16		2500	9-12	8.0-8.5	1800 Max.

Brush tension is 14-18 ounces

Oiling.—Fill oil cups at each end of the generator housing with light engine oil every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Model No. 266-A, 266-B and 263-C. Relay contacts separate .014 inch. The air gap between the relay armature and coil core is .014 inch. Relay contacts close at 550 R.P.M. of the generator armature. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again puttting into service.

LAMPS.—Head and signal lamps are 6-8 volts, 21 cp., S.C. Auxiliary head and dash lamps are 6-8 volts, 4 cp., S.C. Side and tail lamps are 6-8 volts, 2 cp. S.C. Trouble lamp is 6-8 volts, 4 cp., D.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuses are 20 amperes.

MODELS 21-24 (1924-25)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY:—Westinghouse, Type 6-WO-17, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 168 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 19.6 hours.

IGNITION:—Coil Model N7. Distributor Type RA. The breaker contacts separate .015 inch. When the condition of the contact points affects the ignition, remove and scrape with a penknife or resurface on a medium hard oilstone.

Mounting:—Distributor is mounted at the left of the engine. To remove distributor, disconnect breaker lead and manual advance rod and remove distributor head or disconnect spark plug cables. Then remove cap screws holding bearing cap and lift the distributor from place.

Oiling:—Fill oil cup under breaker head with light cylinder oil every two weeks. Apply a small amount of vaseline on the breaker cam once every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

Timing:—Breaker contacts begin to separate when piston No. 1 is on power stroke, mark "IN-OP-6" on the flywheel is opposite the indicator. Spark control lever breaker assembly fully retarded. This is 12 degrees after top dead center. To set timing, crank engine over until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully retard spark control lever. Continue to crank engine until the piston reaches a position 12 degrees after top dead center when the flywheel mark "IN-OP-1-16" will be opposite the indicator on the flywheel case. Loosen advance arm clamp screw and rotate distributor housing until the contacts begin to separate. Tighten the clamp screw and make certain that the segment opposite the rotor is connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plug Gaps:—The spark plug gaps are .020-.025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter is 1 11/16 inches; stem diameter is 3/8 inch; stem length is 6 9/16 inches. Tappet clearance is .006 inch (hot). Spring pressure is 60 pounds. Inlet valves open at 12 degrees after top dead center and close at 40 degrees after lower dead center.

EXHAUST VALVES:—Head diameter is 1 11/16 inches; stem diameter is 3/8 inch; stem length is 6 9/16 inches. Tappet clearance is .008 inch (hot). Spring pressure is 60 pounds. Exhaust valves open at 40 degrees before lower dead center and close at 3 degrees after top dead center.

STARTER:—Model No. 722-A. The starter is connected to the engine through a set of reduction gears and Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The starter is mounted by means of an S.A.E. barrel type mounting.

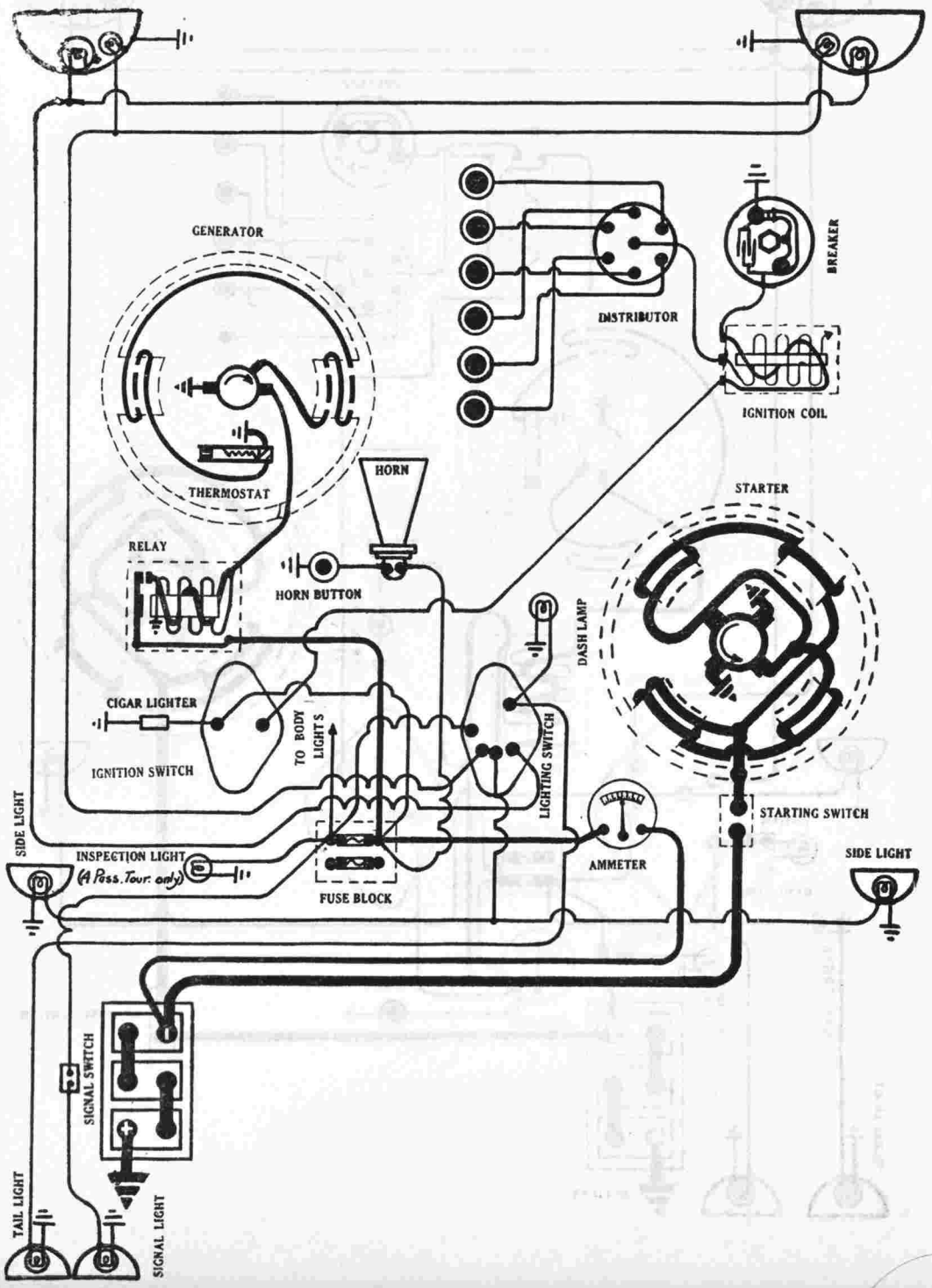
Starter Data

Volts	Amperes	R.P.M. (of Bendix)	Torque
5	70	2500	0 lb. ft.
3.15	570	Lock	28 lb. ft.

The brush tension is 20-28 ounces.

Mounting:—Starter is sleeve mounted at the right of the engine on the forward side of the flywheel housing. To remove starter, disconnect starter cable and remove large pilot mounting screw. Pull starter forward and lift from position.

Oiling:—Fill oil cup at each end of starter with light engine oil every two weeks. If the car is driven more than 500 miles in two weeks, this attention must be given every 500 miles.



PAIGE

MODELS 21-24 (1924-25)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

GENERATOR:—Models 913-H, 917-X, U. Direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. Shift the third brush in the direction of generator rotation to increase the charging rate and in the opposite direction to decrease the charging rate. A themostat is in series with the shunt field. With the themostat contacts open the output is cut down approximately 50%

Generator Data.

Cold Test.			Hot Test.		
Amperes.	Volts.	R.P.M.	Amperes.	Volts.	R.P.M.
7	7.2	850			
19	8.4	1900	11	7.5	1900

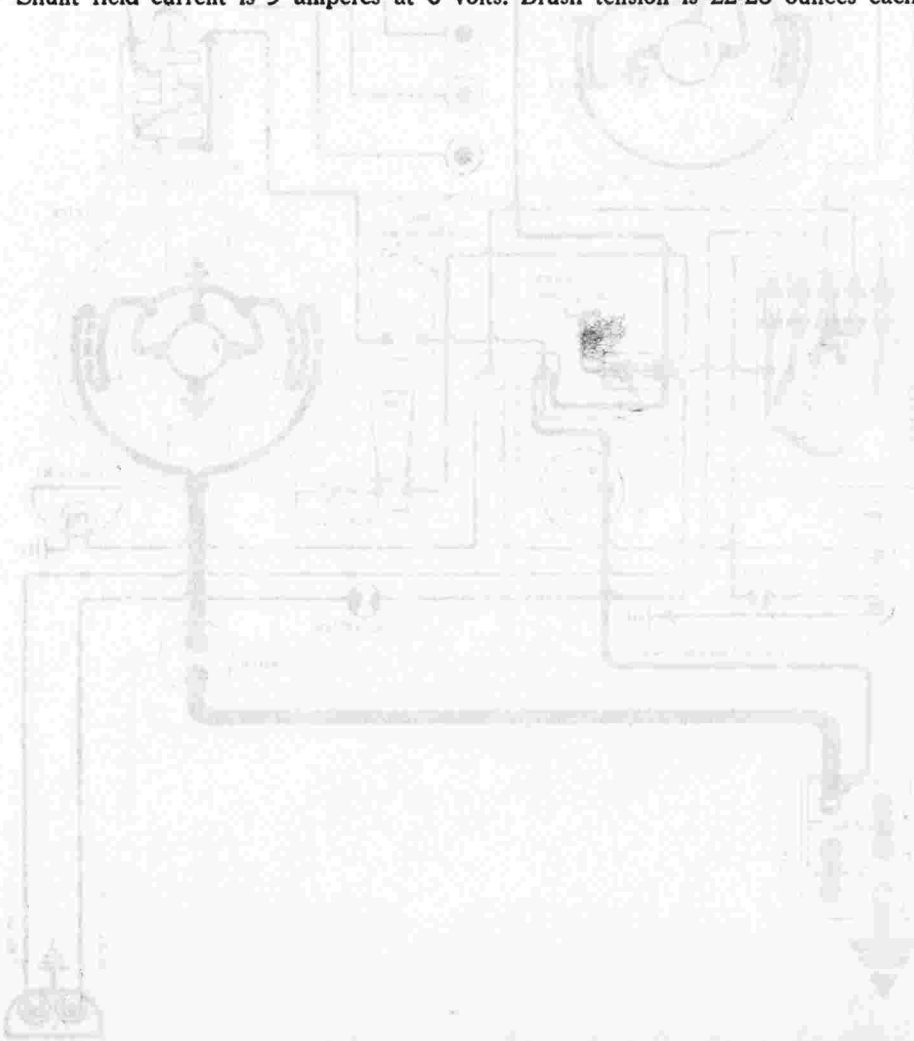
Shunt field current is 5 amperes at 6 volts. Brush tension is 22-28 ounces each.

Oiling:—Fill oil cups at each end of the generator housing with light engine oil every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY:—Model 266-F. Relay is mounted on top of the generator. Relay closes at 675 R.P.M. of the generator armature with a generator of 7.25 volts and opens with a discharge current of 0 - 2.5 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LAMPS:—Head and signal lamps are 6-8 volts, 21 cp. S.C. Auxiliary head and dash lamps are 6-8 volts, 4 cp. S.C. Side and tail lamps are 6-8 volts, 2 cp. S.C. Trouble lamp is 6-8 volts, 4 cp. D.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuses are 20 amperes.



PAIGE

MODELS 6-65 AND 6-75 (1926-27)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY.—Westinghouse, Type 6-OB-13. 6 volt, 115 ampere hour. The starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 19 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Type N-3. Distributor Type L. A. Breaker contacts separate .015 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 30°. Automatic advance is 24°.

Oiling.—Fill the oil cup under the distributor head with light cylinder oil every two weeks or each 500 miles. Put a small bit of vaseline on the face of the breaker cam under the fiber block on the breaker arm every month.

Timing.—Breaker contacts begin to separate when the piston entering power stroke reaches a position 11° 28′ after top dead center with the manual spark control lever and breaker assembly in the fully retarded position. This position is approximately 1⅜ inches past top dead center, measure on the flywheel. With piston No. 1 entering power stroke the flywheel marking "EXCL.1-6" will be approximately opposite the indicator.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plugs are ⅞ S.A.E. Standard. Gaps are .025 inch.

Valve Timing:—INLET VALVES:—Head diameter, 1 9/16 inches; stem diameter, ⅜ inch; stem length, 6 inches; tappet clearance, .006 inch (hot); spring pressure, 50-55 pounds; valve lift, 5/16 inch; intake opens on top dead center and closes 40° after lower dead center.

EXHAUST VALVES:—Head diameter, 1 9/16 inches; stem diameter, ⅜ inch; stem length, 6 inches; tappet clearance, .010 inch (hot); spring pressure, 50-55 pounds; valve lift, 5/16 inch; exhaust opens 40° before lower dead center and closes 10° after top dead center. The guide stems are removable. Oversize valve stems are made.

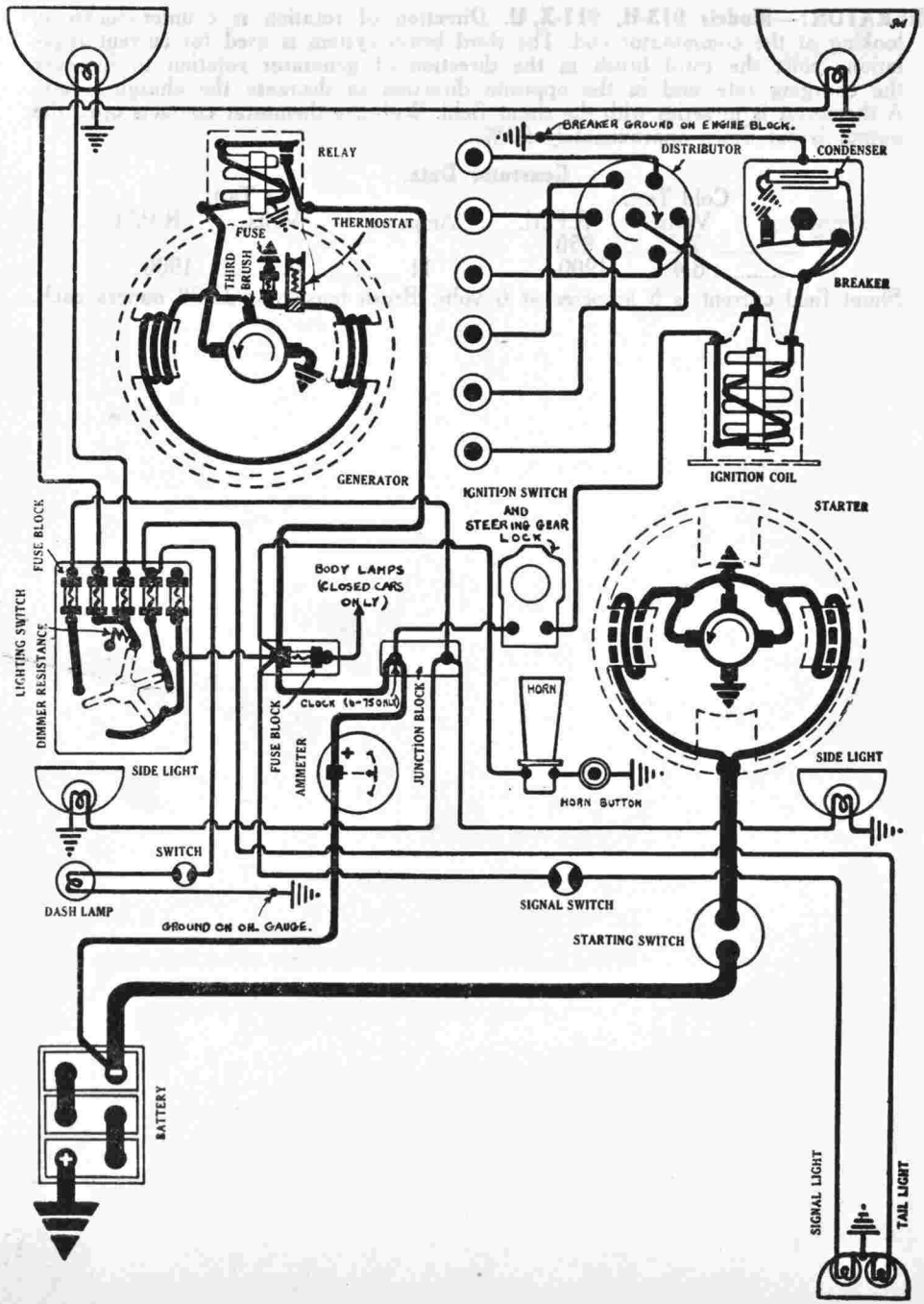
STARTER.—Model 713-F. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 140 R.P.M. taking 125 amperes. Starter brush tension is 24-28 ounces each. Starter switch is Model 404-L.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
12 "	Lock	3.6	475

Oiling.—Put 4 or 5 drops of light engine oil in the starter bearing oilers every two weeks or each 500 miles.

GENERATOR.—Model 941-P. (On Model 6-65) Model 917-ZA. (Model 6-75).—The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the generator output, remove the commutator cover band and loosen the small screw on the generator end plate holding the third brush mounting plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. There is a thermostat in the shunt field circuit. The thermostat contacts open at approximately 165° F. and reduce the output 40-50%.



PAIGE

MODELS 6-65 AND 6-75 (1926-27)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

Generator Data Model 941-P

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7-7.3	750			
21	8.5	1450	12	7.65	2000

Generator Data Model 917-ZA

Cold Test			Hot Test		
7	7-7.3	850			
20	8.4	1900	12	7.65	2000

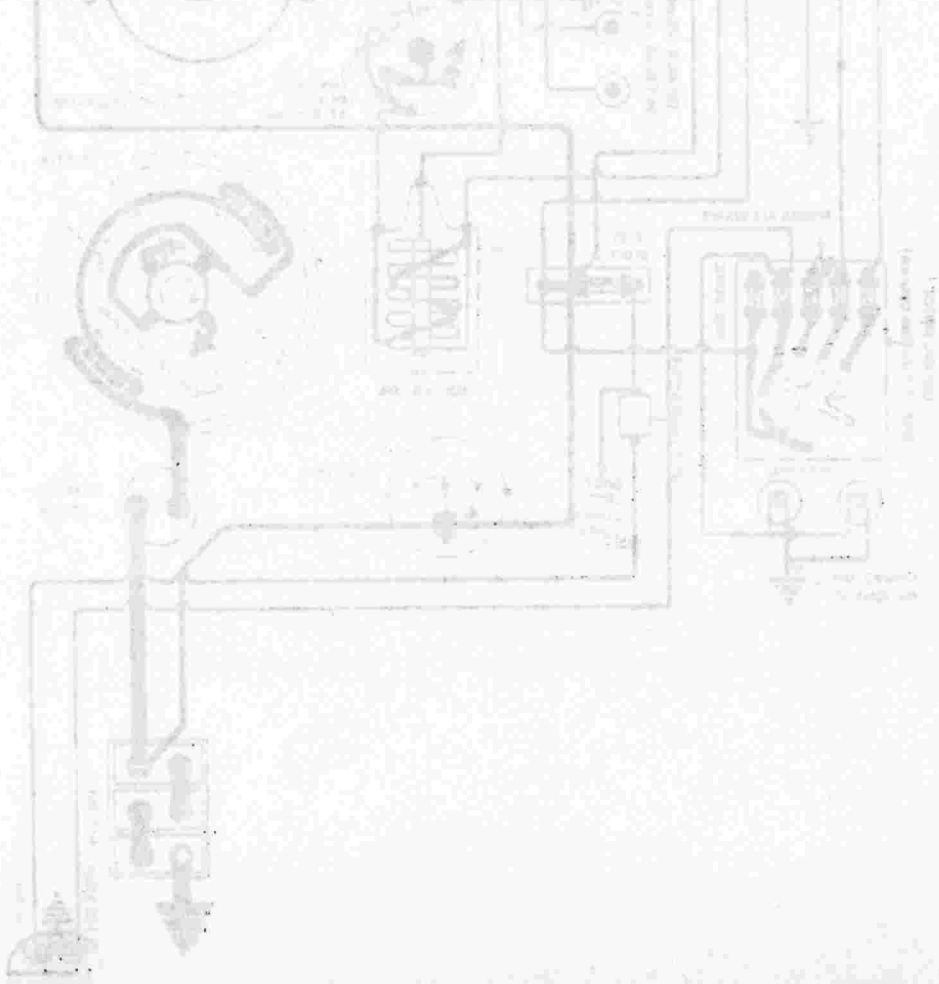
Motoring freely, generator draws 5 amperes at 6 volts. The shunt field current is 5 amperes at 6 volts. Brush tension is 24-28 ounces on the Model 941-P and 22-28 ounces on the Model 917-ZA generator.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY.—Model 265-B. Relay is mounted on the generator. Relay contacts close at 675 R.P.M. of the generator when the voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is 2-3 amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING.—Switch Model 420-F. Head and stop lamps are 6-8 volt, 21 cp. S.C. Side lamps are 6-8 volt, 3 cp. S.C. Dash lamp is 6-8 volt, 2 cp. D.C. Tail lamp is 6-8 volt, 2 cp. S.C.

FUSES.—Generator field fuse is 6 amperes on the Model 941-P generator and 5 amperes on the Model 917-ZA generator. Lighting fuses on switch are 10 amperes.



PAIGE

MODEL 6-45 (1926-27)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

BATTERY.—Westinghouse, Type 6-OB-13. 6 volt, 115 ampere hour. Starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 19 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model 525-A. Distributor Model 637-A. Breaker contacts separate .025 inch. They are made of tungsten. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 30°. Automatic advance is 20°. The tension of the breaker arm spring is 15-20 ounces. The stationary contact is mounted on a special crescent-shaped arm which moves in same arc as the breaker arm. To adjust contacts, loosen the screw holding the contact mounting arm and turn eccentric adjusting screw until desired contact opening is secured. Then tighten the mounting screw to hold adjustment.

Oiling.—Refill the grease cup under the distributor head and turn down two turns each month or each 1000 miles. Put a small bit of vaseline on the face of the breaker cam under the fiber bumper every month.

Timing.—Breaker contacts begin to separate when piston No. 1 entering power stroke reaches a position at which the marking "10-1-6" on the flywheel is 1½ inches past the indicator on the flywheel housing. This position is 11° 21′ after top dead center. The manual spark control lever and breaker assembly must be in the fully retarded position.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plugs are ⅞ S.A.E. Standard. Gaps are .030 inch.

Valve Timing:—INLET VALVES:—Head diameter, 1⅜ inches; stem diameter, ⅜ inch; stem length, 5 13/32 inches; tappet clearance, .006 inch (hot); spring pressure, 50-55 pounds; valve lift, 5/16 inch; inlet opens 4° after top dead center and closes 46° after lower dead center.

EXHAUST VALVES:—Head diameter, 1¼ inches; stem diameter, ⅜ inch; stem length, 5 13/32 inches; tappet clearance, .006 inch (hot); spring pressure, 50-55 pounds; valve lift, 5/16 inch; exhaust opens 41° before lower dead center and closes 1° after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

STARTER.—Model 711-E. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 120 R.P.M. drawing 175 amperes. Starter brush tension is 20-28 ounces. Starter switch is Model 404-U.

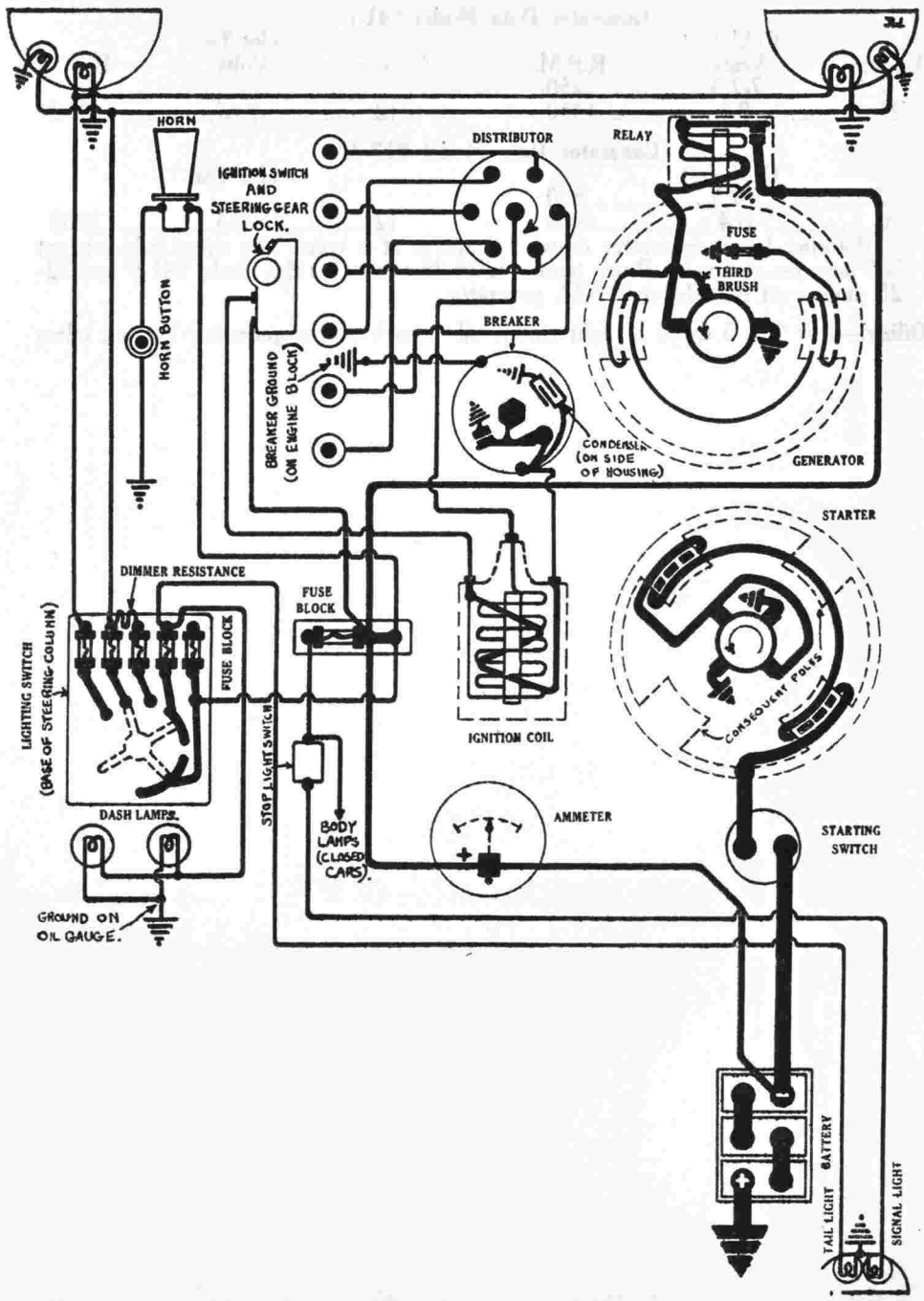
Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4500	5	70
10 "	Lock	3.7	450

Mounting.—Starter is mounted at right of engine by a modified S.A.E. No. 2 flange mounting. To remove starter, remove three mounting screws and slide starter from place.

Oiling.—Put 4 or 5 drops of light engine oil in the starter bearing oilers every month or each 1000 miles.

GENERATOR.—Model 943-A. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the generator output, loosen the small round headed screw on the generator end plate and shift the third brush mounting bracket by hand. Shift the



third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The maximum charging rate of 17 amperes is reached at 1600 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M
7	7-7.3	850			
17	8	1600	11-13	7.7	1800
11		2500			

Motoring freely, generator draws 5 amperes at 6 volts. Shunt field current is 4-6 amperes at 6 volts. Generator brush tension is 16-18 ounces.

Mounting.—Generator is mounted at right front of engine by special mounting.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles.

RELAY.—Model 265-B. Relay is mounted on top of the generator. Relay closes when the voltage of the generator reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING.—Remy Lighting Switch Model 420-F. Head and stop lamps are each 6-8 volt, 21 cp. S. C. Side lamps are 6-8 volt, 3 cp. S. C. Dash lamp is 6-8 volt, 2 cp. D. C. Tail lamp is 6-8 volt, 2 cp. S. C.

FUSES.—Generator field fuse is 6 amperes. Lighting fuse is 20 amperes.

PAIGE

MODEL 8-85 (1927) SERIAL NOS. 500,001 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Westinghouse, Type 6-0B-15, 6 volt, 135 ampere hour. Starting capacity is 133 amperes for 20 minutes. Lighting capacity is 5 amperes for 22 hours. The positive (+) terminal is grounded. Battery is mounted under the right front seat.

IGNITION:—Coil Model 525-A. Distributor Model 658-A. Breaker contacts separate .018-.024 inch. Resurface contacts whenever necessary with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Maximum manual advance is 15° (engine). Automatic advance begins at 300 R.P.M. (engine). Maximum automatic advance is 17° (engine) reached at 2000 R.P.M. Breaker arm spring tension is 17-21 ounces. Ignition current is 1-3 amperes with engine running and 3.4-5 amperes with engine stopped. Two sets of breaker contacts are used. They operate on a four sided cam and open alternately at intervals of 45° corresponding to 90° of crankshaft rotation. This firing interval must be accurately set for correct ignition. (See Timing.)

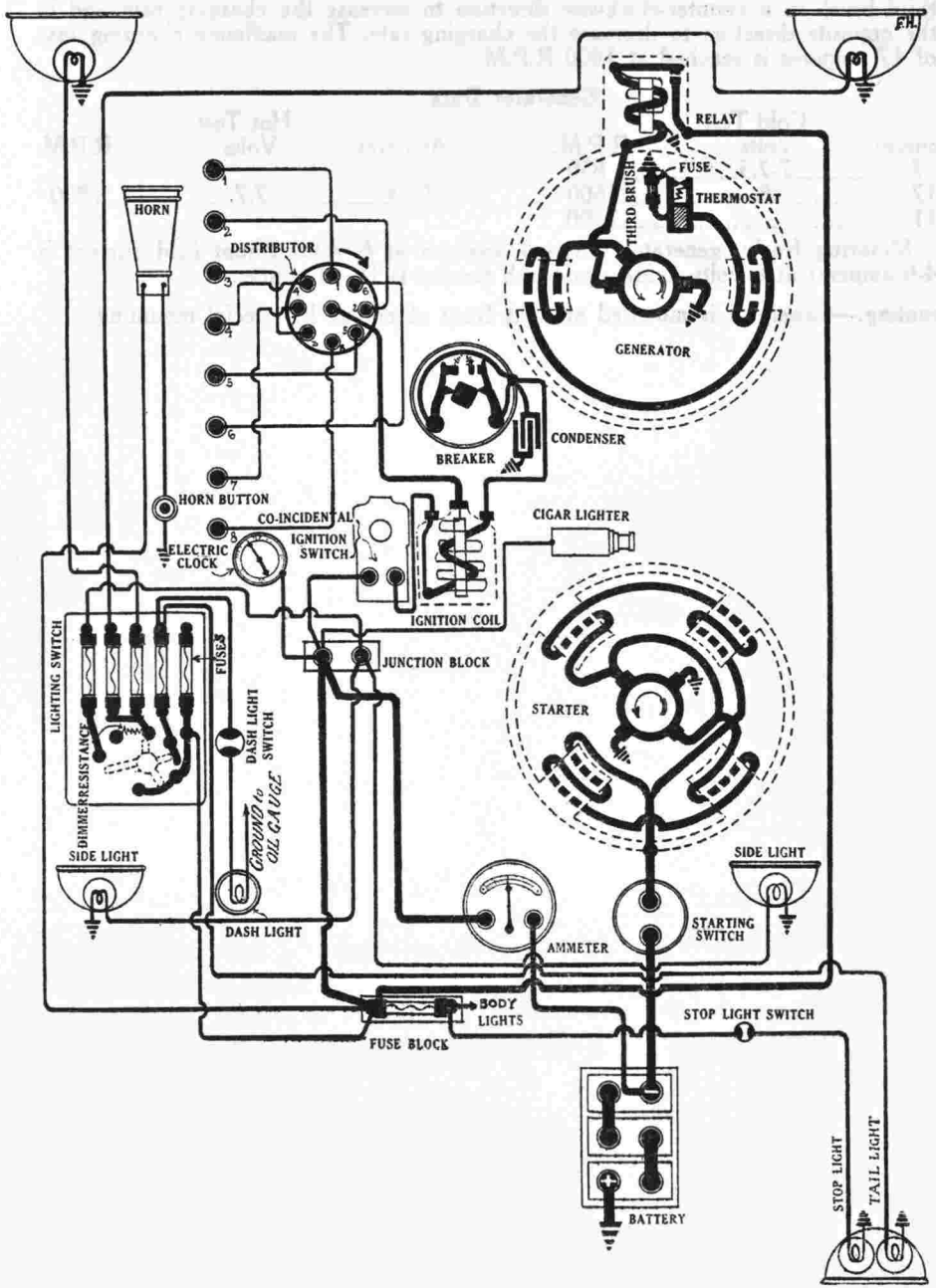
Mounting:—Ignition coil is mounted on the generator. Distributor is mounted on cylinder head. To remove distributor, disconnect manual advance rod and primary lead and remove head with cables attached. Then loosen distributor clamp screw and lift unit from place.

Oiling:—Refill the grease cup under the distributor head with medium cup grease and turn down one turn every two weeks or each 500 miles. Every 5000 miles remove the rotor button and saturate the wick oiler with light engine oil. Put a small amount of vaseline on the face of the breaker cam under the fiber bumper of the contact arm.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 11° 28′ after top dead center with the spark control lever in the fully retarded position. To set timing, crank engine until piston No. 1 reaches top dead center on compression stroke (the upstroke with both valves closed). Make certain that the spark control lever is in the fully retarded position. Then crank engine over 11° 28′. The stationary set of breaker contacts should separate at this point. To set contacts, loosen distributor clamp screw and rotate distributor cup until contacts begin to separate. Tighten the clamp screw. To check contacts for correct firing interval use Delco-Remy Part No. 820738. Place the synchronizing tool on the shaft locking it in place with the slide pushed in so that the arrow visible on the slide points in the direction of rotation. Then turn shaft until contacts mounted on stationary plate begin to separate. Note reading on leading scale opposite the edge of the primary terminal on the edge of the distributor cup. Continue to turn shaft until same reading on second scale is opposite the same point on the cup. If second set of contacts are not separating, loosen lockscrews on mounting plate and turn eccentric adjusting screw until contacts separate. Tighten the lockscrews and check the contact opening. If it is not within limits of .018-.024 inch with contact arm on lobe of cam, the gap must be set at .022 inch and the operation repeated.

Valve Timing:—INLET VALVES:—Head diameter, 1 7/16 inches; stem diameter, 11/32 inch; stem length, 4 7/8 inches; tappet clearance, .010 inch (hot); spring pressure, 58-62 pounds; valve lift, 5/16 inch. Inlet opens on top dead center and closes 35° after lower dead center.
EXHAUST VALVES:—Head diameter, 1 5/16 inches; stem diameter, 11/32 inch; stem length, 4 7/8 inches; tappet clearance, .010 inch (hot); spring pressure, 58-62 pounds; valve lift, 5/16 inch. Exhaust opens 42° before lower dead center and closes 5° after top dead center. Valve stem guides are removable. Oversize valve stems are made.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.



PAIGE

MODEL 8-85 (1927) SERIAL NOS. 500,001 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Regular. Gaps are .025 inch.

STARTER:—Model 720-Q. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 140 R.P.M. taking 200 amperes at 5 volts. Starter brush tension is 24-28 ounces. Starter switch is Model 404-U.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Mounting:—Starter is flange mounted on right side of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove three flange mounting capscrews. Then pull starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR:—Model 945-F. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system combined with a thermostat. Thermostat contacts open at 165°F. cutting a resistance in the shunt field circuit and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The maximum charging rate is 18-20 amperes reached at 1800 R.P.M. or 40 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
4	7.0	700			
12	7.8	1000	11	7.7	1500
18-20	8.0	1300			

Shunt field current is 5 amperes at 6 volts. Running as a motor, generator draws 5-5.5 amperes at 6 volts. Brush spring tension is 22-28 ounces each.

Mounting:—Generator is mounted on right side of engine by special mounting.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay closes at 600-650 R.P.M. of the generator when the voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts must not exceed 3 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.020 inch, contacts closed.

LIGHTING:—Remy Lighting Switch Model 420-F. Switch is mounted on the base of the steering column. Head lamps are each 6-8 volt, 21 cp. S.C. Side lamps are 6-8 volt, 3 cp. S.C. Dash lamp is 6-8 volt, 2 cp. D.C. Tail lamp is 6-8 volt, 3 cp. S.C. Stop lamp is 6-8 volt, 15 cp. S.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuses are 10 amperes.

PAN-AMERICAN

MODELS G-4, G-5, G-7 (1917-18-19)
GRAY & DAVIS GENERATING, STARTING AND LIGHTING SYSTEM
REMY OR GRAY & DAVIS IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .020 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the grease cup under the breaker head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1 inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—The spark plug gaps are .025 inch.

STARTER.—Model No. 515. Starter cranks the engine at 100-150 R.P.M Lock torque is 15 pound-feet at 3.5 volts.

Starter Data

Torque	R.P.M.	Amperes
1 lb. ft.	2100	100
2 lb. ft.	1600	135
4 lb. ft.	1200	195
8 lb. ft.	650	320

OILING.—Put 4 or 5 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Model No. 619. Generator current regulation is by the third brush system. Maximum charging rate is 15 amperes, reached at 1400 R.P.M. of the armature or 25 miles per hour.

Amperes	Generator Data	R.P.M.
0		460
4		580
8		720
12		940
15		1400
12		2600

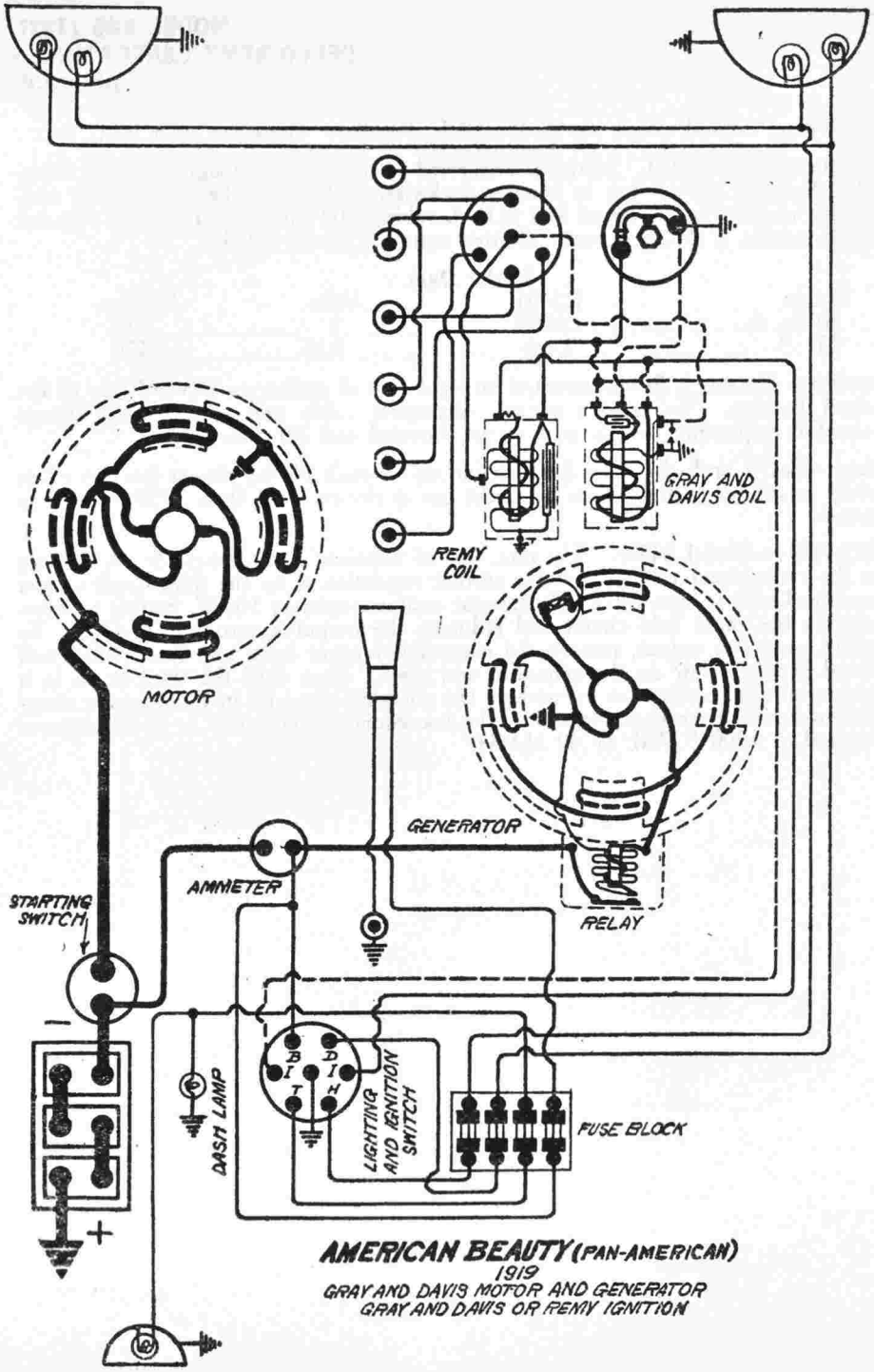
Shunt field winding takes 2.6 amperes at 6 volts.Charging rate is varied by adjustment of the third brush setting. Adjustment is made by turning the pinion screw located at the bottom of the rear cover plate, between the fuse and the relay. Turn this screw to the right to increase the charging rate and to the left to decrease the charging rate.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 460-500 R.P.M. of the armature or 8-10 miles per hour, and opens at 420-460 R.P.M. of the armature or 6-8 miles per hour. Relay contacts separate .015 to .018 inch. Air gap between coil core and moving member is .010 to .012 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

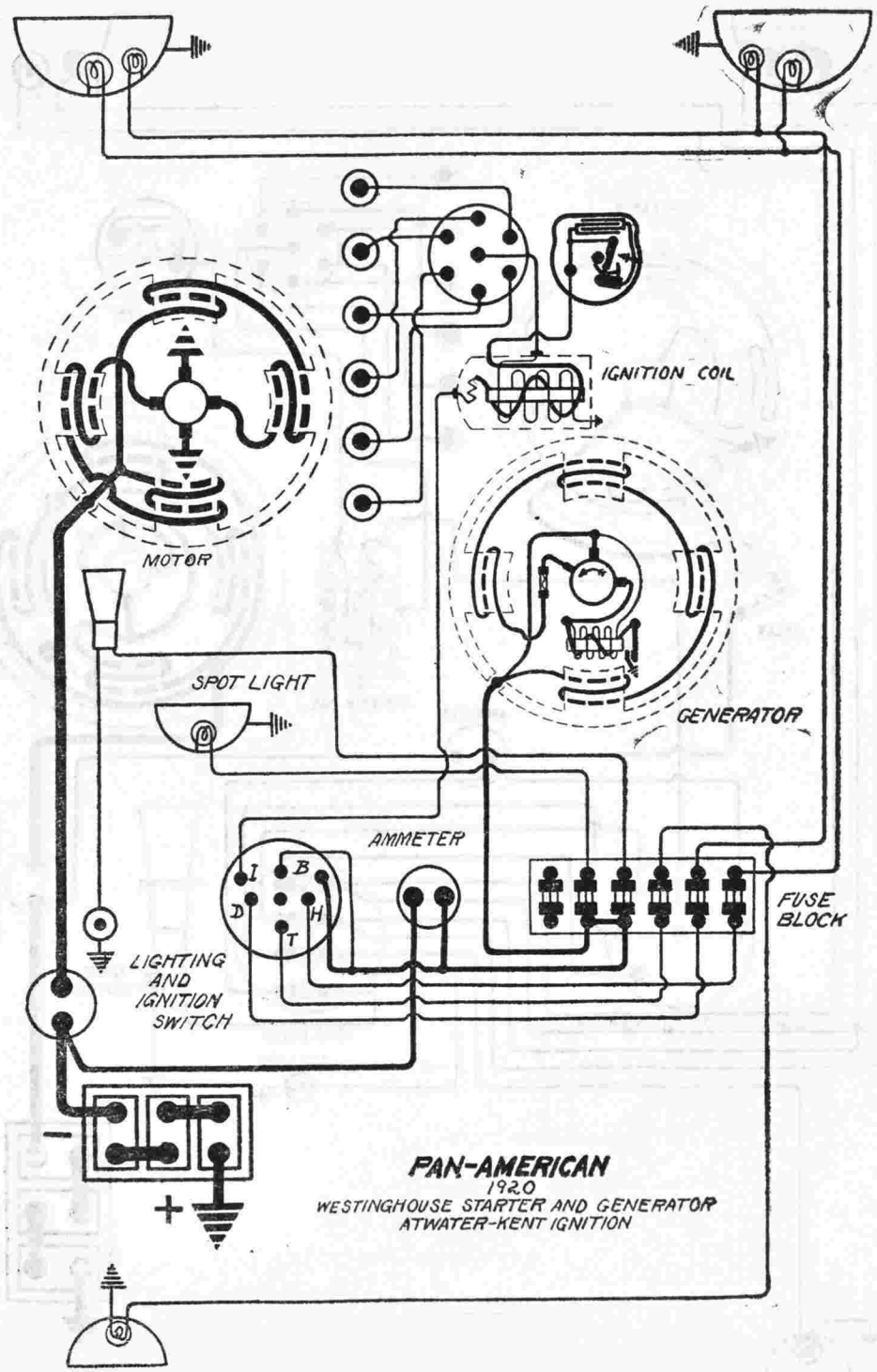
LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp. All lamps have single contact base.

FUSES.—Fuses are 10 ampere.



AMERICAN BEAUTY (PAN-AMERICAN)
1919
GRAY AND DAVIS MOTOR AND GENERATOR
GRAY AND DAVIS OR REMY IGNITION

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PAN-AMERICAN

MODELS 6-45, 6-48 (1919-20-21)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM

ATWATER KENT IGNITION

BATTERY.—Willard, 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type CC. Breaker contacts separate .006 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Remove the distributor cap every two weeks and put 4 or 5 drops of light engine oil in the oil hole exposed. Put a small amount of vaseline on the cam, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attention must be given every 500 miles

TIMING.—Breaker contacts begin to separate when the flywheel marking "1 & 6 DC" is one inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUGS.—Diameter, 7/8 inch. Spark plug gaps are .025 inch.

STARTER.—Frame 711. Starter is connected to the engine through a Bendix drive. Lock torque is 17 pound-feet, current being 525 amperes at 4 volts. Torque at 1300 R.P.M. is 2.5 pound-feet, current being 150 amperes at 5.5 volts. Running freely, starter takes 35-45 amperes at 5.5 volts, armature revolving at 3500-6000 R.P.M. Pressure of bruhses on the commutator is 2.5 to 3 pounds.

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR.—Frame No. 760. Generator current regulation is by the third brush system. Maximum current output is 13-17 amperes, reached at 1250 R.P.M. of the armature or 16-20 miles per hour.

Generator Data

Amperes	Cold Test R.P.M.	Amperes	Hot Test R.P.M.
0	450	0	500
8	675	6	725
12	840	9	850
15-17	1250	12-14	1250
10	2000	7- 8	2000

The cold test readings are obtained with a generator temperature under 95°F. The hot test readings are obtained after the generator has been operated one hour at 1800 R.P.M., charging a half-charged battery. Shunt field current is 2.5 amperes at 6 to 6.3 volts. When generator is operated freely as a motor, current is 3.5 to 5 amperes at 6 to 6.6 volts. Charging rate is varied by adjustment of the third brush setting.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in the generator frame. Relay closes at 8-10 miles per hour or 500-550 R.P.M. of the armature, and opens at 6-8 miles per hour or 450-500 R.P.M. of the armature. Adjust the spring tension on the relay armature so that the contacts open when the discharge current is 0-3 amperes. Adjust the air gap between the relay armature and coil core so that the contacts close when the voltage of the generator reaches 6.2 to 6.5 volts. Air gap between the relay armature and coil core is .005 inch, contacts closed. Contacts separate .030 to .035 inch. Resistance of the shunt coil is 68 ohms. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 32 cp. Dash lamp is 6-8 volt, 4 cp. Tail lamp is 6-8 volt, 2 cp.

FUSES.—Fuses are 15 amperes.

PARENTI

1920-1921-1922

BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—U. S. L., Type HDN-311-X, 6 volt, 92 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model 284-B. Distributor Model No. H-366. The breaker contacts separate .010 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or a piece of No. 00 sandpaper.

Oiling.—Put 2 or 3 drops of light neutral oil in the distributor oilers each month. If the car is driven more than 1000 miles in a month, this oiling must be done every 1000 miles.

Timing.—Breaker contacts begin to separate when the piston entering the power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—The spark plug gaps are .032 inch.

STARTER.—Type FD-140. Starter is connected to the engine through a Bijur automatic pinion shift. Starter cranks the engine at 140 R.P.M., taking 125 amperes. The lock torque is 11.6 pound-feet, current being 500 amperes at 4 volts. Running freely, the starter armature revolves at 5600 R.P.M., with a current of 27 amperes. Brush pressure on the commutator is 30 ounces.

Oiling.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

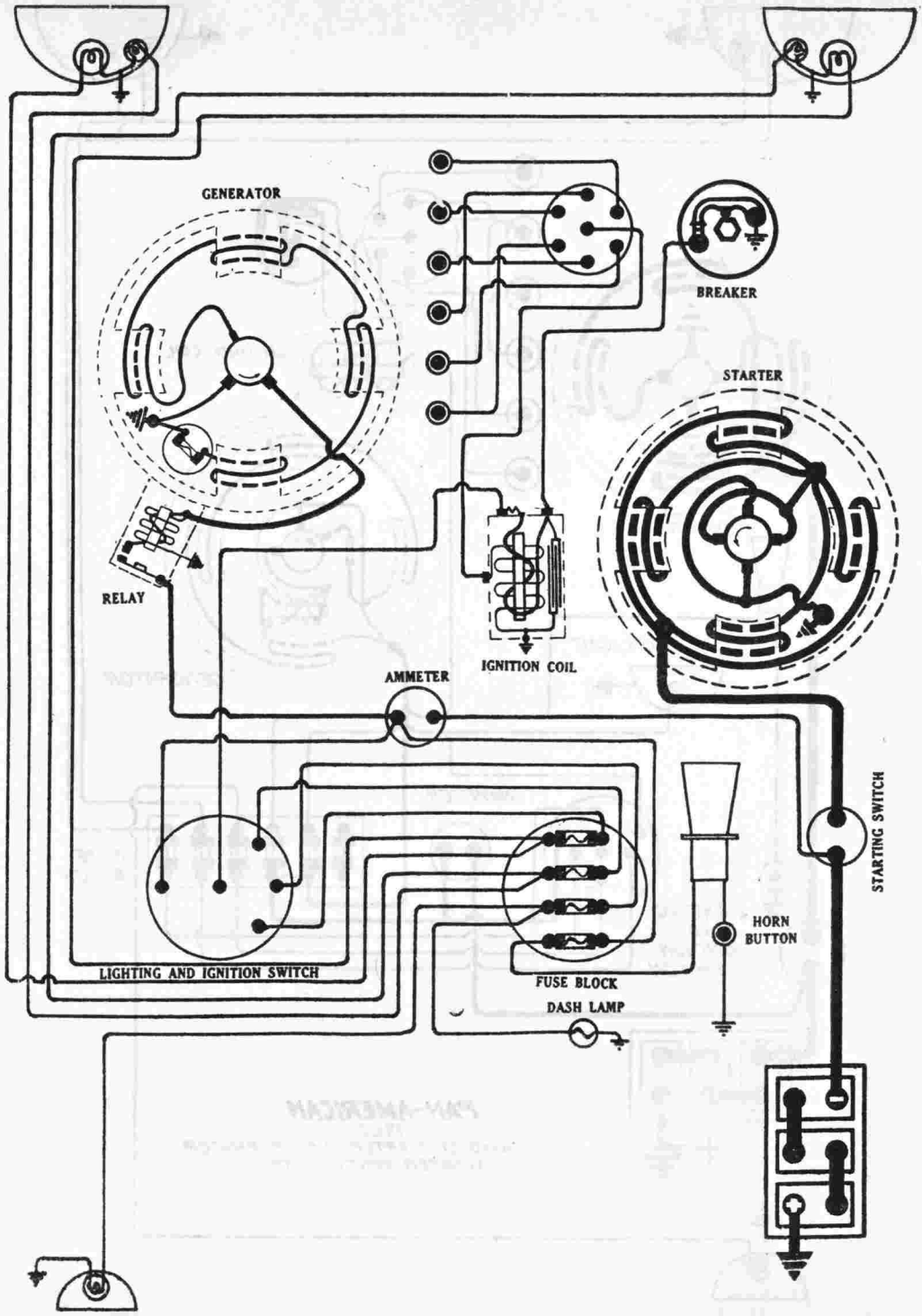
GENERATOR.—The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Maximum charging rate is 12-15 amperes, reached at 1000 R.P.M. of the armature, or 18 miles per hour. The charging rate is varied by adjusting the third brush setting. This adjustment is made by inserting a special toothed wrench in the adjusting hole in the commutator end plate, and moving the third brush through a ratchet engagement. Turn the wrench to the right to increase the charging rate, and to the left to decrease the charging rate. The pressure of the brushes on the commutator is 32-36 ounces.

Oiling.—Put 5 or 6 drops of light engine oil in the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, this oiling must be done every 500 miles.

RELAY.—Relay is mounted on generator frame. Relay closes at 8-10 miles per hour or 600-650 R.P.M. of the armature, and opens at 6-8 miles per hour or 550-600 R.P.M. of the armature. Relay contacts separate .015 inch. Air gap between relay armature and coil core is .030 inch, contacts closed. Relay must be adjusted so that the contacts will close when the voltage of the generator reaches 6.5 volts, as indicated by a voltmeter connected across the main brushes. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

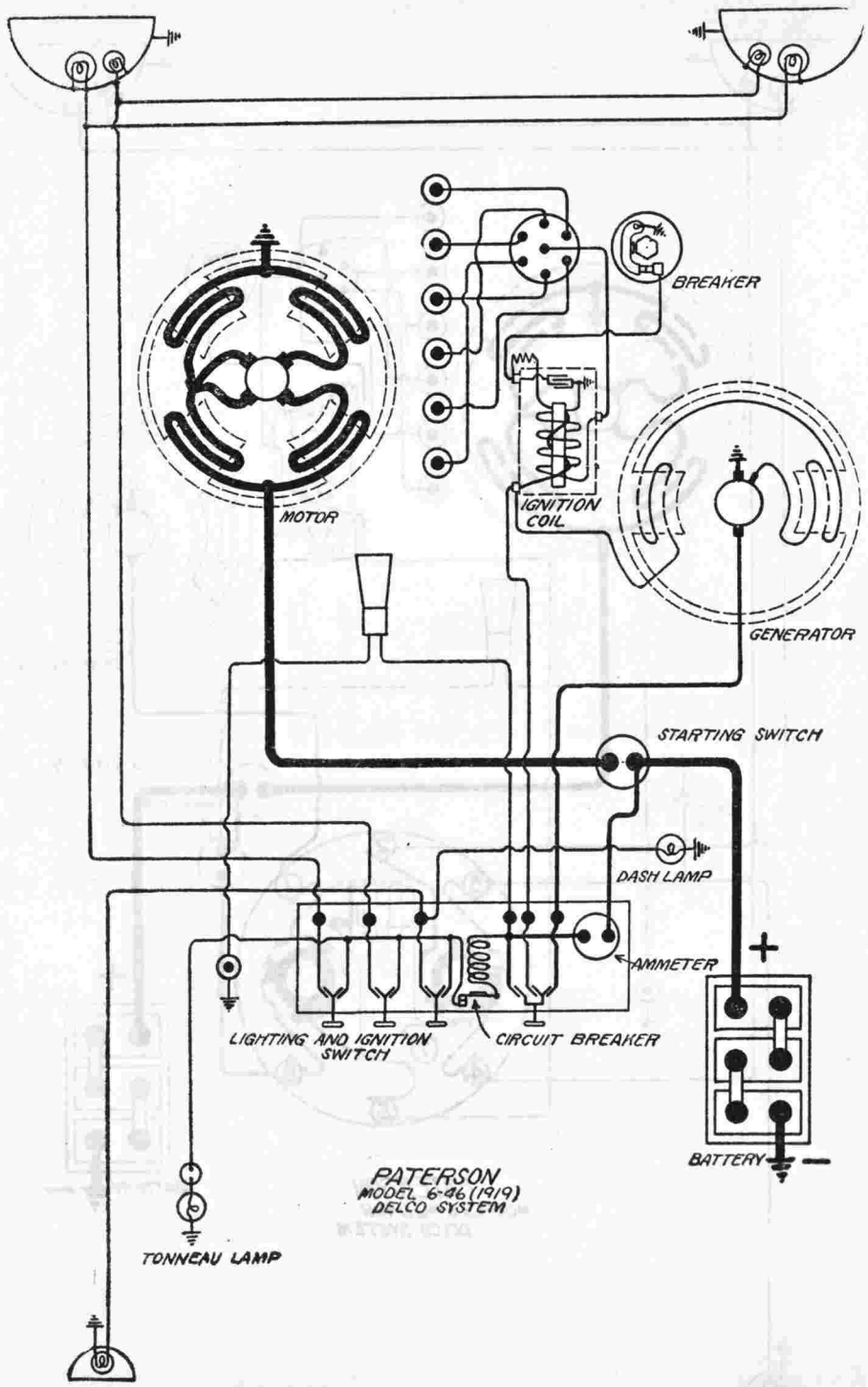
LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer, dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—The fuses are 20 ampere.



PATERSON

MODEL 6-42 (1916), 6-45, 6-45-R (1917-18) 6-46 (1919
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION



BATTERY:—(1916, 17-18) 6 volt, 85 ampere hour (1919) 6 volt, 110 ampere hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Distributor shaft bearings are of the oilless type. If the rotor button and its track in the distributor head are not well polished, apply a small amount of vaseline with a soft cloth.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever one third advanced on 1919 cars, in the fully retarded position on the 1918 cars, and when the mark on the flywheel is 1¾ past indicator with breaker assembly fully retarded on the 1916 and 17 cars.

Firing Order:—The firing order is 1, 5, 3, 6, 2, 4,

Spark Plug Gaps:—Spark plug gaps are .030 inch.

STARTER:—Models 85 and 106. Starter is connected to engine through a Bendix drive. Running freely, starter takes 40 amperes. Lock torque is 16 pound-feet at 3-5 to 3-8 volts.

Oiling:—Model 106 has oilless bearings and requires no attention. Put 4 or 5 drops of light oil in each oiler on the Model 85 starter once each month.

GENERATOR:—Models 84 and 105. Current regulation is by third brush system. Generator begins to supply current at 6-8 miles per hour or 500 R.P.M. of armature and reaches its maximum output at 18-22 miles per hour, or 1400 R.P.M. of armature.

Hot Test	Generator Data	Cold Test	
Amperes	R.P.M.	Amperes	R.P.M.
Neutral	500	Neutral	500
10-12	900	10.5-12.5	900
14-16	1400	15.5-18.0	1400
11-13	2000	13.0-17.0	2000

To increase charging rate loosen the two screws holding third brush arm and move third brush in a counter-clockwise direction (looking at commutator end). To decrease charging rate move third brush in a clockwise direction. Brush must be reseated after adjusting position.

OILING.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch. The overrunning clutch at driving end allows generator to operate as a motor when battery's pressure is above that of generator. If engine is killed when stopping, the noise made by the clutch serves to attract the operator's attention to open the ignition switch. The opening and closing of the generator-battery circuit by the operator takes the place of the relay.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp. On 1916-17-18 cars, head lamps are 6-8 volt, 12 or 14 cp. Dash and tail lamps are 3-4 volt, 2 cp.

Note:—On Model 84, generator field is connected to the ungrounded main brush.

PATERSON

MODELS 6-46 AND 6-46-R (1920)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Battery is 6 volt, 110 ampere-hour. The negative (—) terminal is grounded

IGNITION.—Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Distributor shaft bearings are of the oilless type. If the rotor button and its track in the distributor head are not well polished, apply a small amount of vaseline with a soft cloth.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control one-third advanced.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model No. 106. Starter is connected to the engine through a Bendix drive. Operating freely, current is 40 amperes. Lock torque is 16 pound-feet, with 3.5-3.8 volts.

OILING.—Starter bearings are of the oilless type.

GENERATOR.—Model No. 105. Generator current regulation is by third brush system. Generator begins to supply current at 6-8 miles per hour or 500 R.P.M. of armature and reaches its maximum output at 18-22 miles per hour, or 1400 R.P.M. of armature.

Generator Data

Hot Test		Cold Test	
Amperes	R.P.M.	Amperes	R.P.M.
Neutral	500	Neutral	500
10-12	900	10.5-12.5	900
14-16	1400	15.5-18.0	1400
11-13	2000	13.0-17.0	2000

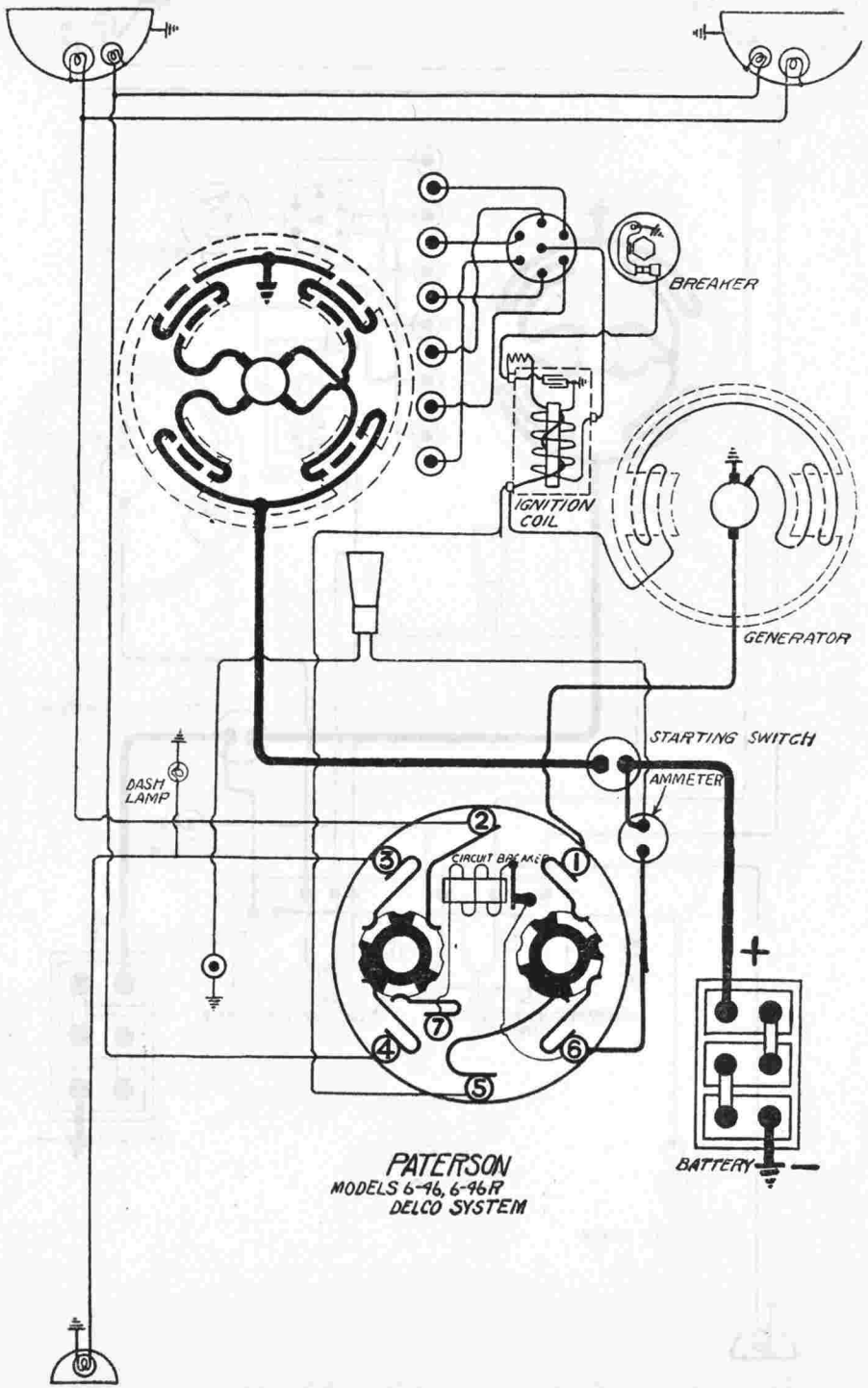
To increase charging rate loosen the two screws holding third brush arm and move third brush in a counter-clockwise direction (looking at commutator end). To decrease charging rate move third brush in a clockwise direction. Bush must be reseated after adjusting position.

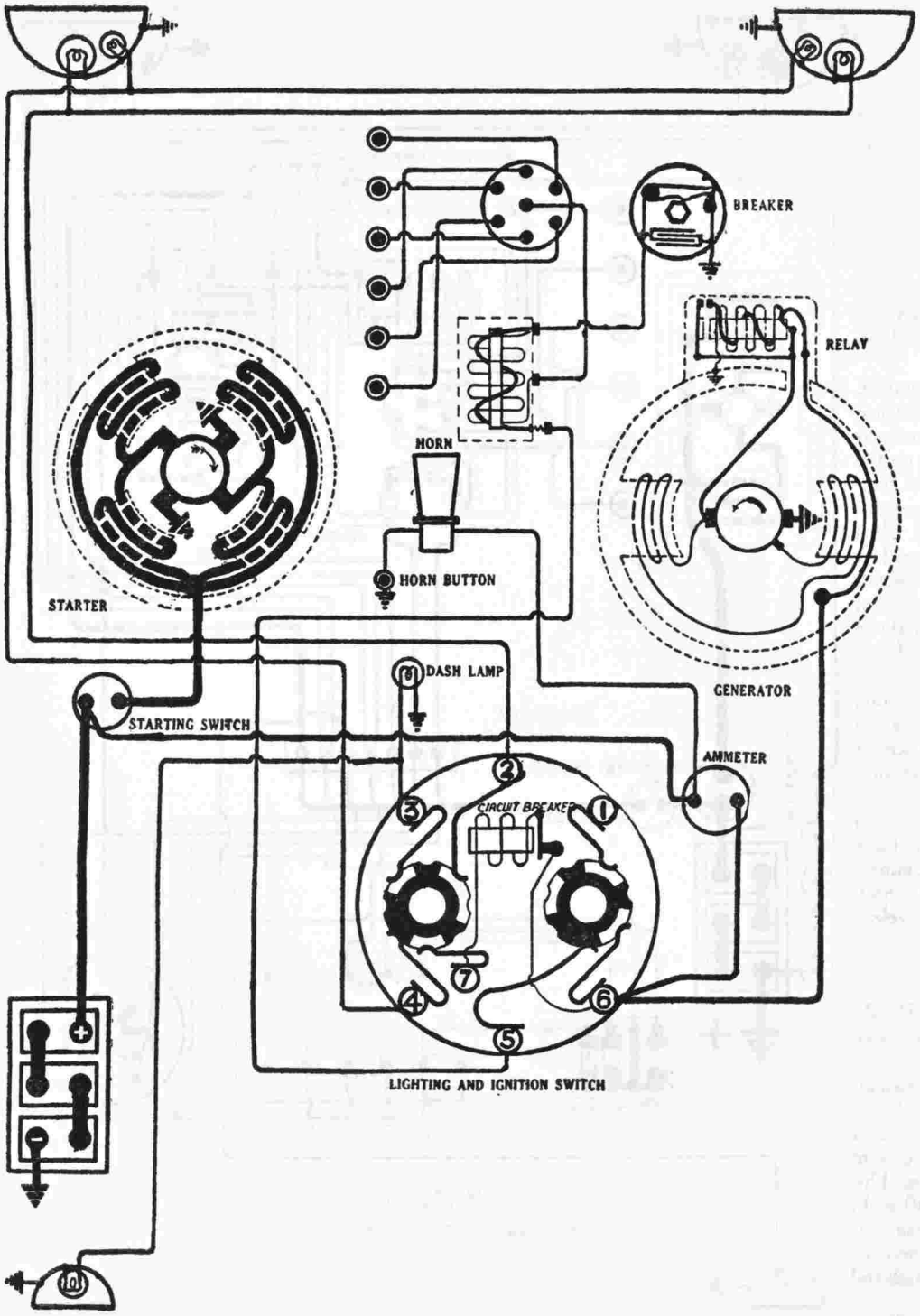
OILING.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch. The overrunning clutch at driving end allows generator to operate as a motor when battery's pressure is above that of generator. If engine is killed when stopping, the noise made by the clutch serves to attract the operator's attention to open the ignition switch. The opening and closing of the generator-battery circuit by the operator takes the place of the relay.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tial lamps are 6-8 volt, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start this device vibrating. While vibrating, the current is 3 to 5 amperes.





PATERSON

MODEL 6-47 (1920-21-22)
MODEL 22-6-52 (1922-23)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SJRN-3, 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2159, Distributor Model No. 5207. Breaker contacts separate .020 to .0275 inch. They are made of tungsten. When the condition of the contacts affects the ignition remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Put 3 or 4 drops of light engine oil in the oiler at the side of the distributor every 500 miles. Apply a very small amount of light grease or vaseline to the face of the cam every 1000 miles. If the track of the rotor button is not well polished it should receive a very small quantity of vaseline. Pack the distributor housing with light cup grease once each season.

Timing.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1⅜ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .030 inch.

STARTER:—Model No. 164,181. Direction of rotation is clockwise, looking at the commutator end. Starter is connected to the engine through a Bendrix drive and a set of reduction gears. Running free, the starter takes 30-40 amperes at 6 volts. The lock torque is 28 pound feet at 4 volts, the current being 525 amperes. Remove the grease plug in the reduction gear case and inject soft cup grease every six months.

Oiling.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR.—Model No. 165. Rotaton is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Maximum charging rate is 16 amperes reached at 1200 R.P.M. of the armature.

Generator Data.

Amperes	R.P.M.
Neutral	550
4	800
8	1000
11-15	1200
11-14	2000

The charging rate of the generator is adjusted by shifting the third brush by loosening the three screws holding the bearing retainer plate on the commutator end and shift the plate. Move in a counter-clockwise direction to increase the charging rate, or in the opposite direction to decrease the charging rate. Tighten the adjustng screws and reseat the brush after making the adjustment. Maximum charging rate must not exceed 16 amperes.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is drven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes when the voltage of the generator reaches 7.5 volts, and opens when there is a discharge current of 0 to 2 amperes. Relay contacts separate .046 to .062 inches. Air gap between the relay armature and coil core is .020 to .035 inch, contacts closed. To adjust relay connect a voltmeter between the positive (+) generator brush and ground. Then slowly speed up the generator and adjust the relay spring tension by turning the thumb nut until the contacts close when the voltmeter indicates 7.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volts, 24 cp. Dimmer lamps are 6-8 volt, 6 cp. Dash and tail lamps are 3-4 volt, 4 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. A current of 25 amperes will start the vibrator, which, while operating, reduces the current to 3-5 amperes.

COMBINATION SWITCH.—Delco No. 1171.

Pathfinder

1915

Westinghouse Starting and Lighting System
Westinghouse Ignition

Battery.—Battery is 6 volt, 130 ampere-hour. The positive (+) terminal is grounded.

Ignition.—The ignition system and generator is combined into one unit. The breaker is operated direct from the armature shaft. The centrifugal weights perform the double duty of automatically advancing and retarding the spark in relation to the engine speed, and of closing the timer contacts at the proper time. As these weights are revolved, they bear against the fiber bumper on the contact arm, pushing it down and causing the contact points to be brought together. As the weights are moved further, their bearing surface passes off the fiber bumper, which allows the spring to force contact arm upwards, causing the contacts to be quickly separated. As the speed increases, the weights are thrown out from the center, and automatically advance the time of opening of the contacts, hence advancing the spark. The weights are so shaped that they permit the contacts to be closed a greater part of the revolution, as the spark advances, resulting in a uniform spark at all speeds.

Adjustment.—When the engine is not running and one of the weights is depressing the fiber bumper, the air gap between the bumper lever and the stop should be 3/64 of an inch. This distance must be correct before the contact clearance is adjusted. With this distance correct, the contacts should be separated .005 inch to .008 inch when the contact arm or bumper lever is resting on the stop. Interrupter weights should turn freely on their supporting pins and their surfaces should clear the back of the spring support by .01 inch. After making adjustments, see that both weights depress the contact lever sufficiently that positive connection between the contacts is assured when engine is cranked very slowly by hand. If they do not, there will be a tendency of missing at low speed, especially if contacts are worn or otherwise not in first-class condition. When the weights are in the inner (or retarded) position the springs should just touch the fiber covered pins without exerting any appreciable pressure on them. If it is necessary to adjust these springs, always do so by bending the supporting arms, not the springs themselves. Distributor brushes should move freely in their holders. The springs should exert just enough pressure on them to force their ends ½ inch from holder. They should be retained by the springs so that they do not tend to fall out. The gears should be so meshed that the mark on the edge of the distributor (large) gear lines up with the tooth on the small gear (on the armature shaft) which is slightly beveled. The two screws holding the distributor plate in place make connection between the ignition coil and the generator. They must both be screwed firmly in place to complete the coil circuit.

Timing.—To time generator to engine, first turn engine until the piston of No. 1 cylinder is on top dead center, both valves closed, then remove distributor plate and turn generator armature back until the mark on the distributor brush holder lines up with the mark on the end bracket. Connect to engine in this position and connect spark plug to the distributor according to the firing order. Should timer contacts become badly burned or pitted, resurface them with a fine, flat jeweler's file or a strip of worn No. 00 sand paper.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—Spark plug gaps should be about .023 inch.

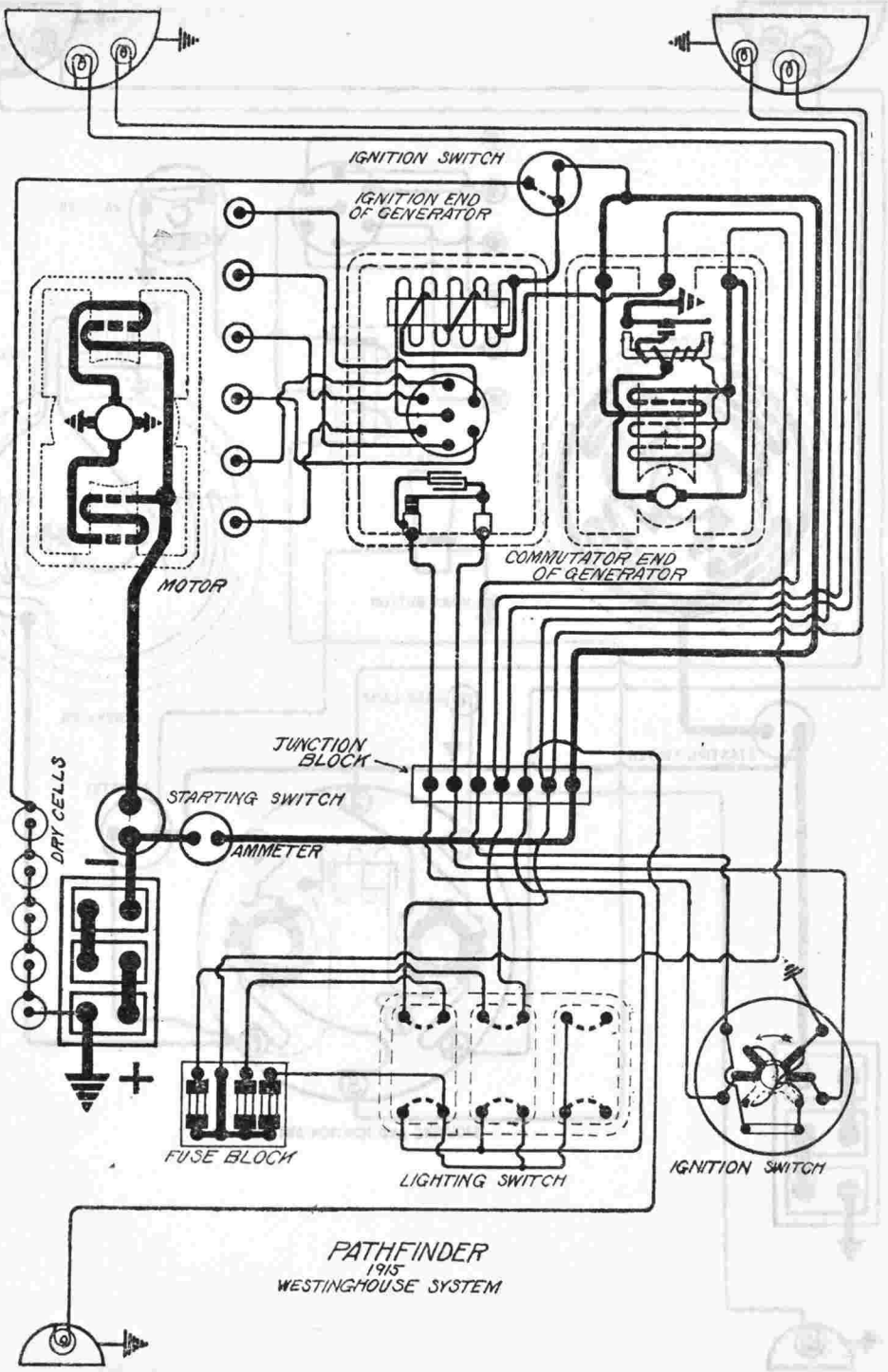
Starter.—Starter is connected to the engine through a Bendix drive. It should run at 1500 R. P. M., when delivering 2 pound-feet torque. It should develop 11.5 pound-feet lock torque, taking about 400 amperes.

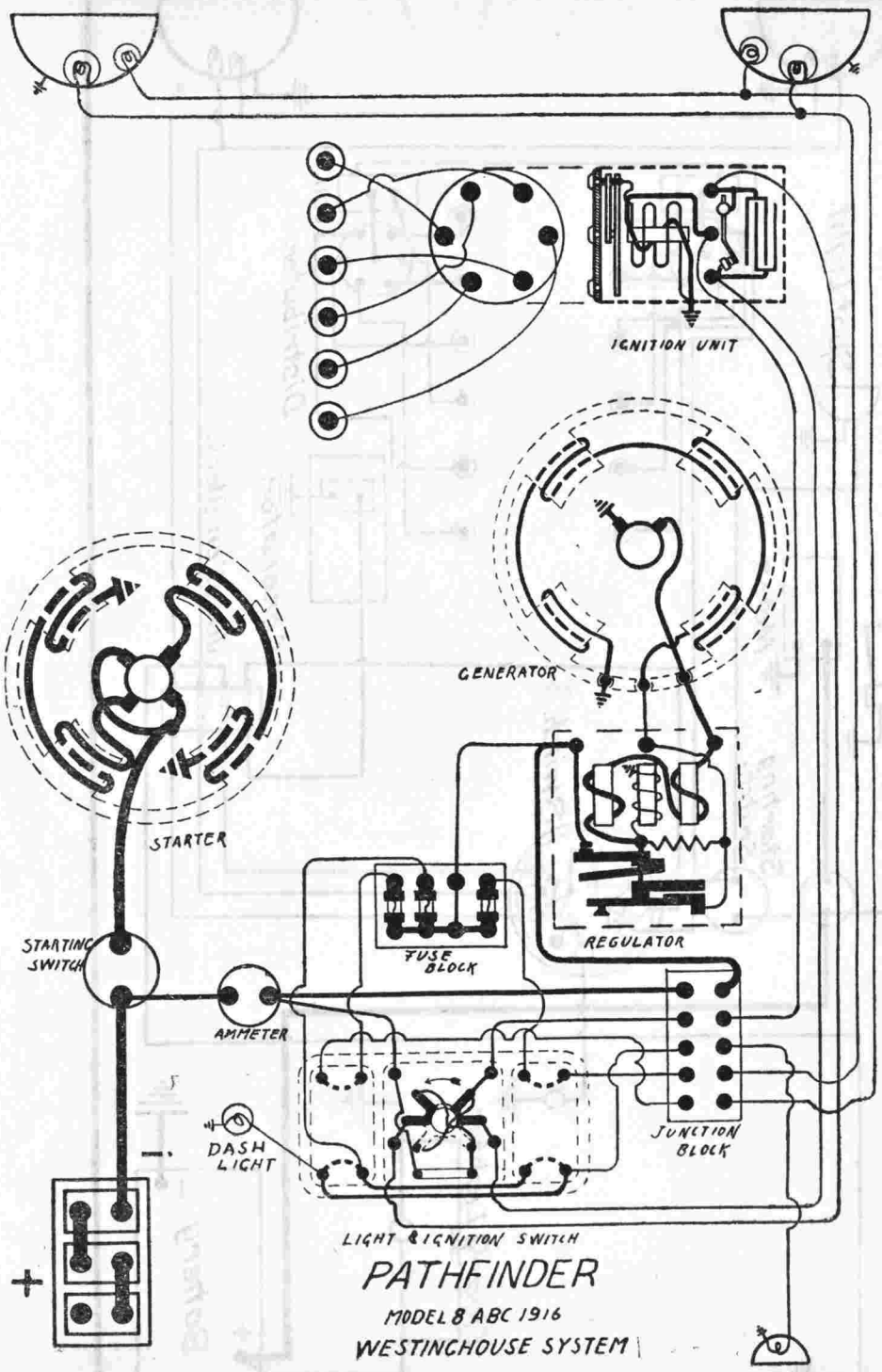
Oiling.—Refill the wicked oil cup under the starter bearings with light machine oil every month.

Generator.—Generator charging current regulation is by reverse field. Current taken by the lamps does not flow through the series winding, hence has but little effect on the charging rate. Generator should deliver about 15 amperes at 7 volts, reached at about 2500 R. P. M. Charging current should be .5 to 1.5 amperes at closing and .75 to 1.25 amperes at opening of relay contacts. The air gap between relay armature (moving member) and coil core should be .027 inch to .030 inch. Contacts should separate .013 inch to .017 inch. Adjust by bending the brass prongs. Clean contacts by drawing a piece of unglazed paper between them. Should they be badly burned or pitted, resurface them with a piece of well worn No. 00 sand paper, drawing a piece of unglazed paper between them, to remove all grit, and adjust, before again putting into service.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 15 cp. Dimmer lamps are 6-8 volts, 4 cp. Tail lamp is 6-8 volts, 2 cp.





PATHFINDER

MODELS 8 A-B-C (1915-16-17)

Westinghouse Starting and Lighting System
Westinghouse Ignition

Battery.—Battery is 6 volt. 100 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate .006 inch to .008 inch. Should they become burned or pitted, affecting the ignition, resurface them with a fine, flat jeweler's file. The springs should exert just enough pressure on the distributor brushes to force them ¼ inch past the top of the holder when the distributor cap is removed, but should retain them firmly so that they do not tend to fall out. Brushes must move freely in their holders. Be sure that both brushes are in place when replacing the rotor. (There is a brush on both top and bottom side of the rotor).

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever within one inch of the fully retarded position. (First see that breaker assembly is fully retarded when control lever is in the fully retarded position). Contacts are beginning to separate when the end of the distributor rotor is directly opposite the V notch on the rim of the case.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—Spark plug gaps should be about .025 inch.

Ballast Resistor.—There is a ballast resistor in the ignition switch. A fuse must not be permanently substituted for this resistor. In case it is necessary to operate the car with the ballast defective, a 5 ampere fuse may be used temporarily, but the ballast must be replaced as soon as possible, as continued operation without it will result in serious burning of the timer contacts.

Oiling.—Put 3 or 4 drops of light machine oil in the oil cup at the side of the breaker assembly unit every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

Starter.—Starter is connected to the engine through a Bendix drive. The Frame No. 318 starter should run at 1500 R. P. M., when delivering 2 pound-feet torque. It should develop 11.5 pound-feet lock torque, taking about 400 amperes. Frame No. 750 motor should run at 1050 R. P. M., when delivering 3.5 pound-feet torque. It should develop 17.5 pound-feet lock torque, taking about 500 amperes.

Oiling.—Put several drops of light engine oil in each of the starter oilers every month.

Generator.—Generator Frame No. 400 voltage regulation is by a vibrating regulator. Relay is combined with the regulator. The charging current should be about 1.5 amperes at closing and the discharge current 1.25 amperes at opening of relay contacts. The gap between relay armature (moving member) and coil core should be .027 inch to .030 inch. Contacts should separate .013 inch to .017 inch. Adjust by bending brass prongs. Clean relay and regulator contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface them with a piece of well worn No. 00 sand paper, drawing a piece of unglazed paper between them, to remove all grit, before again putting into service. The output of generator Frame No. 400 should be 14 amperes at 7.5 volts. Generator Frame No. 240 charging current regulation is by reverse series field. The current taken by the lights does not flow through the series field hence it has but little effect on the charging rate.

GENERATOR DATA, FRAME NO. 240

Speed R. P. M.	Total Output Amperes	Charging Rate, No Lamps Amperes
400	2	1.0- 1.5
500	5-6	2.5- 3.0
750	10	6.0- 6.5
1000	13	8.5- 9.0
1250	15-16	9.5-10.0
1500	16-17	10.5-11.0
2000	18	11.0-12.0
2500	18-19	12.
3000	19	12.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 15 cp. Dimmer lamps are 6-8 volts, 4 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.

Fuses.—Fuses are 20 ampere.

Pathfinder

12 Cylinder Models. (1917-18)

Delco Starting and Lighting System Delco Ignition

Battery.—Battery is 6 volt, 130 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Two separate ignition coils, timers and distributors provide a complete and separate ignition system for cylinder block. Breaker contacts should open .018 inch to .020 inch.

Care.—Should they become badly burned or pitted, resurface them with a very fine flat jeweler's file or a small strip of worn No. 00 sand paper.

Timing.—Contacts should be just beginning to separate when the piston entering power stroke is on top dead center, spark control lever within one inch of the fully retarded position. (Make sure that breaker nearly is fully retarded when control lever is in this position.)

Firing Order.—The firing order is 1R, 1L, 4R, 4L, 2R, 2L, 6R, 6L, 3R, 3L, 5R, 5L.

Spark Plug Gaps.—The proper spark plug gap is .028 inch to .031 inch.

Oiling.—Once every two weeks put 4 or 5 drops of light machine oil in each of the oil holes beneath the cover on the top of the distributor. If the machine is run more than 500 miles in two weeks, oil every 500 miles. Thoroughly clean out and repack the lower distributor ball bearing with soft cup grease, two or three times a season.

Starter.—The starter (Model 86) is connected to the engine by a Bendix drive. It should develop at least 16 ft. lbs. lock torque. When running free it should not take over 40 amperes. Tests should be made with a line voltage of 3.5 volts to 3.8 volts, machine running. The motor requires absolutely no oil. Should the pinion stick on the shaft, clean the shaft well with gasoline.

Generator.—Generator voltage regulation (Model 87) is by third brush system. Relay should close at 8-10 miles per hour and open when the discharge current reaches 2 amperes. The generator should reach the neutral point (that is, the point at which it neither delivers current to, or receives current from the battery) at about 500 R. P. M. The following data applies to the generator:

Hot—Output-Amp.	R. P. M.	Cold—Output-Amp.	R. P. M.
Neutral	500	Neutral	500 (or less)
11-13	900	11.5-13.5	900
16-18	1400	16.5-19.5	1400
15-17	1800	15.5-18.5	1800
14-16	2000	15-18	2000

Care.—The third brush should not be adjusted when the generator is hot from operation. Every two weeks, put 4 or 5 drops of light engine oil in each of the generator oilers. If the machine is run more than 500 miles in two weeks, oiling every 500 miles.

Lamps.—Head lamps are 6-8 volts, 15 cp. Dimmer lamps are 6-8 volts, 5 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.

Circuit Breaker.—There is a circuit breaker located on the lighting switch, to take the place of fuses in the lighting circuits.

Model Numbers.—Generator is model No. 87; starter No. 86; starting switch No. 1966; combination lighting and ignition switch No. 1082; distributor No. 5156; ignition coils 2123; ammeter No. 6064.

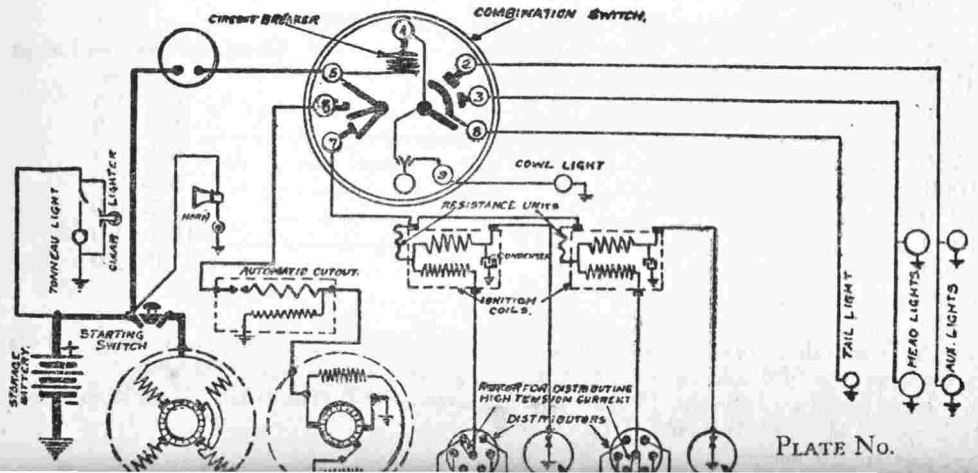
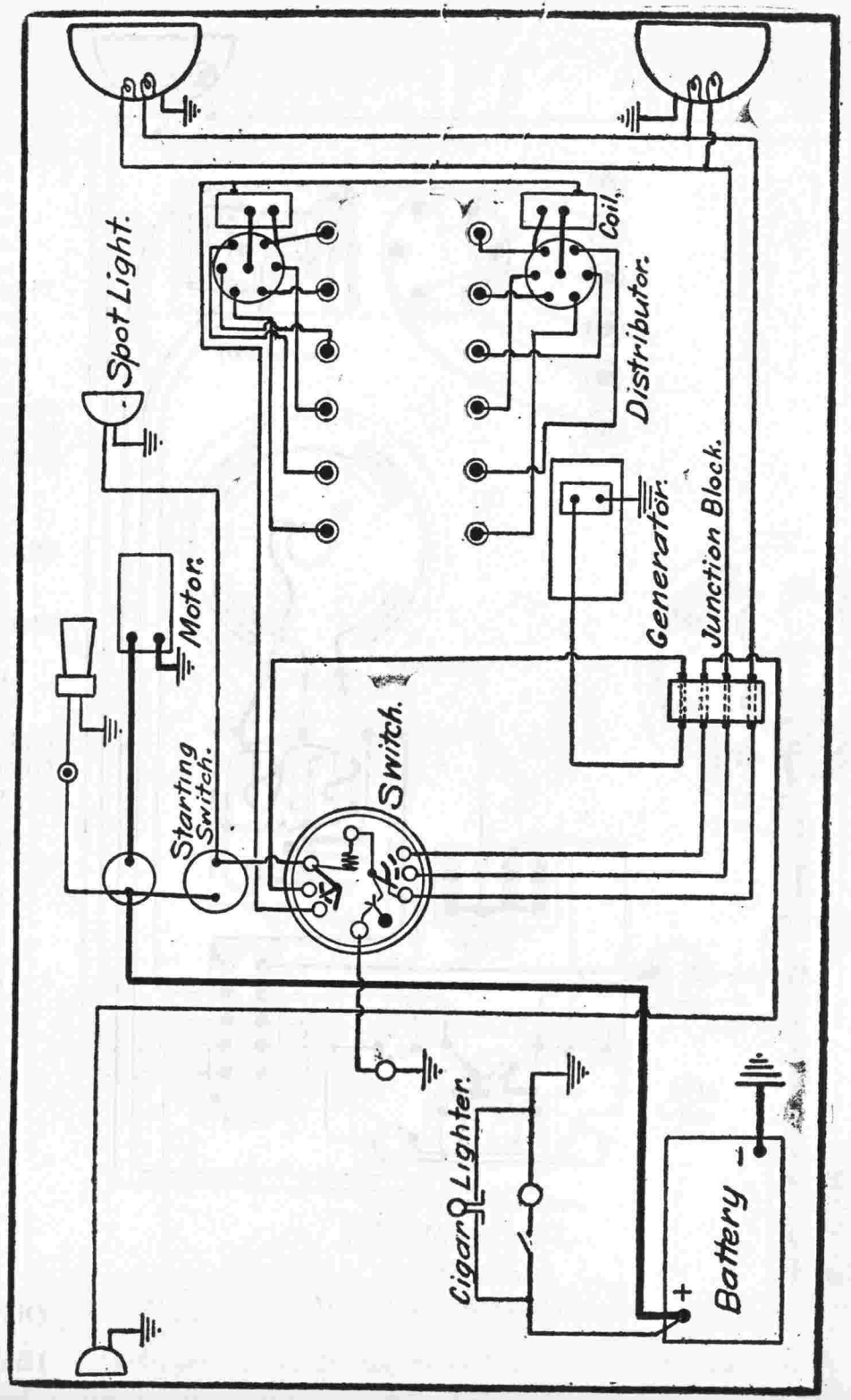
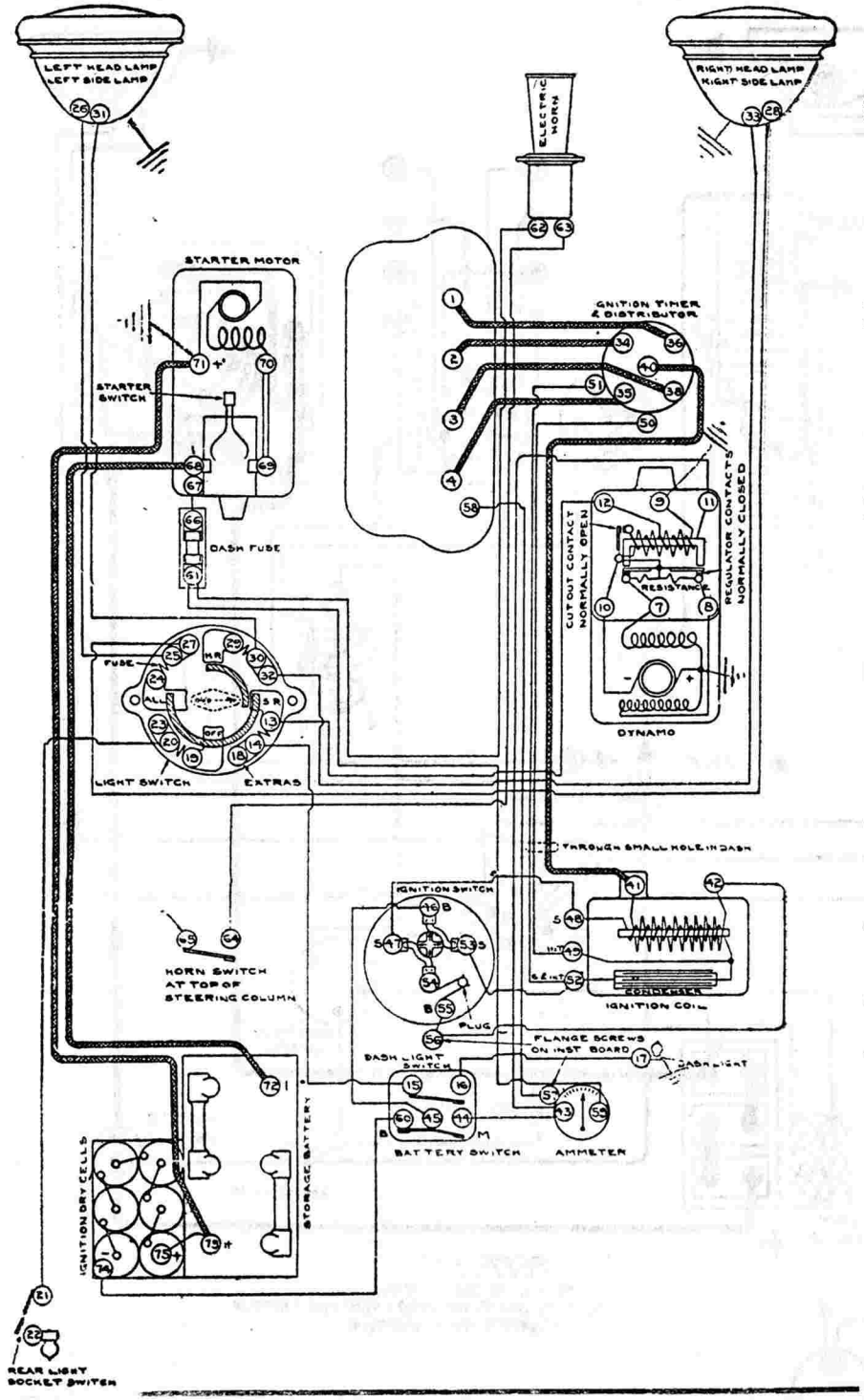


PLATE No.



PEERLESS

MODELS 54 AND 55 (1915)
MODELS 48 (1915-16) 56, 56-F (1916)
Gray and Davis Starting and Lighting System
Atwater-Kent Ignition



Battery.—A 6 volt, 85 ampere-hour capacity battery is used on the 1915 cars. On the 1916 cars a 6 volt, 115 ampere-hour capacity battery is used. The positive (+) terminal is grounded at the starting motor.

The Models 56 and 57FF are the same as the 54 and 55 except for the starter switch and starter transmission. On the Models 56 and 57FF cars, the switch is under the floor boards. Its only function is to open and close the starting circuit. On these models the dash fuse is connected to the negative (—) terminal of the starter switch and the positive (+) terminal of the battery is grounded to the car frame instead of being led to the motor first.

Ignition.—Breaker contacts should open .010 inch to .012 inch. They are made of tungsten metal. If it is desired to adjust or work on the breaker or distributor, the unit may be removed as directed on Plate No. 15 and taken to a convenient place to work.

Timing.—Spark should occur when the piston entering power stroke is on top dead center, spark control lever on the steering gear midway between the fully retarded and the fully advanced position.

Firing Order.—On the 1915 type 5K cars, the firing order is 1, 4, 2, 6, 3, 5. Since that time, the firing order of all six cylinder cars is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—The spark plug gap is .030 inch to .034 inch.

Oiling.—Clean thoroughly and put a small amount of light machine oil on the wearing parts of the breaker, every month. This oil must reach the lifter guide, the latch pivot and the notched shaft, but the contact points must be kept free from oil and all foreign matter. If the machine is driven more than 1000 miles per month the oiling must be done every 1000 miles. Do not test the circuit across the contacts with a screw driver or other conducting material as the resulting current flow will injure the parts.

Starter.—The starter is connected to the engine by a set of reduction gears and sliding pinion which meshes with the flywheel gear. When the starting pedal is depressed, the pinion is moved along the keyed shaft. If it is in the proper position to mesh with the flywheel gear when it reaches it, they are meshed immediately. If not, the spring is compressed, which forces the pinion into mesh as soon as the starter switch is closed and the armature begins to turn. There is an overrunning clutch to prevent the engine driving the starter.

Oiling.—Every two weeks put 8-10 drops of light engine oil in each of the motor oilers. If the machine is driven more than 500 miles in two weeks, the oiling must be done every 500 miles. The gears and sliding surfaces must be kept well oiled. The starter gear case should receive at least one tablespoonful of heavy engine oil every month.

Generator.—Generator voltage regulation is by a vibrating regulator, combined with the relay and mounted on the generator case. When relay or regulator contacts become dirty, they should be cleaned by drawing a piece of soft paper between them.

Care.—If they are corroded or burned, due to operating when oily or under other adverse conditions, they should be resurfaced with a very fine, flat jeweler's file or a worn piece of No. 00 sand paper.

Output.—The maximum output of the generator is reached at 10-12 miles per hour.

Charging Rate.—The charging rate will vary with the state of charge of the battery. When the battery is nearly discharged, the charging current may reach as high as 14-16 amperes. This rate will gradually reduce to 4 or 5 amperes when the battery is nearly charged. When the lights are turned on, the frequency at which the regulator operates is reduced, thus increasing the output of the generator and holding the charging rate practically constant at a given speed, whether lights are "On" or "Off." The generator terminals are marked "B" and "L," (marked "11" and "12" on diagram.) Both of these terminals are negative. The frame serves as a positive terminal. The center terminal is grounded. It is the end of the shunt winding of the relay-regulator. Terminal "B" is the end of the series winding and is connected to the battery through the ammeter and fuse. Terminal "L" is the tap taken off the series winding at a point near the end. This terminal is to be connected to the lighting switch, and supplies the lighting circuits.

Oiling.—Once every two weeks put 8-10 drops of light engine oil in each of the generator oilers. If the machine is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 17 cp. Side or dimmer lamps are 6-8 volts, 5 cp. Dash and tail lights are each 6-8 volts, 2 cp.

Fuse.—The main fuse on the dash is of 30 amperes capacity. All other fuses are of 10 amperes capacity.

PEERLESS

MODEL 56, SERIES 2, 3, 4, 5, 6 (1917-18-19-20)
AUTO-LITE GENERATING, STARTING, LIGHTING SYSTEM
ATWATER-KENT IGNITION

BATTERY.—Battery is 6 volt, 115 ampere-hour. The negative (—) terminal is grounded at the starting motor.

IGNITION.—Breaker contacts separate .005 to .008 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put several drops of light engine oil in the oil hole, exposed when distributor cap is removed, every two weeks. At the same time put a very small amount of vaseline on the cam, applying with a toothpick. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

SPARK PLUG GAPS.—Spark plug gaps are .023 inch.

STARTER.—Model ME. Starter is connected to engine through a Bendix drive.

Starter Data—Model ME

Torque	R.P.M.	Amperes
1 lb. ft.	1960	80
3 lb. ft.	1100	160
5 lb. ft.	800	220
7 lb. ft	500	280
9 lb. ft.	230	340
13 lb. ft.	Lock	470

OILING.—Starter bearings are packed with soft cup or ball bearing grease. Thoroughly clean out and repack every 6 months.

GENERATOR.—Model GH, Special type. Generator current regulation is by third brush system.

Amperes	Generator Data. Special Model GH	R.P.M.
5		770- 855
10		1075-1210
12		1285-1575
12-13		1575-1625

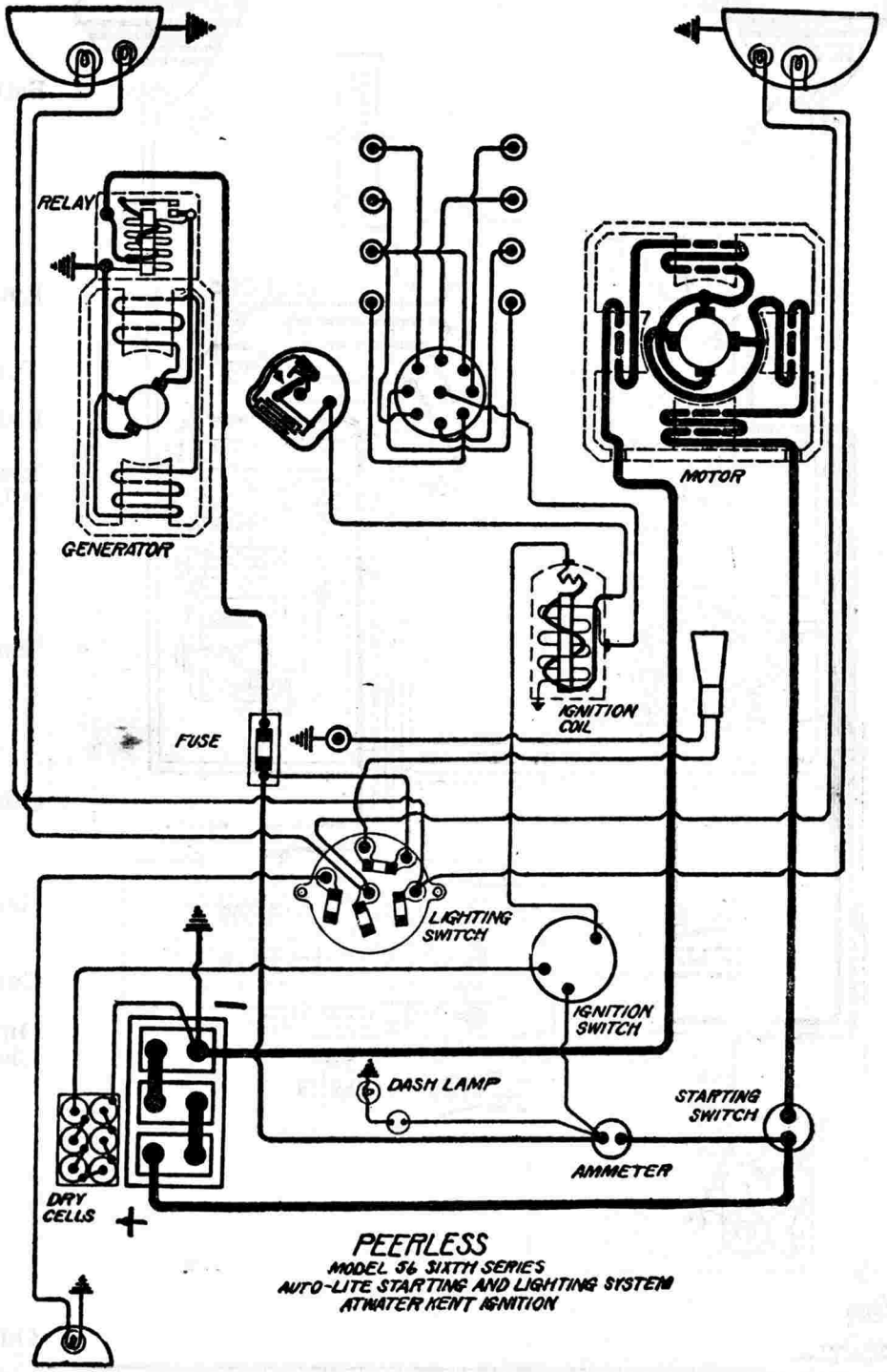
Brush pressure on commutator is 1 to 1¼ pounds.

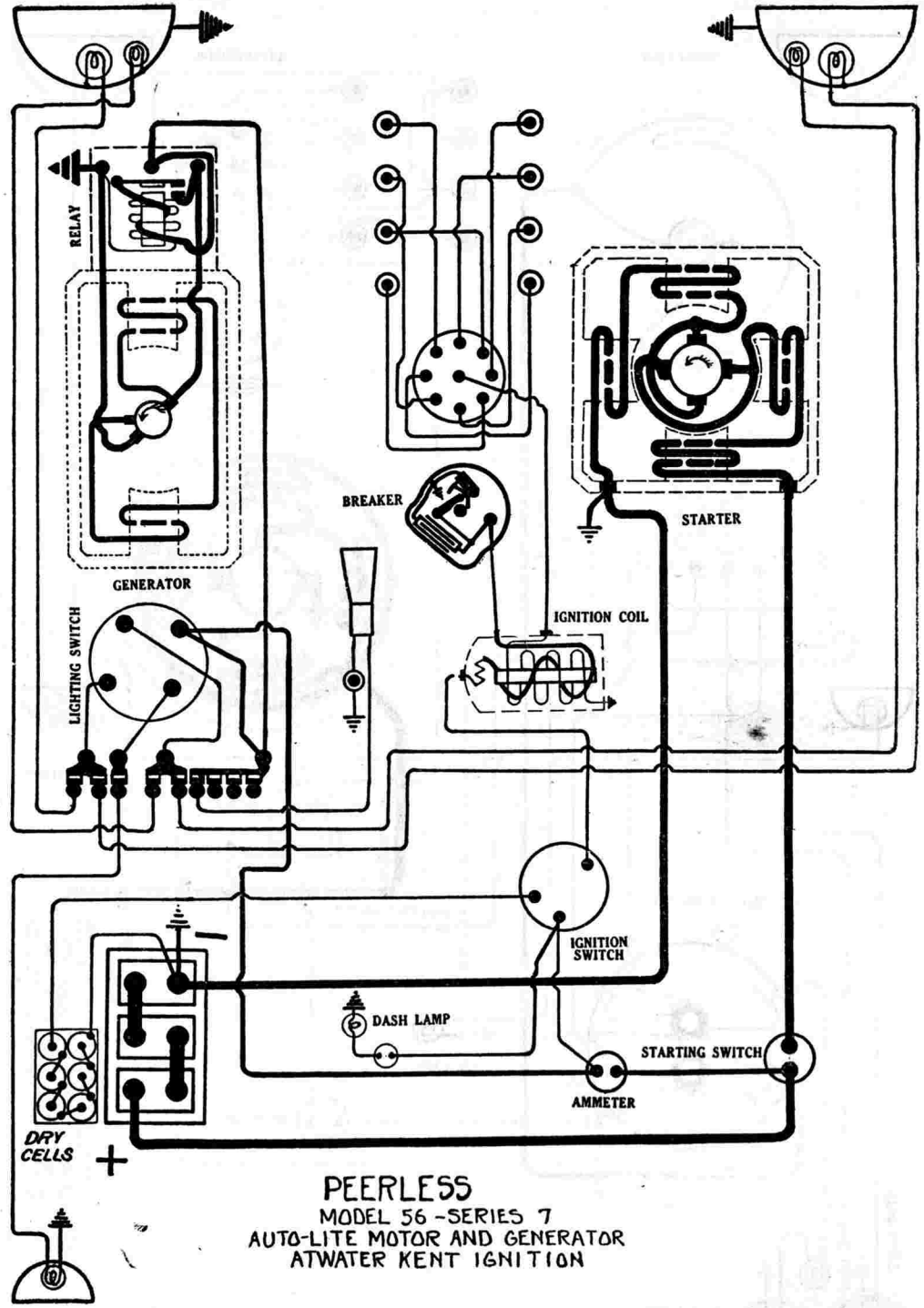
OILING.—Generator bearings are packed with soft cup or ball bearing grease, but should receive 2 or 3 drops of light engine oil every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Relay closes at 8 miles per hour, or 570-600 R.P.M. of armature and opens at 6 miles per hour or 500-570 R.P.M. of armature. Charging current is .5 to 1.5 amperes at closing, and the discharge current 0 to 1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Side lamp is 6-8 volt, 5 cp. Spot lamp is 6-8 volt, 5 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

FUSES.—Lighting fuses are 10 ampere.





PEERLESS
MODEL 56 -SERIES 7
AUTO-LITE MOTOR AND GENERATOR
ATWATER KENT IGNITION

PEERLESS

MODEL 56, SERIES 7 (1920-21-22)
AUTO-LITE GENERATING, STARTING, AND LIGHTING SYSTEM
ATWATER KENT IGNITION.

BATTERY:—Willard, (1921) Type SJRN-5 (1922) Type SJRG-5, 6 volt,125 ampere hour. The negative (—) terminal is grounded.

IGNITION.—Type CA. Coil Model N-7. Breaker contacts separate .015 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Put 4 or 5 drops of light engine oil in the ignition unit oilers every two weeks. Put a small amount of vaseline on the cam, applying with a toothpick. If the car is driven more than 500 milues in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when the piston entering the power stroke is on top dead center, spark control one-half advanced.

Firing Order.—The firing order is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

Spark Plug Gaps.—Spark plug gaps are .025 inch.

STARTER.—Model M.G. 1025. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes
2 lb. ft	1280	135
4 lb. ft	900	210
6 lb. ft	600	275
8 lb. ft	400	335
10 lb. ft	180	390
13 lb. ft	Lock	500

Oiling.—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month.

GENERATOR.—Model GH 1025. Generator current regulation is by the third brush system.

Amperes	Generator Data. Model GH	R.P.M.
5		770- 855
10		1075-1210
12		1285-1575
12-13		1575-1625

Brush pressure on commutator is 1 to 1¼ pounds.

Oiling.—Generator bearings are packed with soft cup or ball bearing grease, but should receive 2 or 3 drops of light engine oil every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Relay closes at 8 miles per hour, or 570-600 R.P.M. of armature and opens at 6 miles per hour or 500-570 R.P.M. of armature. Charging current is .5 to 1.5 amperes at closing, and the discharge current 0 to 1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp. On enclosed models side lights replace the dimmer lights shown here. Side lights are 6-8 volt, 4 cp.

FUSES.—Fuses are 10 ampere.

PEERLESS

MODEL 66, SERIES 23 (1922-23-24)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Exide, Model 3-XXV-19-2, 6 volts, 19 plate, 120 ampere hour. The positive (+) terminal is grounded.

IGNITION: — **Coil Model No. 2177. Distributor Model No. 5250.** Breaker contacts separate .015-.0225 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a hard oilstone.

Oiling.—Put 8 or 10 drops of light engine oil into each distributor oiler every two weeks. If car is driven over 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when piston entering power stroke is 15 degrees before top dead center (measured on the flywheel) with the spark control lever and breaker assembly in the fully advanced position.

Firing Order.—The firing order is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

Spark Plug Gaps.—The spark plug gaps are .020 to .025 inch.

STARTER.—Model No. 248. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Running free the starter takes 50 amperes at 6 volts. Lock torque is 12 lb. ft. at 2.75 volts. The pressure of the starter brushes on the commutator should be 2¼ to 2¾ pounds.

Oiling.—Put 8 or 10 drops of light engine oil into oiler on commutator end of motor each 500 miles or every two weeks. Saturate the large cotton wick in the oiler on the Bendix drive end of motor each 2000 miles.

GENERATOR.—Model No. 247. Generator current regulation is by the third brush system. The armature is driven at one and one-half times engine speed. Generator charges battery at approximately 8 miles per hour in high gear, or at correspondingly lower speed in low gear. Maximum output is reached at 18 to 25 M.P.H. At higher speed charging rate decreases. Looking at commutator end, the direction of rotation is counter-clockwise.

Generator Test Data

Amperes	R.P.M.
5	800
13-15	1500
15-17 Max.	2000

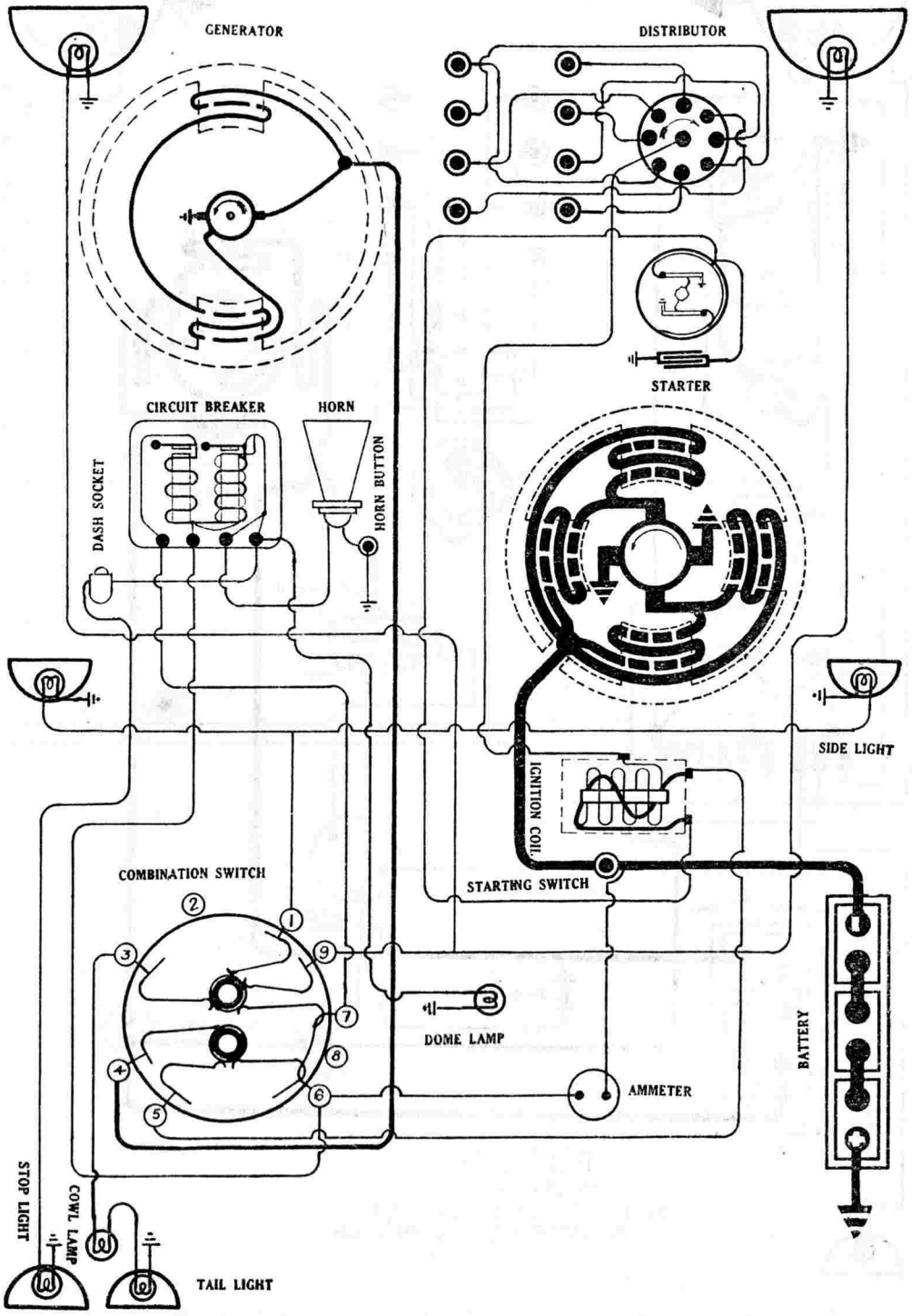
To adjust the generator output, loosen the commutator cover band and the two screws holding the third brush arm mounting bracket. Then shift the third brush in the direction of armature rotation (counter-clockwise) to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the two screws after making the adjustment. The pressure of the generator brushes on the commutator should be 1¼ to 1¾ pounds.

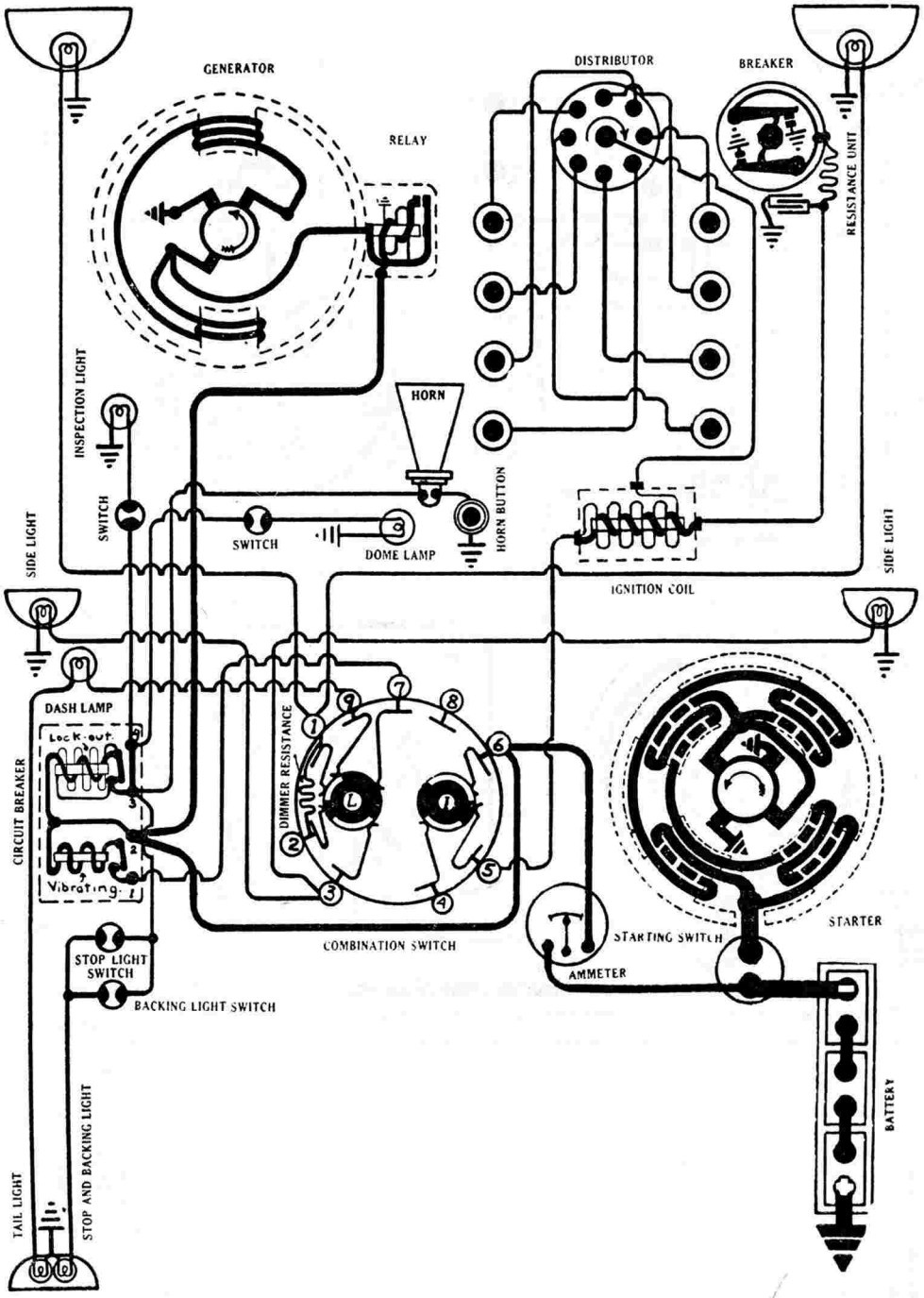
Oiling.—Put 8 to 10 drops of light engine oil into generator oilers every two weeks. If car is driven more than 500 miles in two weeks, these attentions must be given each 500 miles.

RELAY.—There is no relay. The current between the generator and the battery is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volts, 21 cp. Side lamps and dome lamps are 6-8 volts, 4 cp. Tail and dash lamps are 3-4 volts, 2 cp. Signal lamp is 6-8 volts, 21 cp.

FUSES.—A vibrating circuit breaker takes the place of fuses. A current of 25 to 30 amperes will operate vibrator, and will continue to vibrate with a current flow not exceeding 15 amperes. A lockout breaker is located in the dome, stop, and handy lamp circuits and in the horn circuit. A current of 25-30 amperes causes it to open the circuit.





PEERLESS

MODEL 67 (1925) SERIAL NOS. 329,501 UP.
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Exide, Type 3-XX-V-19-2. 6 volt, 135 ampere hour. The starting capacity is 146 amperes for 20 minutes. The lighting capacity is 5 amperes for 27 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model No. 2177. Distributor Model No. 5250. Breaker contacts separate .015-.020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone. The tension of the breaker arm spring should be 13-16 ounces. Automatic advance begins at 500 R.P.M. and reaches a maximum of 14-18° at 1800 R. P. M. Total automatic and manual advance is 38°.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor head every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Place a small bit of medium heavy grease on the surface of the breaker cam every 1000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 15° before top dead center (measured on the flywheel) with the manual spark control lever in the fully advanced position, or on top dead center with the spark control lever in the fully retarded position.

Firing Order:—The firing order is 1R-1L-4R-4L-2L-3R-3L-2R.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .020-.025 inch.

STARTER:—Model No. 277. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The starter brush tension should be 2¼-2½ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	....	6	50
13 "	Lock	3.2	....

Oiling:—Oilless bearings are used. They require no attention.

GENERATOR:—Model No. 258. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the generator output, loosen the commutator cover band and shift the third brush arm mounting plate by means of the handle attached. Shifting the third brush in the direction of generator rotation increases the charging rate and in the opposition direction decreases the charging rate. The mounting plate is held in any position desired by means of friction washers.

Generator Data

Amperes	R.P.M.
4	800
17	1600

The generator brush tension should be 1¼-1¾ pounds each.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Relay contacts close when the voltage of the generator reaches 6.75 to 7.5 volts and open with a discharge current of 0-3 amperes. Relay contacts separate .015 to .025 inch. Air gap between armature and coil core is .025 to .030 inch, contacts closed.

LIGHTING:—Combination Switch Model 1265. Head lamps and stop lamp are each 6-8 volt, 21 cp. Side and dome lamps are 6-8 volt, 4 cp. Tail and dash lamps are in series. They are each 3-4 volt, 2 cp.

CIRCUIT-BREAKER:—Model No. 5759. A vibrating circuit breaker is located in the lighting circuits. It requires a current of 25-30 amperes to start this device vibrating. While operating, the current is 10-15 amperes. A lock-out circuit breaker protects the horn, handy lamp, signal lamp and dome lamp circuits. A current of 25-30 amperes causes this device to open the circuit.

PEERLESS

MODEL 6-70 (1924), 6-72 (1925-26)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY: — Exide, Type 3-XX-15-1, Willard Type XR-15. 6 volt, 105 ampere hour. The starting capacity is 114 amperes for 20 minutes. The lighting capacity is 5 amperes for 20 hours. The positive (+) terminal is grounded.

IGNITION: — Coil Model No. 2178. Distributor Model No. 5267. Breaker contacts separate .020 to .0275 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file or on a medium hard oilstone. Distributor is of the semi-automatic type. Manual advance is 30°. Automatic advance begins at 500 R.P.M. and reaches a maximum of 19-23° at 2000 R.P.M. Total automatic and manual advance is 53°. The tension of the breaker arm spring is 13-16 ounces.

Mounting.—Distributor is mounted at left of engine. To remove, disconnect primary lead and manual advance rod and remove distributor head. Remove advance lever clamp screw and lift distributor from place.

OILING: — Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles. Place a small bit of hard grease on the fiber bumper of the contact arm every month.

TIMING: — Breaker contacts begin to separate when the piston entering power stroke is 15° before top dead center (measured on the flywheel) as indicated by the mark on the flywheel and clutch housing, with the spark control lever and breaker assembly in the fully retarded position. To set timing, crank engine until No. 1 piston reaches this position. Fully advance spark control lever. Loosen advance lever clamp screw and rotate distributor housing until breaker contacts begin to separate. Then tighten the clamp and make certain that the rotor button is under the segment connected to the spark plug in cylinder No. 1.

FIRING ORDER: — The firing order is 1-5-3-6-2-4.

SPARK PLUGS: — Spark plug diameters are 7/8 inch. Gaps should be .025 inch.

STARTER: — Model No. 282. The starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 2¼-2½ pounds each. Starter switch is Model 1953.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	60
11 "	Lock	2.8	570

Mounting.—Starter is barrel mounted at left of engine. To remove starter, disconnect starter lead and remove large pilot mounting screw. Then lift starter from place.

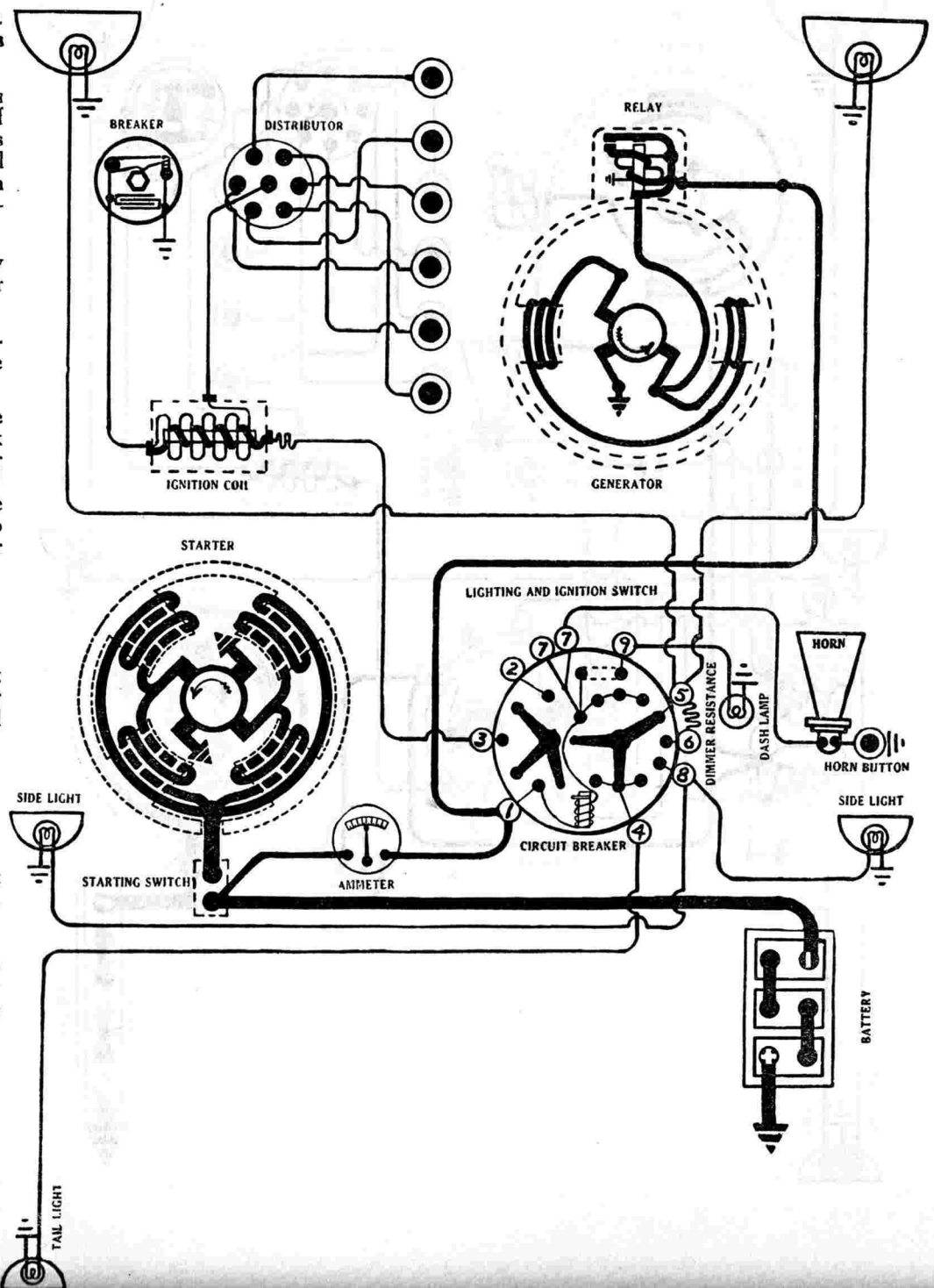
OILING: — Oilless bearings are used. They require no attention.

GENERATOR: — Model No. 284. Generator current regulation is by the third brush system. The direction of rotation is counter-clockwise, looking at the commutator end. The maximum charging rate is 18 amperes reached at 1600 R. P. M. of the generator armature or 20 M. P. H.

Generator Data.

Amperes.	R. P. M.
5	700
18	1600

To adjust the generator output, remove the commutator cover band and shift the third brush mounting plate by means of the handle attached. Shifting the brush in the direction of armature rotation (counter-clockwise) increases the charging rate, and in the opposite direction decreases the charging rate. The mounting plate is held in any desired position by friction washers. The pressure of the generator brushes on the commutator should be 1¾ pounds each.



PEERLESS

MODEL 6-70 (1924), 6-72 (1925-26)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM.
DELCO IGNITION.

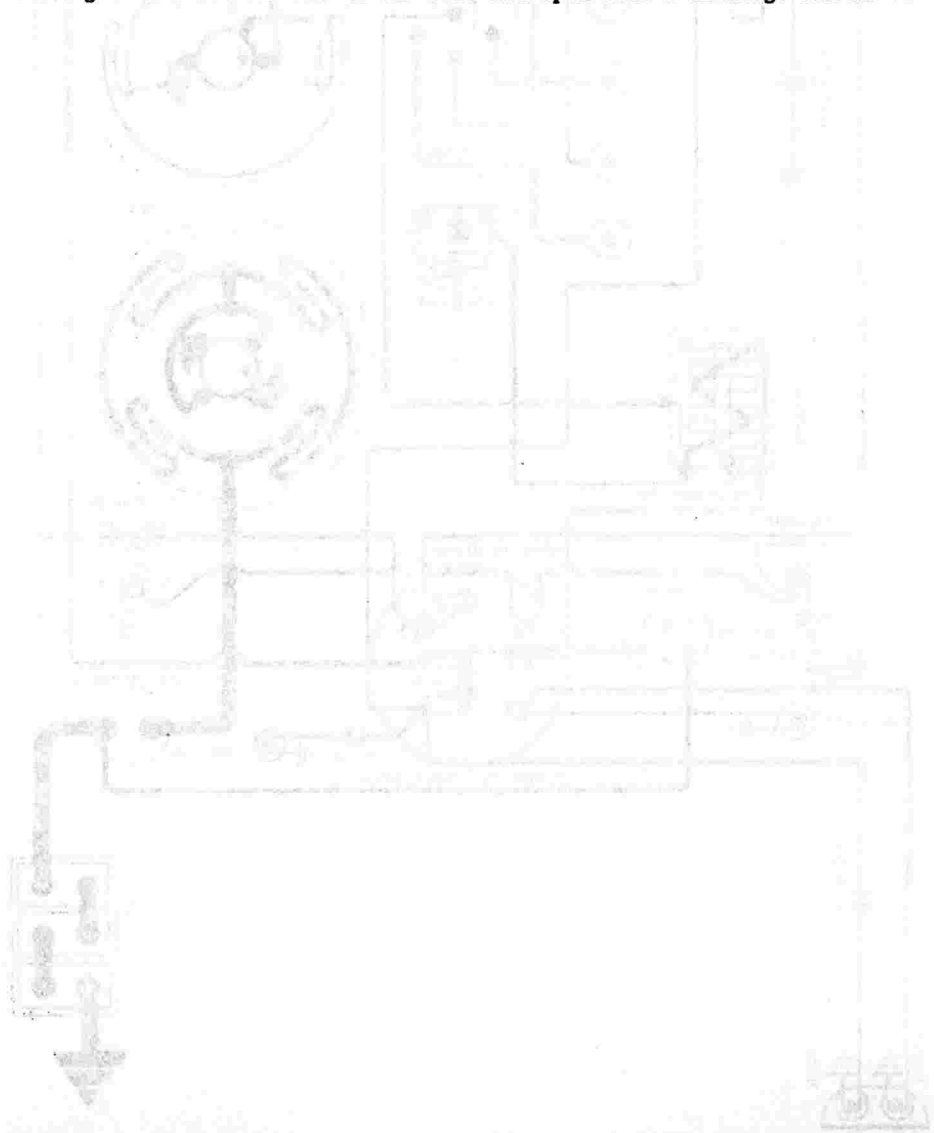
Mounting.—Generator is flange mounted at right of engine. To remove generator, disconnect generator lead and remove three flange mounting screws. The lower screw may be removed through a hole in the pan provided for this purpose. Then slide the generator from place.

OILING: — Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY: — Model No. 5754. Relay contacts close at 8 M. P. H. when the voltage of the generator reaches 6.75 to 7.5 volts and open with a discharge current of 0 to 3 amperes. The contacts separate .030 inch. The air gap beetween the relay armature and coil core is .015-.020 inch, contacts closed.

LIGHTING: — Switch Model No. 1260. Head lamps are 6-8 volt, 21 cp. S. C. Signal lamp is 6-8 volt, 21 cp. S. C. Dome lamp is 6-8 volt, 4 cp. S. C. Side, dash and tail lamps are each 6-8 volt, 2 cp. S. C.

CIRCUIT BREAKER: — A vibrating circuit breaker mounted on the back of the switch takes the place of fuses. A current of 25-30 amperes will cause this device to operate. While vibrating the current is 10-15 amperes.



PEERLESS

MODEL 6-80 (1926)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

BATTERY.—U. S. L., Type XY-13X. 6 volt. Starting capacity is 102 amperes for 20 minutes. Lighting capacity is 5 amperes for 17.4 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model IG-4065. Distributor Model IG-4118-B. Breaker contacts separate .020-.024 inch. Resurface contacts with fine, flat jeweler's file or on a medium hard oilstone. Ignition current is 1-3 amperes with engine running and 3.4-5 amperes with engine stopped. Distributor is of the semi-automatic type. Manual advance is 20°. Automatic advance is 20°.

Mounting.—Distributor is mounted at right of engine forward of the generator. Mounting is by set screw and lock nut through the side of the distributor mounting bracket.

Oiling.—Refill the grease cup on the side of the distributor housing with medium heavy cup grease and turn down two turns every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Put a small bit of vaseline on the face of the breaker cam every 1000 miles. Every 5000 miles put one drop of light oil on the interrupter arm pivot pin.

Timing.—Breaker contacts begin to separate when the piston entering power stroke reaches a position two teeth on the flywheel before top dead center with the spark control lever in the fully advanced position.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER.—Model MN-4102. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 120 R.P.M., taking 130 amperes at 5.2 volts. Starter brush tension should be 1¼-1½ pounds each. Starter switch is Model SW-4001.

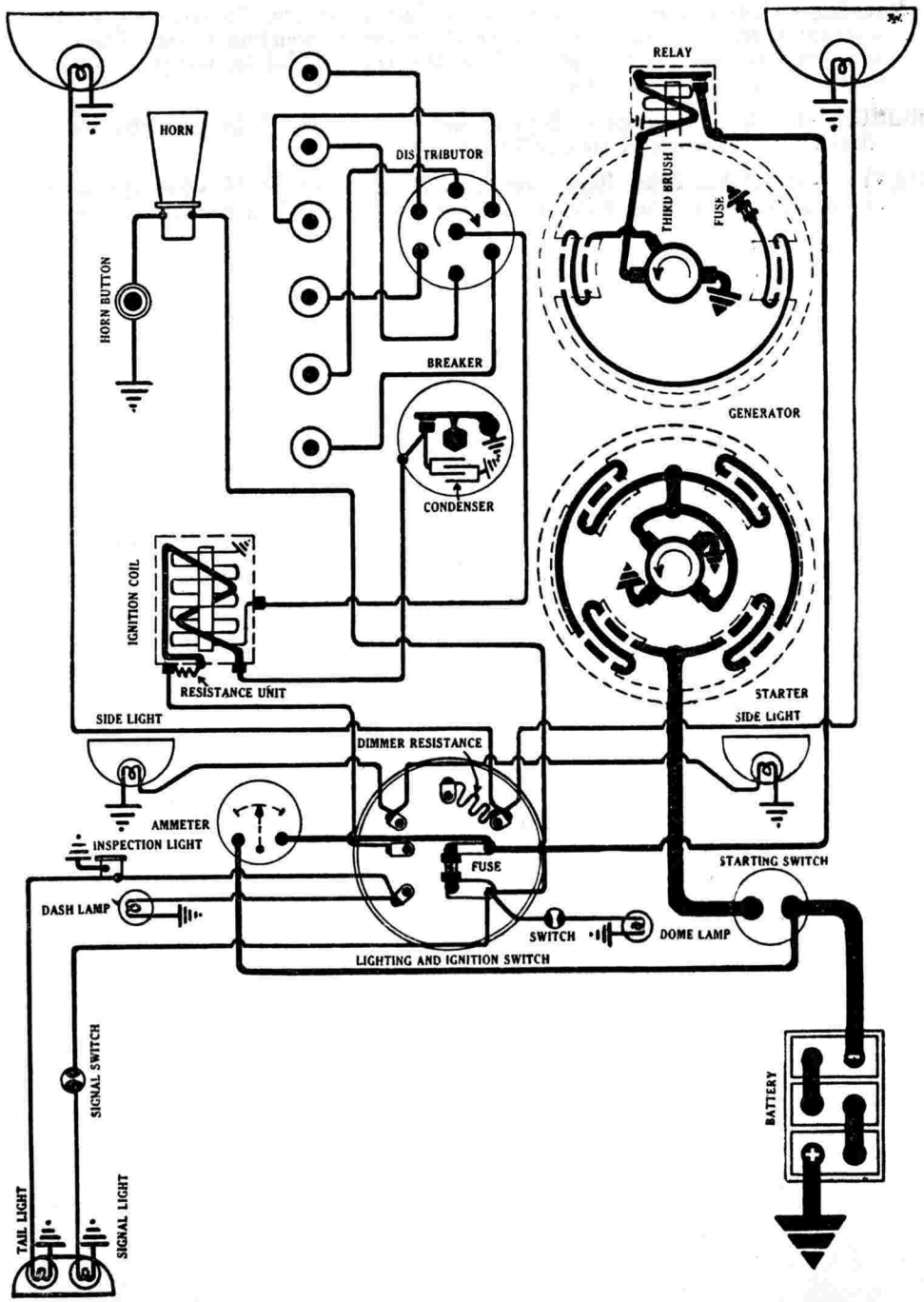
Starter Data

Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	Free	5.5	45	(Without Bendix)
0 "	Free	5.5	50	(With Bendix)
.5 "	2800	5.5	100	
2.4 "	1450	5	200	
4.8 "	950	4.5	300	
7.2 "	650	4	400	
13.6 "	Lock	3	540	

Mounting.—Starter is flange mounted at right of engine. To remove starter, remove three flange mounting screws and slide starter forward from position.

Oiling.—Put 5 to 10 drops of light engine oil in the oiler on the drive end of the starter every month or each 1000 miles. The commutator end bearing is oilless and requires no attention.

GENERATOR.—Model GY-4102. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the charging rate, remove the commutator cover band and shift the third brush mounting plate by tapping on the mounting stud with a screwdriver. Shifting the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. The mounting plate is held in any desired position by friction between the third brush mounting stud and the end plate. Maximum charging rate is 15.5 amperes at 8 volts.



PEERLESS

MODEL 6-80 (1926)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

Generator Data

Cold Test			Hot Test		
Amperes	R.P.M.	M.P.H.	Amperes	R.P.M.	M.P.H.
2	650	10	2	720	11
5	740	11	5	870	13.5
10	930	14	10	1210	19
14	1200	19			

Motoring freely, generator draws 5 amperes at 6 volts. Shunt field current is 3.2 amperes at 6 volts. Generator brush spring tension should be 1¼-1½ pounds each.

Mounting.—Generator is mounted at right of engine. Mounting is by two cap screws which extend through the flange at the rear of the extension mounting bracket into the generator end plate.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles. The drive end bearing is oiled by splash from the chain case.

RELAY.—Model CB-4007. Relay is mounted on top of the generator. Relay closes at approximately 650 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of .5-2.5 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING.—Clum Switch Model 10567. Head and stop lamps are each 6-8 volt, 21 cp. S. C. Dash, dome, side and tail lamps are each 6-8 volt, 3 cp. S. C.

FUSES.—Generator field fuse is 5 amperes.

PEERLESS

MODEL 8-69 (1926)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Exide, Type 3-XX-19. 6 volt. Starting capacity is 146 amperes for 20 minutes. Lighting capacity is 5 amperes for 27 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model 2178. Distributor Model 5297. Breaker contacts separate .0225-.0275 inch. They are made of tungsten. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or on a medium hard oilstone. Distributor is of the semi-automatic type. Manual advance is 18-22°. Automatic advance begins at 600 R.P.M. and reaches a maximum of 30° at 2800 R.P.M. The breaker arm spring tension should be 16-20 ounces. The breaker has two sets of contacts operating on a four sided cam. The contacts open alternately at intervals of 45° and these intervals must be accurately set to secure proper timing.

Mounting.—Distributor is mounted at forward end of engine between cylinder banks. To remove, disconnect manual advance rod and primary lead and remove distributor head. Then remove manual advance stop screw and lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor head every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Place a small bit of medium heavy grease on the surface of the breaker cam every 1000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 15° before top dead center (measured on the flywheel) with the manual spark control lever in the fully advanced position, or on top dead center with the manual advance lever one-half advanced or midway between the fully retarded and fully advanced positions.

Firing Order:—The firing order is 1R-1L-4R-4L-2L-3R-3L-2R.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .020-.025 inch.

STARTER:—Model No. 277. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension is 2¼-2¾ pounds each. Starter switch is Model 1953.

Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	—	6.	50
13 "	Lock	3.2	—

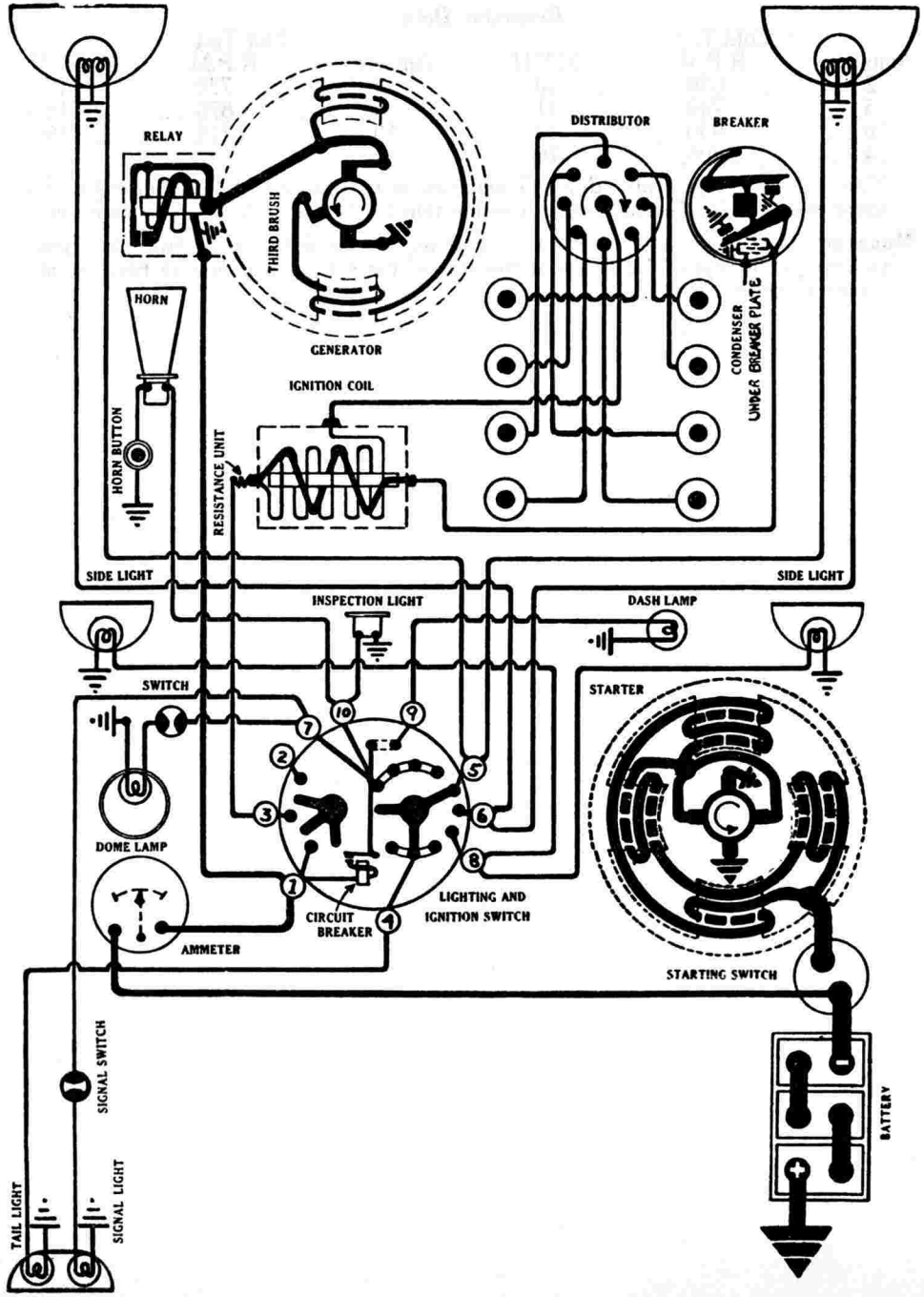
Mounting.—Starter is mounted at right rear of engine. To remove, disconnect motor lead and remove four hold down screws in mounting base. Then slide motor forward and lift from place.

Oiling:—Oilless bearings are used. They require no attention.

GENERATOR:—Model No. 258. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the generator output, loosen the commutator cover band and shift the third brush arm mounting plate by means of the handle attached. Shifting the third brush in the direction of generator rotation increases the charging rate and in the opposite direction decreases the charging rate. The mounting plate is held in any position desired by means of friction washers.

Generator Data.

Amperes.	R.P.M.
4	800
17	1600



PEERLESS

MODEL 8-69 (1926)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION.

The generator brush tension should be 1¼-1¾ pounds each.

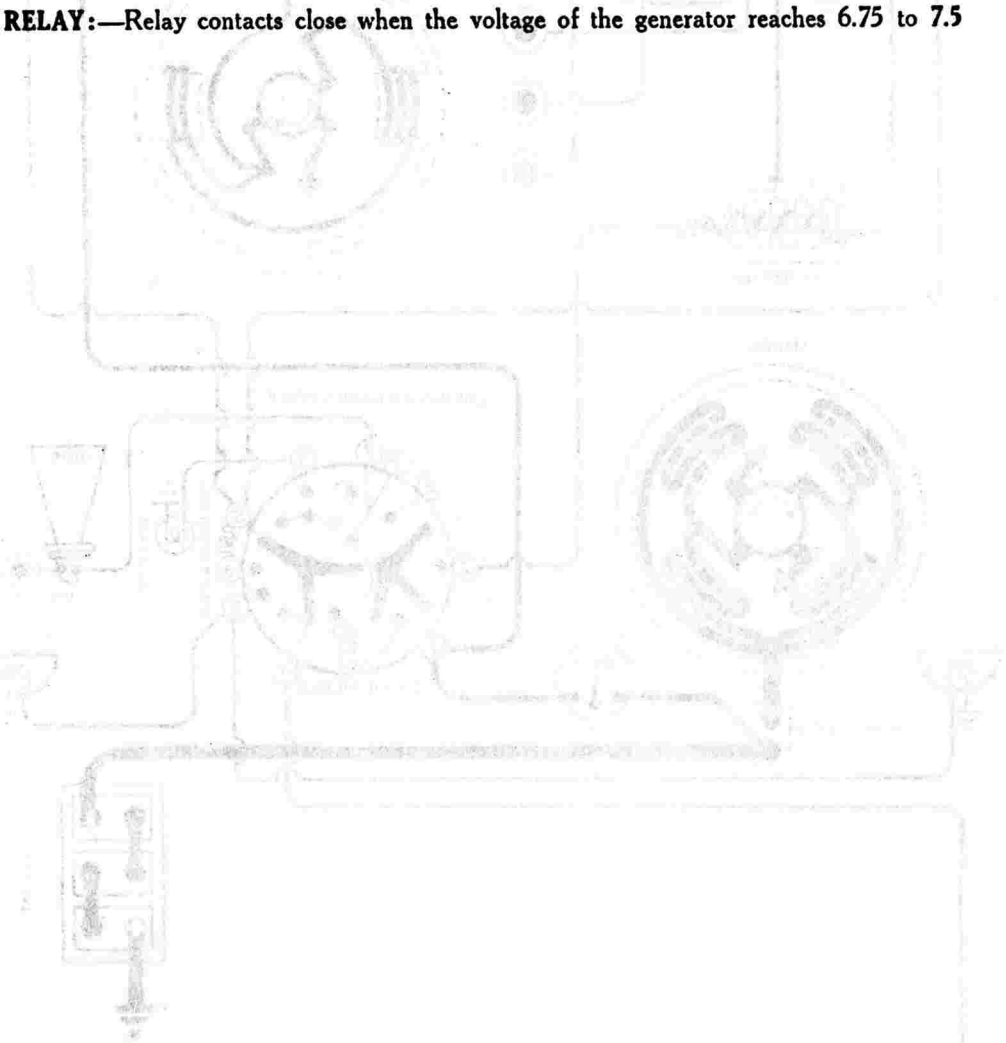
Mounting.—Generator is base mounted at left front of engine. To remove, disconnect generator lead and remove hold-down screws in mounting base. Disconnect coupling and lift generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Relay contacts close when the voltage of the generator reaches 6.75 to 7.5 volts and open with a discharge current of 0-3 amperes. Relay contacts separate .015 to .020 inch. Air gap between armature and coil core is .025 to .030 inch, contacts closed.

LIGHTING.—Combination Switch Model 1293. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament for dimming. Stop lamp is 6-8 volt, 21 cp. S. C. Side, dome, corner, dash and tail lamps are each 6-8 volt, 3 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker is mounted on the back of the switch. A current of 25-30 amperes will cause it to vibrate limiting the current flow to 10-15 amperes until the cause of excessive current is removed.



PEERLESS

MODEL 6-72 (1927-28)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—Exide, Type 3-XC-15-1, or Willard, Type XR-15, 6 volt. Statrting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The positive (+) terminal is grounded. Battery is mounted on the frame at the right of the car.

IGNITION:—Coil Model 2178. Distributor Model 5267. Breaker contacts separate .020-.0275 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 30°. Automatic advance begins at 500 R.P.M. and reaches a maximum of 19-23° at 2000 R.P.M. Total manual and automatic advance is 53°. Breaker arm spring tension is 13-16 ounces.

Mounting:—Distributor is mounted at left of engine. To remove distributor, disconnect primary lead and manual advance control rod and remove distributor head with high tension cables intact. Remove advance lever stop screw and lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles. Place a small bit of heavy grease or vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 15° before top dead center (measured on the flywheel) with the manual advance rod in the fully advanced position. To set timing, fully advance spark control lever and crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Continue to crank engine until the piston reaches a position 15° before top dead center. At this point the mark on the flywheel will be opposite the indicator on the flywheel case. Then loosen the advance lever clamp screw and rotate distributor housing until breaker contacts begin to separate. Then tighten the clamp screw. Make certain that the rotor is under the segment connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

Valve Timing:—INLET VALVES:—Head diameter, 1 13/16 inches; stem diameter, .370 inch; valve length, 6¼ inches; valve lift, 11/32 inch; tappet clearance, .0075 inch; spring pressure, 110-120 pounds. Inlet valves open at top dead center and close 50° after lower dead center.
EXHAUST VALVES:—Head diameter, 1 13/16 inches; stem diameter, .370 inch; valve length, 6¼ inches; valve lift, 11/32 inch; tappet clearance, .0075 inch; spring pressure, 110-120 pounds. Exhaust valves open 50° before lower dead center and close at top dead center. Valve stem guides are removable. Oversize valve stems are not made.

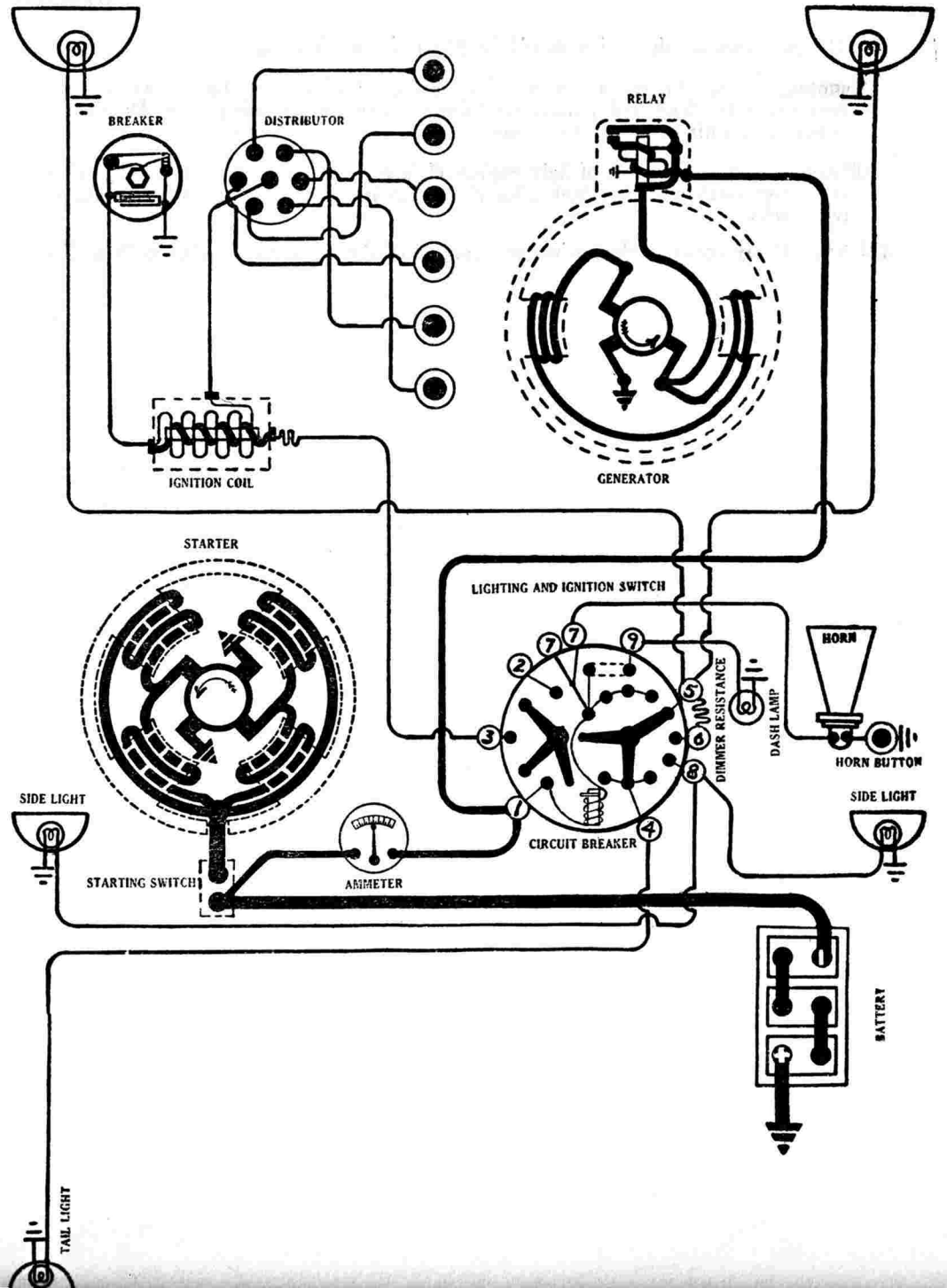
STARTER:—Model 282. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush spring tension is 2¼-2½ pounds each. Starter switch is Model 1953.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	60
11 "	Lock	2.8	570

Mounting:—Starter is barrel mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect starter cable and remove large pilot mounting screw. Then slide starter forward from place.

Oiling:—Oilless bearings are used. They require no attention.



PEERLESS

MODEL 6-72 (1927-28)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

GENERATOR:—Model 284. The direction of rotation is counter-clockwise, looking at the commutator end. To adjust the charging rate, remove the commutator band and shift the third brush by means of the handle on the third brush mounting plate. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The mounting plate is held in any desired position by friction washers. Maximum charging rate of 18 amperes is reached at 1600 R.P.M. or 28 M.P.H.

Generator Data

Amperes	R.P.M.
0	700
17-20	1600

Generator motoring draws 6 amperes at 6 volts. Shunt field current is 3.3 amperes at 6 volts. Generator brush spring tension is 1¾ pounds.

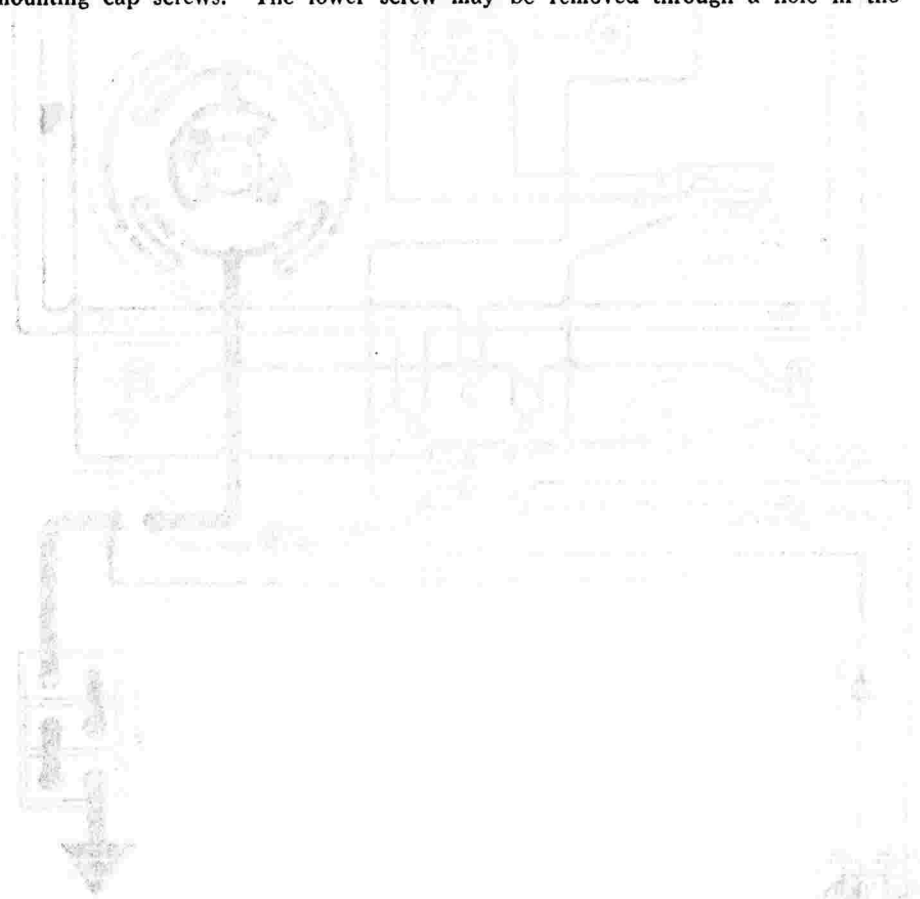
Mounting:—Generator is flange mounted at right of engine at rear of timing chain case. To remove generator, disconnect generator lead and remove three flange mounting cap screws. The lower screw may be removed through a hole in the pan provided for this purpose. Then slide the generator to the rear and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Model 5754. Relay is mounted on top of the generator. Relay closes at 8 M.P.H. when the voltage of the generator reaches 6.75-7.5 volts and opens with a discharge current of 0-3 amperes. Relay contacts separate .030 inch. Air gap between relay armature and coil core is .015-.020 inch, contacts closed.

LIGHTING:—Delco Switch Model 1260. Head lamps are 6-8 volt, 21 cp. S.C. Dimming is by resistance on switch. Side lamps are 6-8 volt, 3 cp. S.C. Stop lamp is 6-8 volt, 21 cp. S.C. Dash and tail lamps are each 6-8 volt, 3 cp. S.C.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the back of the switch. A current of 25-30 amperes causes this to operate. While vibrating, the current is 10-15 amperes.



PEERLESS

MODEL 6-80 (1927)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L., Type XY-15X-6. 6 volt. Starting capacity is 119 amperes for 20 minutes. Lighting capacity is 5 amperes for 20.8 hours. The positive (+) terminal is grounded. Battery is mounted on the frame at right of the car.

IGNITION:—Coil Model IG-4065. Distributor Model IG-4118. Breaker contacts separate .020-.024 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Ignition current is 1.5 amperes with engine running and 4.5 amperes with engine stopped. Distributor is semi-automatic. Manual advance is 20°. Maximum automatic advance is 20°.

Mounting:—Distributor is mounted on the right side of the engine forward of the generator. To remove distributor, loosen lock nut and remove set screw on side of distributor mounting bracket. Then lift distributor from place.

Oiling:—Refill the grease cup on the side of the distributor housing with medium cup grease and turn down two turns every two weeks or each 500 miles. Every 1000 miles put one drop of light engine oil on the breaker arm pivot pin. Every 5000 miles put a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position two teeth on the flywheel before top dead center with the manual spark control lever in the fully advanced position. To set timing, crank engine until piston No. 1 enters compression stroke (this is the upstroke with both valves closed). Remove the clutch inspection plate and continue to crank engine until the second tooth on the flywheel before the top dead center mark is opposite the indicator on the flywheel case. Make certain the manual spark control lever is in the fully advanced position. Then loosen the clamp screw on the advance arm and rotate the distributor cup until the contacts begin to separate. Tighten the clamp screw and make certain that the rotor is under the segment connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

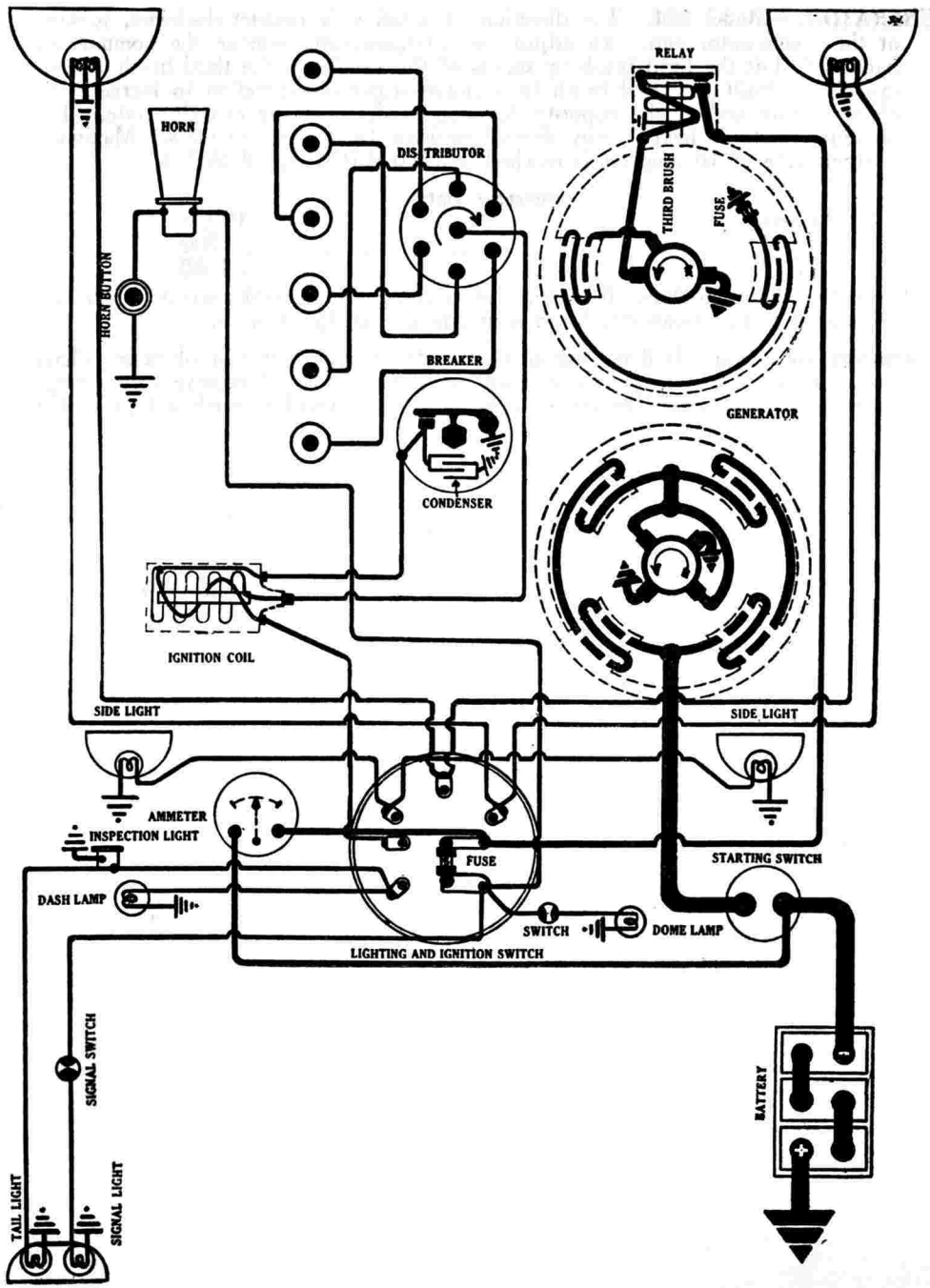
Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1 5/8 inches; stem diameter, .370-.371 inch; stem length, 5 45/64 inches; valve lift, 5/16 inch; spring pressure, 75-80 pounds; tappet clearance, .006 inch. Inlet valves open 4° after top dead center and close 46° after lower dead center.
EXHAUST VALVES:—Head diameter, 1 5/8 inches; stem diameter, .370-.371 inch; stem length, 5 45/64 inches; valve lift, 5/16 inch; spring pressure, 75-80 pounds; tappet clearance, .006 inch. Exhaust opens 41° before lower dead center and closes 1° after top dead center. Valve stem guides are removable.

STARTER:—Model MN-4114. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 120 R.P.M. drawing 130 amperes at 5.2 volts. Starter switch is Model SW-4001. Brush spring tension is 1 1/4-1 1/2 pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free (Without Bendix)	5.5	45
0 "	Free (With Bendix)	5.5	50
.5 "	2800	5.5	100
2.4 "	1450	5.0	200
4.8 "	950	4.5	300
7.2 "	650	4.0	400
13.6 "	Lock	3.0	540



PEERLESS

MODEL 6-80 (1927)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

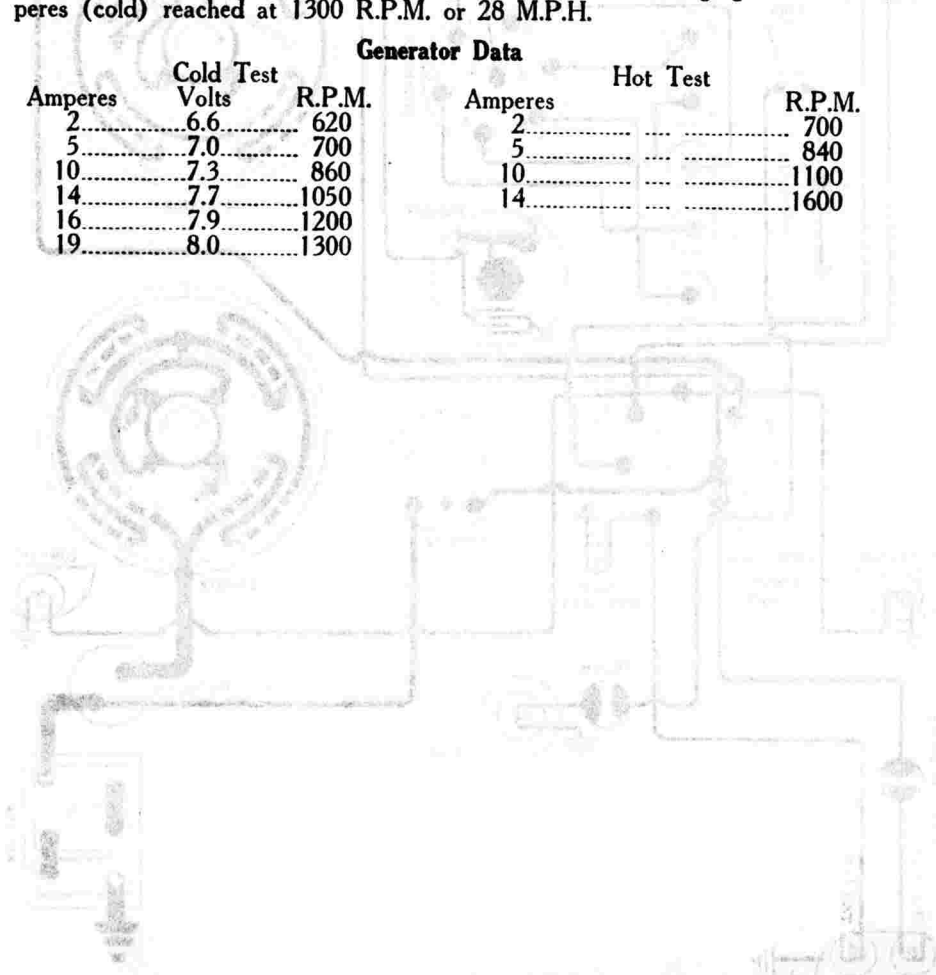
Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect starter cable and remove three flange mounting cap screws. Then slide starter from place.

Oiling:—Put 5 to 10 drops of light engine oil in the oiler on the drive end of the starter every month or each 1000 miles. The commutator end bearing is oilless and requires no attention.

GENERATOR:—Model GYA-4203. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, remove the commutator cover band and shift the third brush mounting bracket by prying on the mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush mounting bracket is held in any desired position by friction between the mounting stud and the generator end plate. Maximum charging rate is 19 amperes (cold) reached at 1300 R.P.M. or 28 M.P.H.

Generator Data

Cold Test			Hot Test	
Amperes	Volts	R.P.M.	Amperes	R.P.M.
2	6.6	620	2	700
5	7.0	700	5	840
10	7.3	860	10	1100
14	7.7	1050	14	1600
16	7.9	1200		
19	8.0	1300		



Generator motoring draws 5 amperes at 6 volts. Shunt field current is 3.8 amperes at 6.2 volts. Generator brush spring tension is 1¼-1½ pounds.

Mounting:—Generator is mounted on rear of timing chain case at right of engine. To remove generator, disconnect lead and remove two mounting studs extending through flange of timing chain case. Pull generator to rear and lift from place. The timing chain is adjusted by loosening the top generator mounting stud and taking up on the adjustment nut. The chain must be loose enough to run quietly. If the chain hums the adjustment nut must be backed off until the noise stops.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Model CB-4007. Relay is mounted on top of the generator. Relay closes at 8 M.P.H. or 620 R.P.M. of the generator when the voltage reaches 7-7.5 volts and opens at 7 M.P.H. with a discharge current of 0-2.5 amperes Charging current at closing of contacts is 2 amperes. Contacts separate .025-.035 inch. Air gap between relay armature and coil core is .015 inch, contacts closed.

LIGHTING:—Clum Switch Model 10592. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Side lamps are 6-8 volt, 3 cp. S.C. Dash and tail lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuse on switch is 20 amperes.

PEERLESS

MODEL 6-90 (1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

BATTERY:—U.S.L. Type XY-15-X, 6 volt. Starting capacity is 119 amperes for 20 minutes. Lighting capacity is 5 amperes for 20.8 hours. The positive (+) terminal is grounded. Battery is mounted on the frame on the right side of the car.

IGNITION:—Coil Model IG-4065. Distributor Model IG-4137. Breaker contacts separate .020-.024 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Ignition current is 1.2 amperes with engine running and 4.5 amperes with engine stopped. Distributor is semi-automatic. Manual advance is 20°. Maximum automatic advance is 10°. Breaker arm spring tension is 18-20 ounces.

Mounting:—Ignition coil is mounted on the generator at right of engine. Distributor is mounted on right side of engine. To remove distributor, disconnect breaker lead at coil and remove distributor head with high tension cables attached. Then loosen hold-down stud in advance arm and lift distributor from place.

Oiling:—Put 5 to 8 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles. Put one drop of oil on the breaker arm pivot pin. Every 5000 miles put a small amount of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the flywheel mark 'IGN' is under the pointer in the flywheel housing hand hole with piston No. 1 entering power stroke and the spark control lever fully advanced. To set timing, fully advance spark control lever. Then crank engine until piston No. 1 enters power stroke. This is the upstroke with both valves closed. Continue to crank engine until the flywheel mark is under the pointer. If the breaker contacts are not separating, loosen the advance arm clamp screw and rotate the distributor housing until contacts begin to separate. Tighten the clamp screw.

Firing Order:—The firing order is 1-5-3-6-2-4.

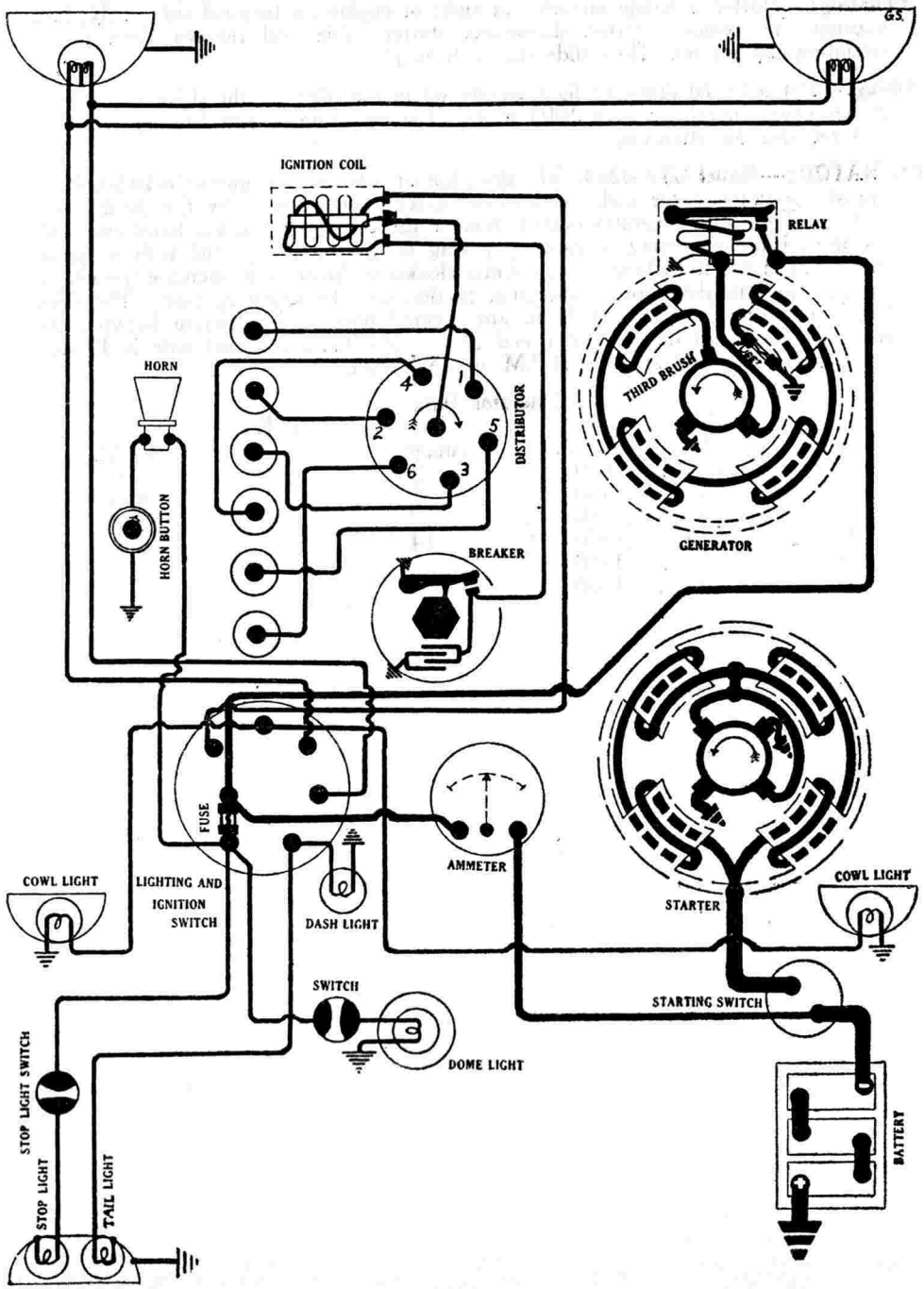
Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

Valve Timing:—INLET VALVES:—Head diameter, 1 13/16 inches; stem diameter, .370 inch; valve length, 6¼ inches; valve lift, 11/32 inch; spring pressure, 110-120 pounds; tappet clearance, .004 inch (hot). Inlet valves open at top dead center and close 50° after lower dead center.
EXHAUST VALVES:—Head diameter, 1 13/16 inches; stem diameter, .370 inch; valve length, 6¼ inches; valve lift, 11/32 inch;; spring pressure, 110-120 pounds; tappet clearance, .006 inch (hot). Exhaust valves open 50° before lower dead center and close at top dead center. Valve stem guides are removable. Oversize valve stems are not made. In setting camshaft, first set tappet clearance at .0075 inch.

STARTER:—Model MW-4101. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension is 2-3 pounds each. Starter switch is Model SW-4105. Starter cranks the engine at 150 R.P.M. taking 140 amperes at 5.0 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	....	5.5	....
1.75 "	1690	5.25	150
3.2 "	1240	5.0	200
6.1 "	770	4.5	300
9.3 "	440	4.0	400
12.6 "	200	3.5	500
15.6 "	Lock	3.0	470



PEERLESS

MODEL 6-90 (1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

Mounting:—Starter is mounted at right of engine on forward side of flywheel housing by sleeve mounting. To remove starter, disconnect starter cable and remove pilot screw and mounting stud. Then slide starter forward from place.

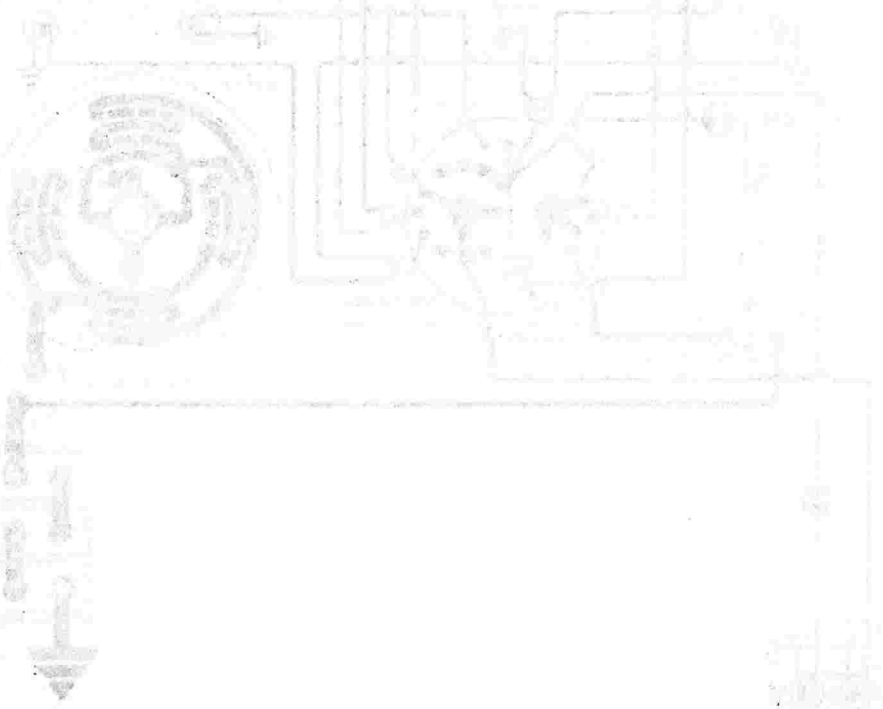
Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GRE-4201-6. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust charging rate, remove commutator cover band and shift third brush mounting bracket by prying on third brush mounting stud with a screw driver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The mounting plate is held in any desired position by friction between the mounting stud and the generator end plate. Maximum charging rate is 18.5 amperes at 8 volts, reached at 1200 R.P.M. or 26 M.P.H., car speed in high gear.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
2	6.75	440	2	6.9	530
5	7.0	500	5	7.1	620
10	7.2	620	10	7.5	820
13	7.5	710	13	7.8	1045
18	7.85	1240	14	8.0	1360

Generator motoring draws 5.5 amperes at 6 volts. Shunt field current is 4-4.5 amperes at 6 volts. Brush spring tension is 1¼-1½ pounds each.



Mounting:—Generator is flange mounted at right of engine on special bracket at rear of timing chain case. To remove generator, disconnect lead and remove three generator flange mounting capscrews. Slide the generator to the rear. Drive is through a slotted steel coupling. Timing chain is adjusted by loosening generator bracket mounting screw and shifting the bracket. Loosen the mounting screws and pry the bracket amay from the engine at the top where the mounting holes are slotted to provide for movement until the chain begins to hum. Then back up the bracket until the noise stops and tighten the screws. The chain must always be loose enough to run quietly.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles. Ball bearings are used on each end of the generator.

RELAY:—Model CB-4007. Relay is mounted on top of the generator. Relay closes at 450-500 R.P.M. of the generator when the voltage reaches 7-7.5 volts and opens at 400 R.P.M. or 6 M.P.H. with a discharge current of .5-2.5 amperes. Charging current at closing of contacts is approximately 3 amperes. Contacts separate .025-.035 inch. Air gap between relay armature and coil core is .015 inch, contacts closed.

LIGHTING:—Clum Switch Model 10592. Auto-Lite No. XA-315. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Side lamps are 6-8 volt, 3 cp. S.C. Dash and tail lamps are each 6-8 volt, 21 cp. S.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuse on switch is 20 amperes.

PEERLESS

MODEL 8-69 (1927-28)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Exide, Type 3-XX-19-1. Willard, Type XR-19, 6 volt. Starting capacity is 146 amperes for 20 minutes. Lighting capacity is 5 amperes for 27 hours. The positive (+) terminal is grounded. Battery is mounted on the car frame at the right.

IGNITION:—Coil Model 2178. Distributor Model 5297. Breaker contacts separate .0225-.0275 inch. They are made of tungsten. Resurface contacts with a fine flat jewelers file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 20°. Automatic advance begins at 600 R.P.M. and reaches a maximum of 23-27° at 2800 R.P.M. Breaker arm spring tension is 16-20 ounces. Breaker has two sets of contacts operating on a four-sided cam and opening alternately at intervals of 45° corresponding to 90° of crankshaft rotation. The firing interval must be correctly set (see Timing).

Mounting:—Distributor is mounted at forward end of engine between the cylinder banks. To remove distributor, disconnect primary leads and remove distributor head with high tension cables intact. Then remove manual advance stop screw and lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles. Place a small bit of heavy grease on the face of the breaker cam every 1000 miles.

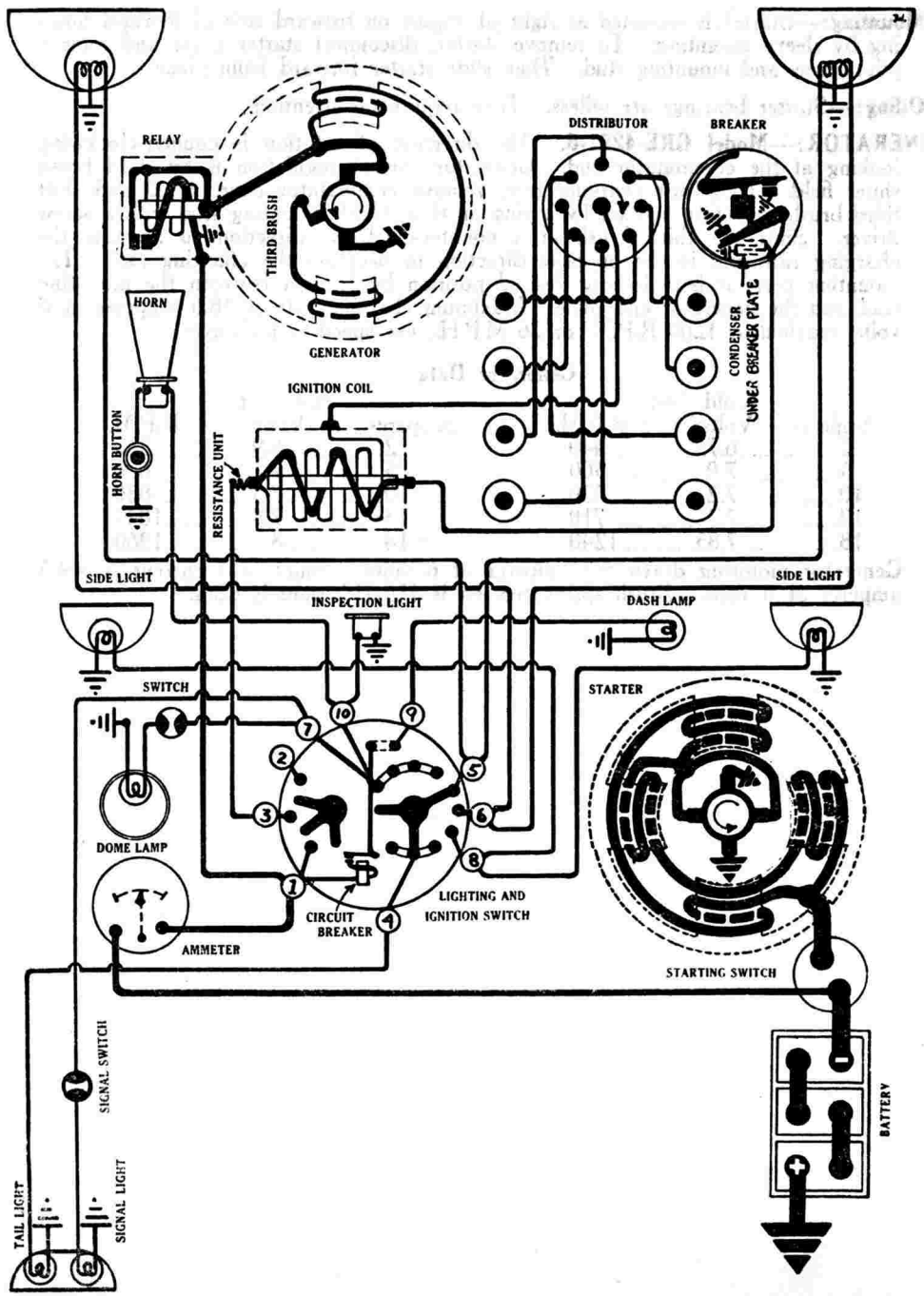
Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 15° before top dead center (measured on the flywheel) with the spark control lever in the fully advanced position. To set timing, fully advance spark control lever. Crank engine over until piston No. 1 enters compression stroke (the upstroke with both valves closed). Continue to crank engine until the mark on the flywheel is opposite the indicator on the flywheel case. This is 15° or approximately 5½ teeth on the flywheel before top dead center mark. The breaker contacts mounted on the stationary plate should begin to separate at this point. To set contacts, loosen the screw in the center of the breaker cam and rotate the cam until contacts begin to separate. Then tighten the screw. The second set of contacts mounted on the movable plate separate 45° after this point. They may be checked by special adjusting cam put out by distributor manufacturer. Remove regular cam and replace with adjustment cam. The fiber bumper of the breaker arm should rest in the notch on the cam. To adjust, loosen the lockscrews in the mounting plate and turn eccentric adjusting screw until this position is reached. Then tighten the lockscrews. With correct adjustment, the second set of breaker contacts begin to separate 27⅛ teeth past the top dead center mark on the flywheel.

Firing Order:—The firing order is 1R-1L-4R-4L-2L-3R-3L-2R.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are .025 inch.

Valve Timing:—INLET VALVES:—Head diameter, 1¾ inches; stem diameter, .370-.372 inch; valve length, 6⅜ inches; valve lift, ⅜ inch; spring pressure, 125 pounds; tappet clearance, .0075 inch. Inlet valves open on top dead center and close 47° after lower dead center.
EXHAUST VALVES:—Head diameter, 1¾ inches; stem diameter, .370-.372 inch; valve length, 6⅜ inches; valve lift, ⅜ inch; spring pressure, 125 pounds; tappet clearance, .0075 inch. Exhaust opens 47° before lower dead center and closes at top dead center. Valve stem guides are removable. Oversize valve stems are not made.

STARTER:—Model 277. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 2¼-2¾ pounds each. Starter switch is Model 1953.



PEERLESS

MODEL 8-69 (1927-28)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	50
13 "	Lock	3.2	....

Mounting:—Starter is base mounted at right of engine. To remove starter, disconnect starter cable and remove four hold down screws in motor base. Then lift starter from place.

Oiling:—Starter uses three oilless bearings. They require no attention.

GENERATOR:—Model 258. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust charging rate, remove commutator cover band and shift third brush mounting plate by means of the handle provided. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The mounting plate is held in any desired position by friction between the plate and the generator end plate. Maximum charging rate is 17 amperes (hot) reached at 1600 R.P.M. or 25 M.P.H.

Generator Data (Hot)

Amperes	R.P.M.
8	800
17	1600

Operating as a motor, generator draws 5 amperes at 6 volts. Shunt field current is 2.75 amperes at 6 volts. Generator brush spring tension is 1¼-1¾ pounds each.

Mounting:—Generator is base mounted at front of engine on left side and is driven through a coupling from the cross shaft at the forward end of the engine. To remove generator, disconnect drive coupling and generator lead. Then remove hold down screws in generator base and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Relay is mounted on the generator. Relay closes when the voltage reaches 6.75-7.5 volts and opens with a discharge current of 0-3 amperes. Charging current at closing of contacts must not exceed 3 amperes. Relay contacts separate .015-.020 inch. Air gap between relay armature and coil core is .025-.035 inch, contacts closed.

LIGHTING:—Delco Switch Model 1293. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Stop lamp is 6-8 volt, 15 cp. S.C. Side lamps are 6-8 volt, 3 cp. S.C. Dash and tail lamps are each 6-8 volt, 3 cp. S.C.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the back of the switch. A current of 25-30 amperes causes this to operate. While vibrating the current is 10-15 amperes.

PEERLESS

MODEL 6-60 (1927-28)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L. Type 3-HVX-5X. Starting capacity is 106 amperes for 20 minutes. Lighting capacity is 5 amperes for 18.4 hours. The positive (+) terminal is grounded. Battery is mounted on the left frame member under the floor boards of the front compartment.

IGNITION:—Coil Model IG-4065. Distributor Model IG-4012. Breaker contacts separate .020-.024 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 30° (engine). Automatic advance begins at 400 R.P.M. (engine). Maximum automatic advance is 25° (engine) reached at 3100 R.P.M. Breaker arm spring tension is 16 ounces. Ignition current is 1-3 amperes at 6.5-6.8 volts with engine running and 4-5 amperes at 6.2 volts with engine stopped.

Mounting:—Distributor is mounted on the cylinder head and is driven by extension of oil pump shaft. To remove distributor, disconnect manual advance rod and primary lead and remove head with cables attached. Then remove hold down screw in advance arm and lift distributor from place.

Oiling:—Put 8 to 10 drops of light engine oil in the oiler on the side of the distributor shaft every two weeks or each 500 miles. Every 1000 miles put a small amount of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position before top dead center when the flywheel mark 'IGN' is opposite the indicator with manual advance lever in the fully advanced position. To set timing, crank engine until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Make certain that manual advance lever is fully advanced and remove flywheel housing hand hole cover. Then continue to crank engine until 'IGN' mark on flywheel is under the pointer. If breaker contacts do not separate at this point, loosen advance arm clamp screw and rotate distributor in a clockwise direction until contacts begin to separate. Tighten the clamp screw.

Firing Order:—The firing order is 1-5-3-6-2-4.

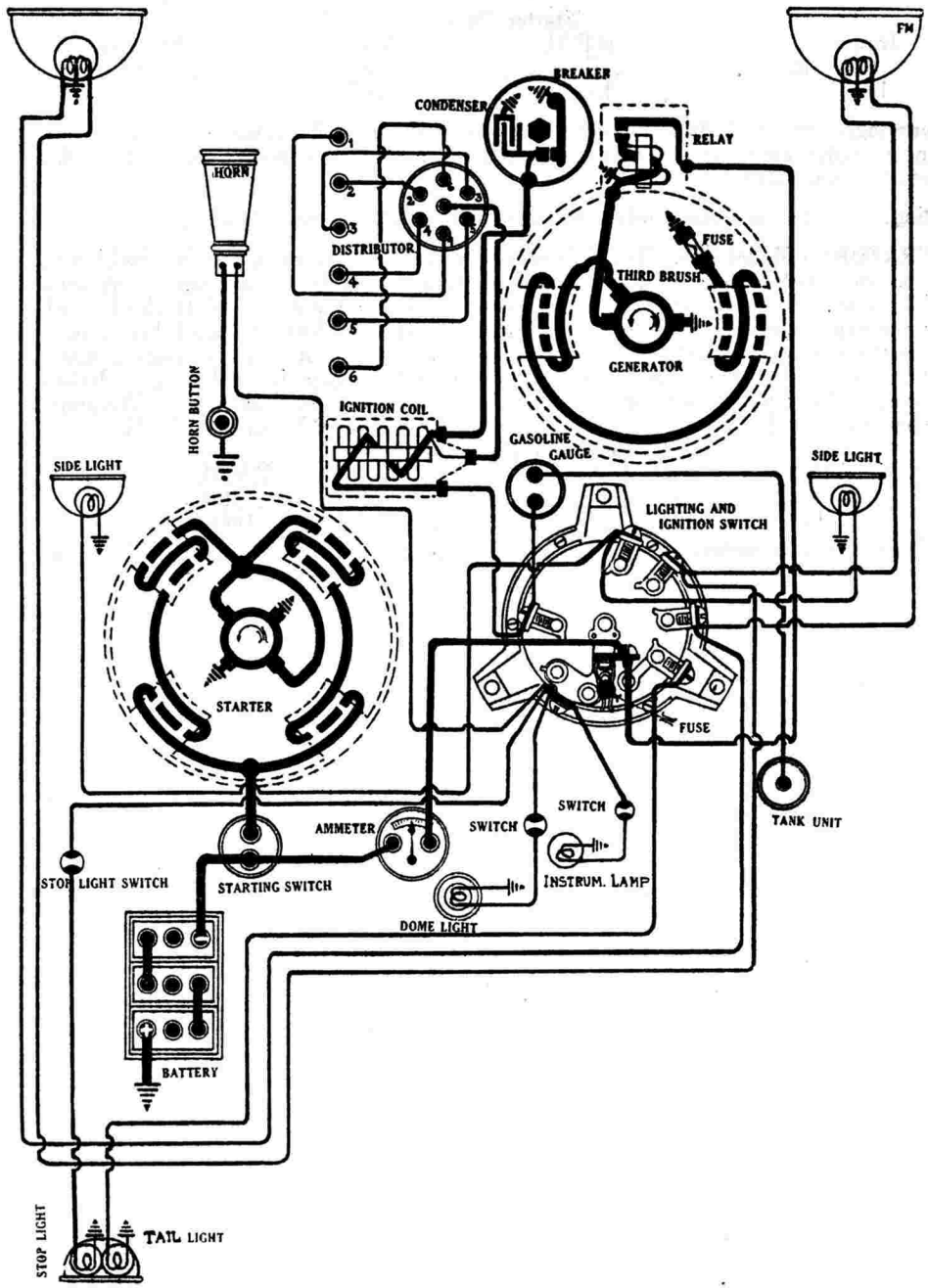
Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

Valve Timing:—INLET VALVES open 5° past top dead center and close 45° past lower dead center. Tappet clearance is .004 inch (hot).
EXHAUST VALVES open 40° before lower dead center and close 5° past top dead center. Tappet clearance is .006 inch (hot).
To set camshaft, crank engine until piston No. 1 is on top dead center with flywheel mark 'No. 1 DC' opposite pointer under flywheel housing hand hole cover. Turn camshaft until there are exactly eleven links (on timing chain) between timing mark on crankshaft sprocket and camshaft sprocket and assemble chain in place.

STARTER:—Model MN-4128. Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 120 R.P.M. drawing 120 amperes at 5.5 volts. Brush spring tension is 1¼-1½ pounds. Starter switch is Model SW-4105.

Starter Data

Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	Free	5.5	45	(Without Bendix)
0 "	Free	5.5	50	(With Bendix)
.6 "	2700	5.5	100	
2.5 "	1500	5.0	200	
5 "	850	4.5	300	
7.5 "	650	4.0	400	
13.5 "	Lock	3.0	540	



PEERLESS

MODEL 6-60 (1927-28)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

Mounting:—Starter is mounted by S.A.E. No. 1 flange mounting at left of engine on forward side of flywheel housing. To remove, disconnect cable and remove three flange mounting capscrews. Then pull starter forward and lift from place.

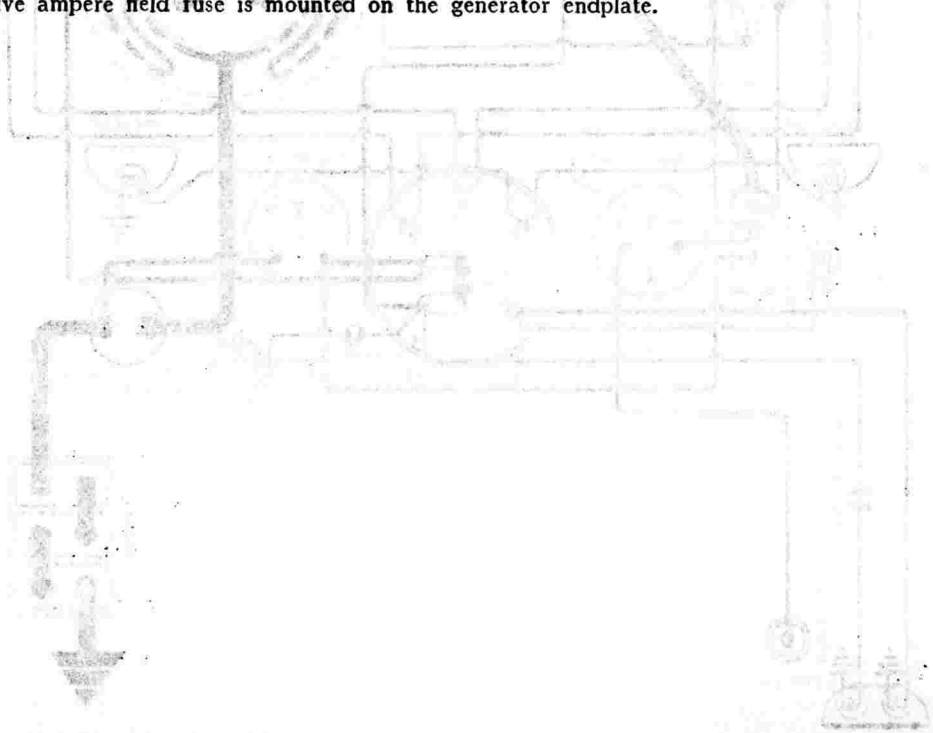
Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GYA-4207. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen the commutator cover band and shift the third brush mounting bracket by tapping on the third brush stud with a screwdriver. Shifting the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. The mounting bracket is held in any desired position by friction between the mounting stud and the endplate. The maximum charging rate is 17-19 amperes (cold) at 8 volts reached at 25-26 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes		R.P.M.
2	6.6	620	2	....	700
5	7.0	700	5	....	840
10	7.3	860	10	....	1100
14	7.7	1050	14	....	1600
16	7.9	1200			

Generator motoring draws 5.32-5.88 amperes at 6.2 volts. Shunt field current is 1.9-2.1 amperes at 6.2 volts. Brush spring tension is 1½-2 pounds each. A five ampere field fuse is mounted on the generator endplate.



Mounting:—Generator is mounted at right of engine on rear of timing chain case by special flange mounting. To remove generator, disconnect lead and remove generator sprocket cover on front of chain case. Then remove cotter and nut from generator shaft. Loosen the chain adjustment set screw and remove two flange mounting cap screws. Pull the generator to the rear leaving the sprocket in the chain case. Do not crank engine while the generator is out or the valve timing will be disturbed.

Timing chain is adjusted by shifting generator. To adjust chain tension, loosen two flange mounting capscrews and shift generator position by turning up the set screw. Do not set chain too tight. Make adjustment with engine running, turning up set screw until chain begins to hum. Then back set screw off slightly until humming stops and tighten capscrews.

Oiling:—Put 3 or 4 drops of light engine oil in the oiler on the commutator end of the generator every two weeks or each 500 miles. The drive end bearing is oiled by splash from the chain case.

RELAY:—Model CB-4011. Relay is mounted on the generator. Relay contacts close at 875 R.P.M. when the generator voltage reaches 7-7.5 volts and open with a discharge current of .5-2.5 amperes. Charging current at closing of contacts must not exceed 3 amperes. Contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Clum Switch Model 10592. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Side lamps are 6-8 volt, 3 cp. S.C. Stop lamp is 6-8 volt, 15 cp. S.C. Dash, dome and tail lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuse on switch is 20 amperes.

PEERLESS

MODEL 6-80 (1928)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L. Type XY-15X-6, 6 volt. Starting capacity is 119 amperes for 20 minutes. Lighting capacity is 5 amperes for 20.8 hours. The positive (+) terminal is grounded. Battery is mounted on the frame at right of the car.

IGNITION:—Coil Model IG-4065. Distributor Model IFA-4003 A. Breaker contacts separate .020-.024 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Ignition current is 1.5 amperes with engine running and 4.5 amperes with engine stopped. Distributor is semi-automatic. Manual advance is 20 degrees. Automatic advance begins at 1500 R.P.M. Maximum automatic advance is 20 degrees at 3600 R.P.M.

Mounting:—Distributor is mounted on the right side of the engine forward of the generator. To remove distributor, loosen lock nut and remove set screw on side of distributor mounting bracket. Then lift distributor from place.

Oiling:—Refill the grease cup on the side of the distributor housing with medium cup grease and turn down two turns every two weeks or each 500 miles. Every 1000 miles put one drop of light engine oil on the breaker arm pivot pin. Every 5000 miles put a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position two teeth on the flywheel before top dead center with the manual spark control lever in the fully advanced position. To set timing, crank engine until piston No. 1 enters compression stroke (this is the upstroke with both valves closed). Remove the clutch inspection plate and continue to crank engine until the second tooth on the flywheel before the top dead center mark is opposite the indicator on the flywheel case. Make certain the manual spark control lever is in the fully advanced position. Then loosen the clamp screw on the advance arm and rotate the distributor cup until the contacts begin to separate. Tighten the clamp screw and make certain that the rotor is under the segment connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

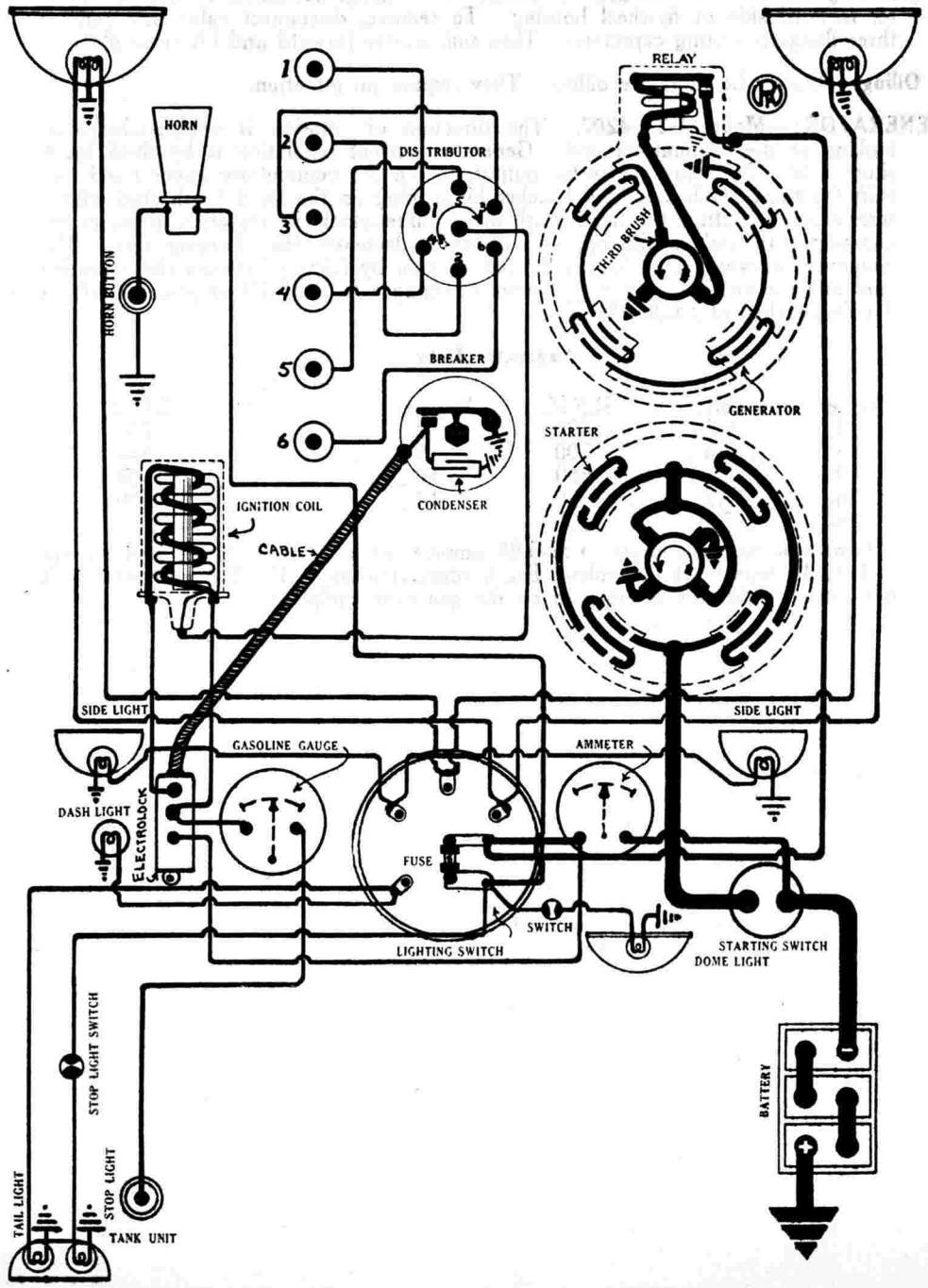
Valve Timing:—INLET VALVES:—Head diameter, 1 5/8 inches; stem diameter, .370-.371 inch; valve length, 5 45/64 inches; valve lift, 5/16 inch; spring pressure, 75-80 pounds; tappet clearance, .006 inch. Inlet valves open 4° after top dead center and close 46° after lower dead center.

EXHAUST VALVES:—Head diameter, 1 5/8 inches; stem diameter, .370-.371 inch; valve length, 5 45/64 inches; valve lift, 5/16 inch; spring pressure, 75-80 pounds; tappet clearance, .006 inch. Exhaust opens 41° before lower dead center and closes 1° after top dead center. Valve stem guides are removable.

STARTER:—Model MN-4114. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 120 R.P.M. drawing 130 amperes at 5.2 volts. Starter switch is Model SW-4001. Brush spring tension is 1 1/4-1 1/2 pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	Free	5.5	45	(Without Bendix)
0 "	Free	5.5	50	(With Bendix)
.5 "	2800	5.5	100	
2.4 "	1450	5.0	200	
4.8 "	950	4.5	300	
7.2 "	650	4.0	400	
13.6 "	Lock	3.0	540	



PEERLESS

MODEL 6-80 (1928)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect starter cable and remove three flange mounting cap screws. Then slide starter forward from place.

Oiling:—Put 5 to 10 drops of light engine oil in the oiler on the drive end of the starter every month or each 1000 miles. The commutator end bearing is oilless and requires no attention.

GENERATOR:—Model GAG-4101. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, remove the commutator cover band and shift the third brush mounting bracket by prying on the mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush mounting bracket is held in any desired position by friction between the mounting stud and the generator end plate. Maximum charging rate is 18 amperes (cold) with standard car setting. This is reached at 1400 R.P.M. or 23-24 miles per hour.

Generator Data (Cold)

Amperes	Volts	R.P.M.
0	6.40	475
4	6.75	575
8	7.10	700
12	7.45	850
16	7.80	1050
18	8.00	1300

Generator motoring draws 5 amperes at 6 volts. Shunt field current is 4.5 amperes at 6 volts. Generator brush spring tension is 22-28 ounces.

Mounting:—Generator is mounted on rear of timing chain case at right of engine. To remove generator, disconnect lead and remove two mounting studs extending through flange of timing chain case. Pull generator to rear and lift from place.

Adjustment of Timing Chain:—The timing chain is adjusted by loosening the top generator mounting stud and taking up on the adjustment nut. The chain must be loose enough to run quietly. If the chain hums the adjustment nut must be backed off until the noise stops.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Model CB-4007. Relay is mounted on top of the generator. Relay closes at 8 M.P.H. or 550 R.P.M. of the generator when the voltage reaches 7-7.5 volts and opens at 7 M.P.H. with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is .5-3 amperes. Contacts separate .030 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING:—Soreng Manegold Lighting Switch. Clum Switch Model No. 10687—Auto-Lite No. XA-322. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using 21 cp filament instead of dimming) Mazda No. 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop light is 6-8 volt, 21 cp. S.C. Mazda No. 1129. Dome light is 6-8 volt, 6 cp. S.C. Mazda No. 81.

FUSES:—Generator field fuse is 5 amperes. Lighting fuse on switch is 20 amperes.

PEERLESS

MODEL 6-91 (1928)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—U.S.L., Type XY-15X. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 119 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20.8 hours. Battery is mounted on the right frame member.

IGNITION:—Coil Model 525-C. Coil is mounted on the dash. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

Distributor Model 641-B. Breaker contacts separate .018-.024 inch. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 30 degrees (engine). Automatic advance begins at 800 R.P.M. Maximum automatic advance is 10 degrees reached at 4000 R.P.M.

Mounting:—Distributor is mounted on the cylinder head. To remove distributor, disconnect manual advance rod and remove head with cables intact. Then remove stop screw in manual advance arm and lift distributor from place. An Electrolock, Type 5-B, is used. This must be taken off the dash and removed with the distributor whenever the distributor is taken off the car.

Oiling:—Fill the grease cup on the side of the shaft housing with medium cup grease and turn down one half turn every 1000 miles. Put one drop of oil on the breaker arm pivot pin and a small bit of vaseline on the face of the breaker cam every 5000 miles.

Timing:—Breaker contacts begin to separate when the flywheel mark 'IGN' is under the pointer in the flywheel housing hand hole with piston No. 1 entering power stroke and the spark control lever fully advanced. To set timing, fully advance spark control lever. Then crank engine until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Continue to crank engine until the flywheel mark is under the pointer. If the breaker contacts are not separating, loosen the advance arm clamp screw and rotate the distributor housing until contacts begin to separate. Tighten the clamp screw.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

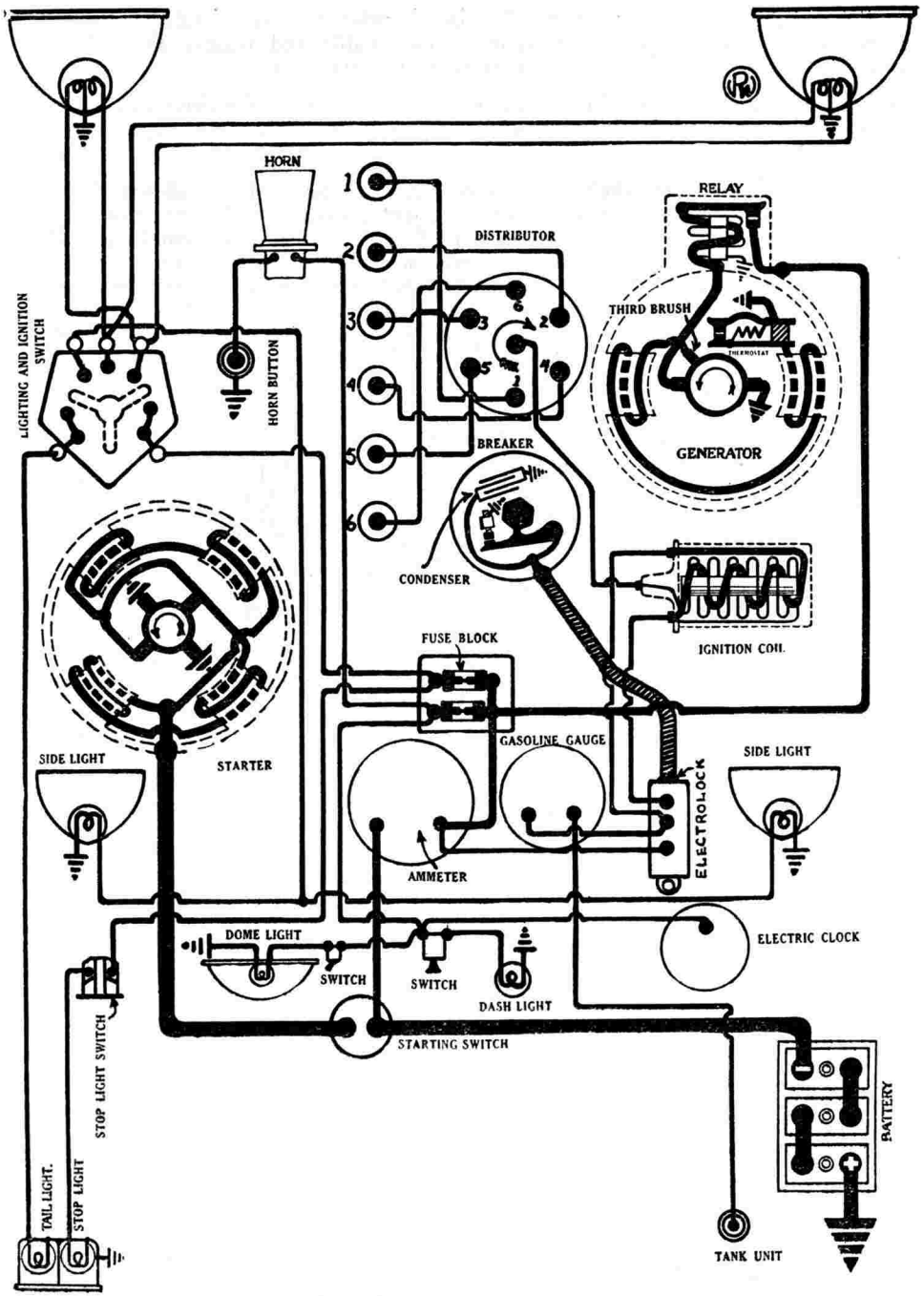
VALVE TIMING:—Specifications:—Head diameter, 1 13/16 inches; stem diameter, .370-.372 inch; stem length, 6 1/4 inches. Tappet clearance (hot), inlet valve, .004 inch; exhaust valve, .006 inch. Spring pressure, 110-120 pounds. Valve lift, 11/32 inch.

Timing:—Inlet valves open at top dead center and close 50 degrees after lower dead center. Exhaust valves open 50 degrees before lower dead center and close at top dead center. Valve stem guides are removable. Oversize valve stems are not made. In setting camshaft, first set tappet clearance at .008 inch.

STARTER:—Model 720-Z. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The brush spring tension is 24 to 28 ounces each. Starter switch is Model 406-G.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.1	570



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PEERLESS

MODEL 6-91 (1928)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

Mounting:—Starter is barrel mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove large pilot mounting screw from housing directly above starter sleeve. Then pull starter forward and lift from place.

Oiling:—Put 8 to 10 drops of good grade medium oil in the hinged cap oiler on the commutator end every 1000 miles. The drive end bearing is oilless. It requires no attention.

GENERATOR:—Model 945-Q. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165 degrees F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the commutator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting the maximum charging rate is 18-20 amperes at 1300 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
18-20	8.3-8.5	1300	9-12	7.35-7.65	1300-1500

Generator motoring draws 5.5 amperes at 6 volts. Brush spring tension is 14-18 ounces. Shunt field current is 5 amperes at 6 volts.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and remove the flange mounting cap screws. Then slide generator to rear and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay closes when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 3 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Lighting switch is mounted at base of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Stop light is 6-8 volt, 21 cp. S.C. Mazda No. 1129. Side lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63. Dome light is 6-8 volt, 6 cp. S.C. Mazda No. 81.

FUSES:—Lighting fuses on fuse block are 20 amperes.

PIEDMONT

MODEL 4-30 (1917-18-19-20-21)

DYNETO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Willard, 6 volt, 90 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface wth fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 4 or 5 drops of light engine oil in the ignition unit oilers every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is ¾ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model No. D-367. Starter is connected to the engine through a Bendix drive. When cranking engine, starter takes 130 amperes, armature revolving at 1500 R.P.M.

Starter Data

0.0 lb. ft.	5600	25	6.4
2.5 lb. ft.	1400	150	5.8
5.0 lb. ft.	850	250	5.3
10.0 lb. ft.	250	420	4.6
14.0 lb. ft.	Lock	530	4.0

OILING.—Put several drops of light engine oil in starter oilers every month.

GENERATOR.—Model C-162. Generator current regulation is by the third brush system. Maximum current output is 12-15 amperes, reached at 1200 R.P.M. of the armature or 20-25 miles per hour.

Generator Data

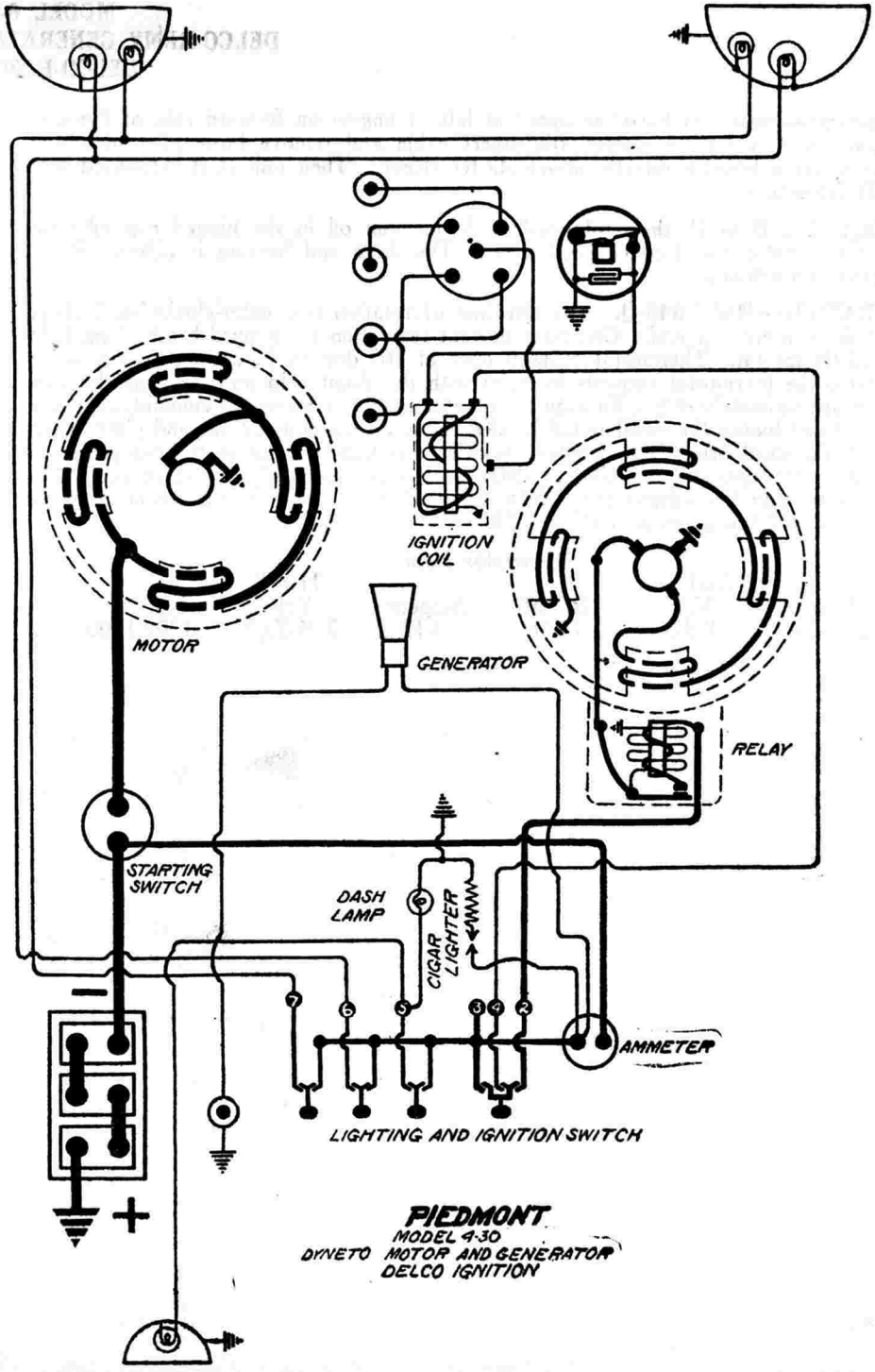
Amperes	Cold Test	R.P.M.	Amperes	Hot Test	R.P.M.
6		600	5		600
13		900	10		900
15		1200	12		1200
13.5		1600	11.5		1600
11.5		2000	10		2000

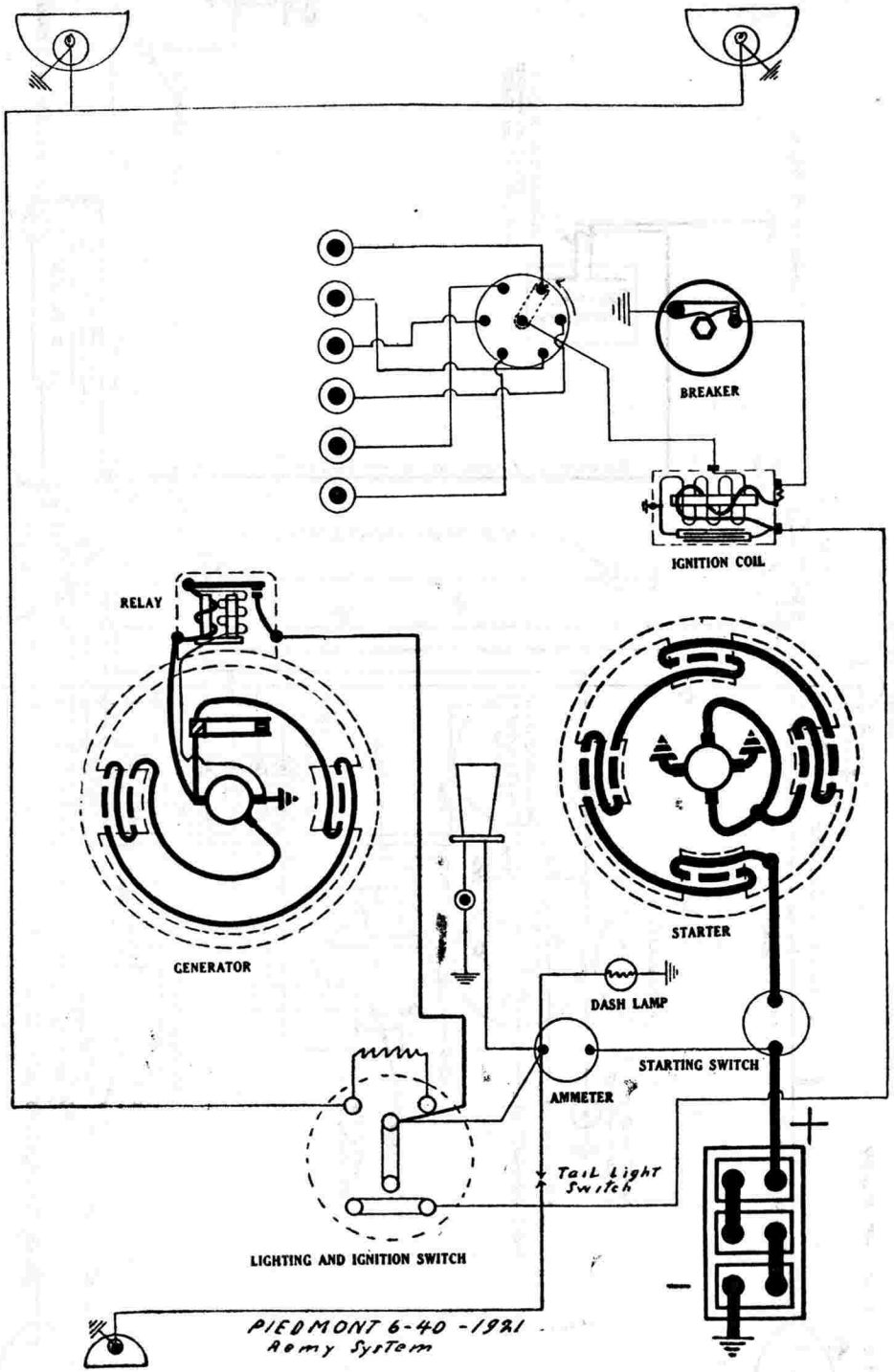
Shunt field current is 3.5 amperes at 6.5 volts. Charging rate is varied by adjustment of the third brush setting. Remove the leather plug in the commutator end of the generator, loosen the screw exposed and move in the direction of armature rotation to increase the charging rate. Move in the opposite direction to decrease the charging rate. Tighten the adjusting screw and replace the leather plug after adjustment is made.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 450-500 R.P.M. of armature, and opens at 6-8 miles per hour or 400-450 R.P.M. of armature. Relay contacts separate 3/32 inch. Air gap between relay armature and coil core is ⅛ inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 12 cp. Dash and tail lamps are 6-8 volt, 2 cp.





PIEDMONT

MODEL 6-40 (1919-20-21)

REMY GENERATING, STARTING, AND LIGHTING SYSTEM

REMY IGNITION

BATTERY.—Willard, SJRM, 6 volt, 90 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 284-C, Distributor Model No 353-A. Breaker contacts separate .020 to .025 inch. When the condition of the contact points affects the ignition resurface with a flat jewelers file or worn No. 00 sand paper.

Timing.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control and breaker assembly in the fully retarded position.

Firing Order.—Firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .030 inch.

Oiling.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions should be given every 500 miles.

STARTER.—Starter is connected to engine through a Bendix drive.

Starter Data, Model 303-A

Torque	R.P.M.	Amperes	Volts
1 lb. ft	1850	110-115	5.3-5.5
2 lb. ft	1400	158-165	5.1-5.3
3 lb. ft	1150	200-210	4.9-5.1
4 lb. ft	850	238-250	4.6-4.8
5 lb. ft	700	275-285	4.4-4.6
15 lb. ft	Lock	550-575	3.3-3.4

Oiling.—Put several drops of light engine oil in each of starter bearings every month.

GENERATOR.—Generator current regulation is by the third brush system. A thermostat located in the brush rigging of the generator, cuts in a resistance at a temperature of 175o F., reducing the maximum charging rate 6 amperes. Resistance also acts as a shunt field fuse. The thermostat is intended to change the charging rate as demand of seasons or car operation requires. Never touch the thermostat points.

Generator Data, Model 230-B

Ampere	R.P.M.	Volts
0	515	6.4
7	745	7.1
14	1000	7.9
22	1800	8.6
17	2500	8.2
12.25	3000	7.8

Above tests made with relay in circuit and thermostat contacts closed, and without ignition. Field winding takes 5 amperes at 6.4 volts. Pressure of main brushes on commutator should be 17 to 20 ounces. Pressure of third brush should be 13 to 17 ounces.

Oiling.—Fill generator bearing oil wells with light engine oil every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Model 264-A. Relay closes at 7-10 miles per hour, and opens at 5-8 miles per hour. Air gap between relay contacts is .012 to .015 inch. Air gap between armature (moving member) and coil core is .012 inch to .015 inch, with contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volts, 15 cp. Dash and tail lamps are 6-8 volts, 2 cp.

Pierce-Arrow

SERIES 1 (1913), 2 (1914) AND 3 (1915)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH MAGNETO AND BATTERY IGNITION

BATTERY.—Exide, Type 3X-15-1, 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Bosch, Type ZR6. Breaker contacts separate .016 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper. The battery ignition system consists of a set of six high tension coils, a master vibrator, a commutator for distributing the low tension current to the proper coil,and a set of spark plugs. The master vibrator should be so adjusted that it takes the least possible current that will produce a satisfactory spark at high speed. Clean vibrator contacts by drawing unlgazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

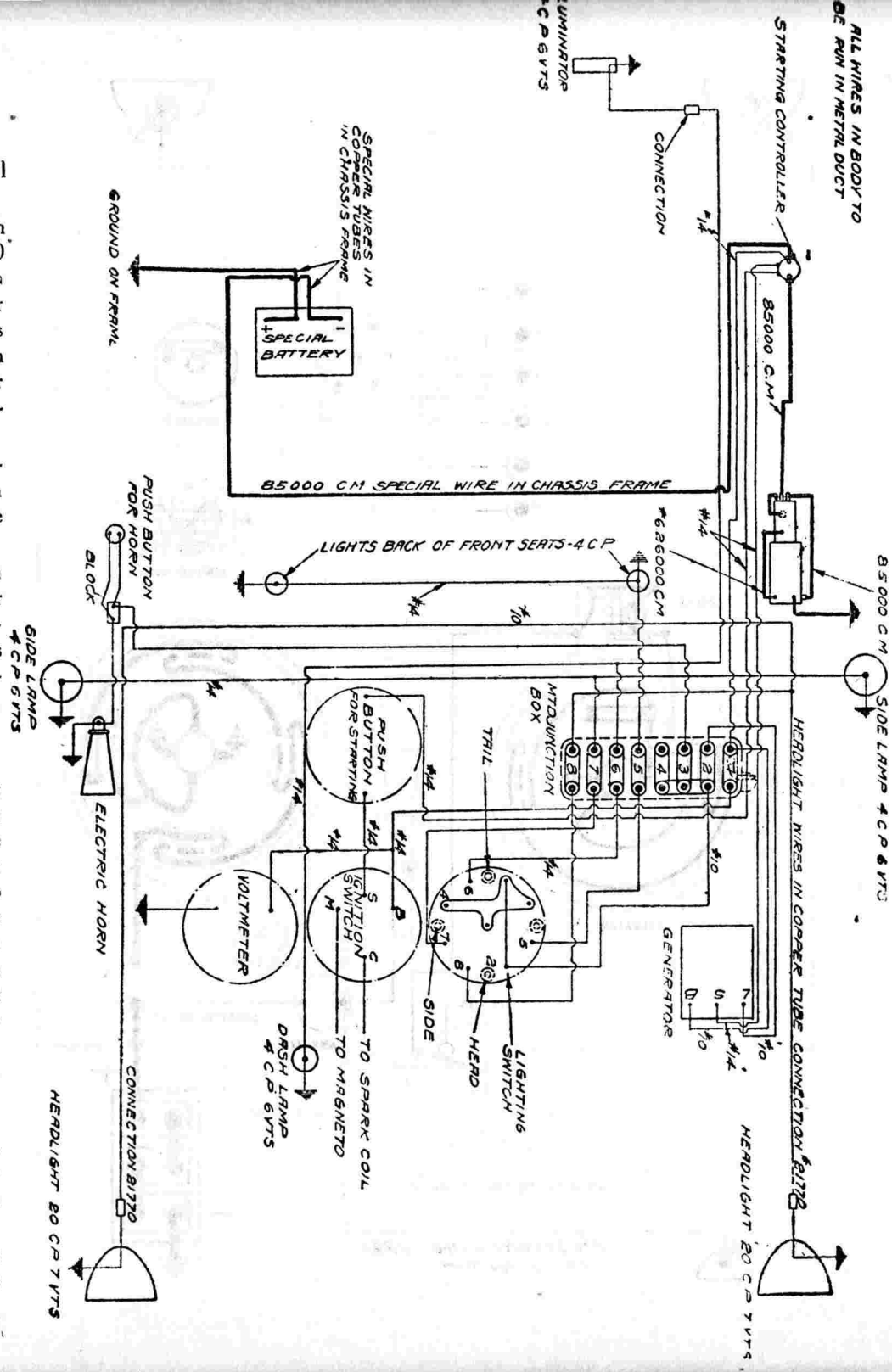
OILING.—Put 2 or 3 drops of light engine oil in magneto oilers every two weeks. Lubricate the battery commutator and rotor with light engine oil. Refill the grease cup on the commutator shaft bearing and turn down two turns. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Magneto breaker contacts begin to separate whn the top dead center mark on the flywheel is 4 13/16 inches before the indicator, spark control lever and breaker assembly in the fully advanced position. The timer rotor should just make contact with a segment when the top dead center mark on the flywheel is 10½ inches past the indicator, spark control lever and timer housing in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SARK PLUGS.—Spark plugs gaps are .020 inch.

STARTER.—Frame No. 501, Style 5W-164; or Frame No. 506, Style No.196861. Starter is connected to engine through a magnetic pinion shift, controlled by a push button on the dash. When the starting buton is pressed, the current flows from the positive terminal of the batery to the frame, through the ignition switch, the push button to the starting controller (or magnetic switch), through the winding of this switch to terminal "S" on the generator, through the armature and the series winding of the generator to terminal "B" on the generator, then to No. 1 connector on the junction box, then to the negative main terminal of the magnetic control switch and to the negative terminal of the battery, through the large lead, thus completing the circuit through the magnetic control switch, closing the contacts. This completes the circuit through the motor and the solenoid pinion shifting coil. When the circuit is completed, the current flows from the positive terminal of the battery to the ground, to the grounded terminal of the solenoid and to the positive terminal of the motor. The current through the solenoid attracts the iron plunger, drawing the pinion into mesh. Before the plunger has been attracted, the motor is in series with a resistance (Plate 202A) in the starting switch. As soon as the current is turned on, the motor is turned slowly, to aid the meshing of the gears. As the solenoid draws in the armature, the motor circuit is broken, the pinion is drawn into mesh and the motor circuit again completed, this time without the resistance in the circuit, thus applying the full pressure to the motor, cranking the engine. There is an overrunning clutch to prevent the engine driving the motor.



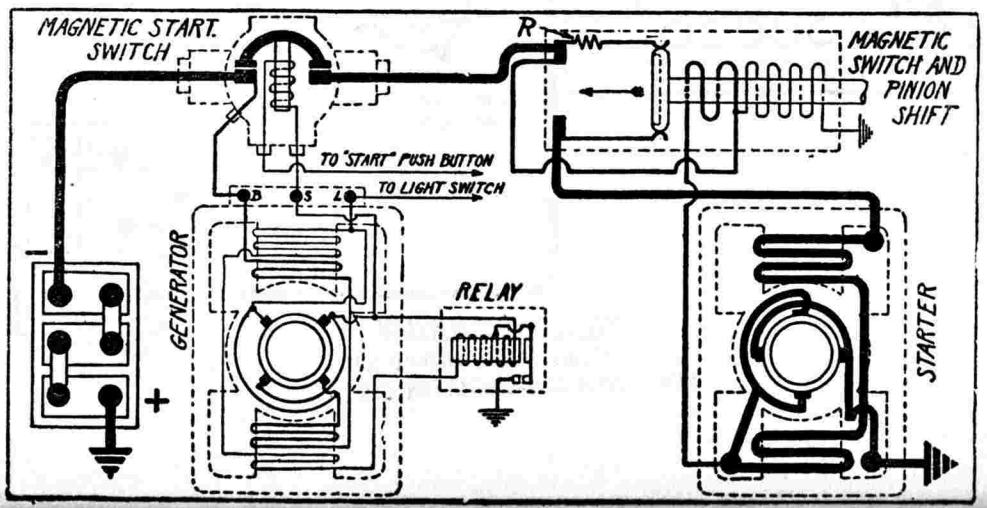
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Pierce-Arrow

SERIES 1 (1913), 2 (1914) AND 3 (1915)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH MAGNETO AND BATTERY IGNITION

Continued from preceding page.

STARTER—Continued.—The heavy winding shown in the solenoid, Plate No. 202A, is in series with the motor armature. As the speed of the motor increases, the current through the armature decreases, due to the back pressure produced by the motor increasing, thus cutting down the current in the heavy winding, reducing the magnetic pull of the solenoid and allowing the spring acting aganst the magnet to force the pinion out of mesh and opening the main cranking circuit. The starting button should be released as soon as the engine begins to run on its own power. As soon as the generator produces sufficient pressure to close the contacts, the terminal "S" of the generator is grounded through the relay. Should the starting button be presed when the contacts are closed, the current flows from the grounded contact to the positive terminal of the battery, and tends to send current from terminal "S" of the generator to the battery through the starting switch button and the ignition switch Hence if the button is pressed, the battery will be tending to send current in one direction and the generator in the opposite direction, over the same wire. Hence no current will flow, and should the button be pressed with the generator running at or above cut-in speed no harm can come, as the magnetic control switch will not operate. Should the apparatus fail to work when the starting button is depressed, relay contacts closed, see that the ignition switch key is inserted and turned and that the switch lever is on the "M-B" or "B" position, as the device is inoperative otherwise. If the ear is plased near the magnetic control switch, a sharp click will be heard when the starting button is pressed, if it is working properly. If no click is heard test for current at the terminals, starting button pressed in. If the terminals test O K, there is an open circuit in the windings or the switch is sticking. A sharp blow with a hammer on the side of the case will nearly always loosen it. Should there be any difficulty in meshing the gears, see that the distance between th pinion and the flywheel gear, when in the demeshed position, is correct. This distance should not vary any appreciable amount from 3/16 inch. Should the magnetic control switch close when the starting button is pressed, but the motor fail to operate, there may be an open circuit in either the motor or the pinion shifting switch, or the wires leading to them. To test the motor, run an insulated wire (No. 10 or larger) from the negative terminal of the battery to the main terminal on the motor. Should the motor spin rapidly, the pinion shift or switch is at fault. If the motor spins slowly, the battery is low, the terminals are defective, the commutator or brushes are defective, the bearings are tight or the armature winding may be grounded or short circuited.



STARTER DATA, FRAME NO. 501

Torque	R. P. M.	Amperes
2 lb. ft	1000	80
4 lb. ft	650	125
6 lb. ft	450	165
8 lb. ft	300	210
10 lb. ft	200	250
13-14 lb. ft	Lock	325

Oiling.—Put 5 or 6 drops of light engine oil in each of starter oilers every month.

Generator.—Frame No. 250, Style 171514-A on the Series 1 cars. Frame No. 251, Style 186757-A or Frame No. 520, Style 188196-A on the Series 2 and 3 cars. Generator current regulation is by reverve series field. Maximum current output is reached at 25 miles per hour.

GENERATOR DATA

Frame No. 251			Frame No. 520		
Charging Rate (No Lamps)	Total Output	R. P. M.	Charging Rate (No Lamps)	Total Output	R. P. M.
3.6	8.0	500	4.4	7.6	500
7.6	13.8	1000	8.0	12.0	800
9.0	15.6	1500	10.0	13.6	1200
9.6	16.6	2000	11.0	14.4	1600
10.0	17.0	2500	11.2	14.8	2000

The current for the lights does not pass through the reverse series field, so when they are turned on the output automatically increases to supply the extra current used, keeping the charging rate practically constant. There is a switch mounted on the back of the junction box with "On" and "Off" positions. Place the switch in the "On" position when it is necessary to increase the charging rate.

Oiling.—Put 5 or 6 drops of light engine oil in each of generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—Relay closes at 360-400 R. P. M. of armature or 6-9 miles per hour, and opens at 320-360 R. P. M. of armature or 4-7 miles per hour. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 21 cp. Side lamps are 6-8 volt, 4 cp. Dash and trouble lamps are 6-8 volt, 4 cp. Tail lamp is 6-8 volt, 2 cp. Dome lamp is 6-8 volt, 6 cp. Pillar and tonneau lamps are 6-8 volt, 4 cp. Number illuminator is 6-8 volt, 2 cp.

PIERCE-ARROW

SERIES 4 (1916-17-18) AND SERIES 5 (1918)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH MAGNETO AND WESTINGHOUSE BATTERY IGNITION

BATTERY.—Battery is 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Bosch Type ZR6, Model 4. Magneto breaker contacts separate .014 to .016 inch. Battery breaker contacts separate .010 to .012 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 2 or 3 drops of light machine oil in each of magneto oilers every two weeks. Put 3 or 4 drops of light engine oil in the oiler at the side of the generator and bracket on which the distributor is mounted. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Magneto breaker contacts begin to separate when the "Magneto" mark on flywheel is at the indicator, spark control lever and breaker assembly in the fully retarded position. Battery breaker contacts begin to separate when the "Igniter" mark on flywheel is at indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is **1, 5, 3, 6, 2, 4.**

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER.—Frame No. 775, Styles 238094 and 253100. Starter is connected to the engine through a magnetic pinion shift.

Starter Data.

Torque	R.P.M.	Amperes	Volts
4.0 lb. ft.	1000	160	5.6
8.0 lb. ft.	600	245	5.0
12.0 lb. ft.	490	320	4.8
16.0 lb. ft.	200	390	4.6
22.5 lb. ft.	Lock	500	4.5

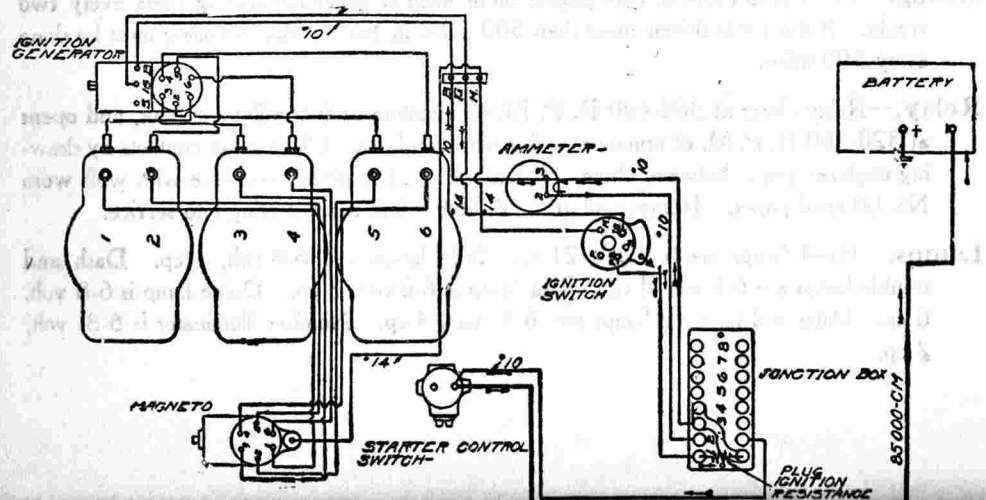
OILING.—Put 5 or 6 drops of light engine oil in each of starter oilers every month.

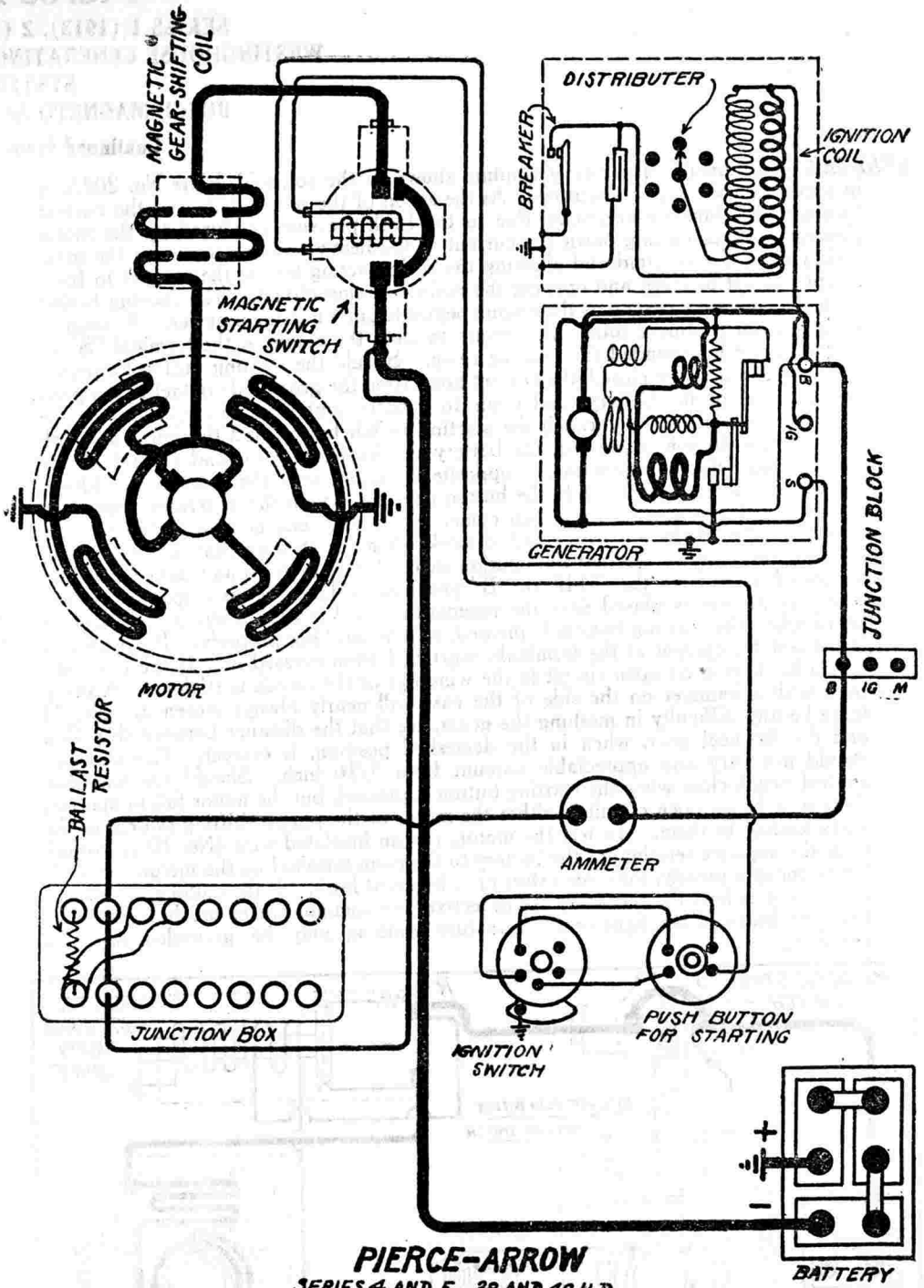
GENERATOR.—Frame No. 246-R. Generator voltage regulation is by vibrator regulator. Maximum charging rate is 15-20 amperes at 1200 R.P.M. of armature or 24 miles per hour with discharged battery, decreasing to 4-9 amperes when battery becomes charged. Shunt field current is 1.5-2 amperes at 6-6.3 volts.

OILING.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

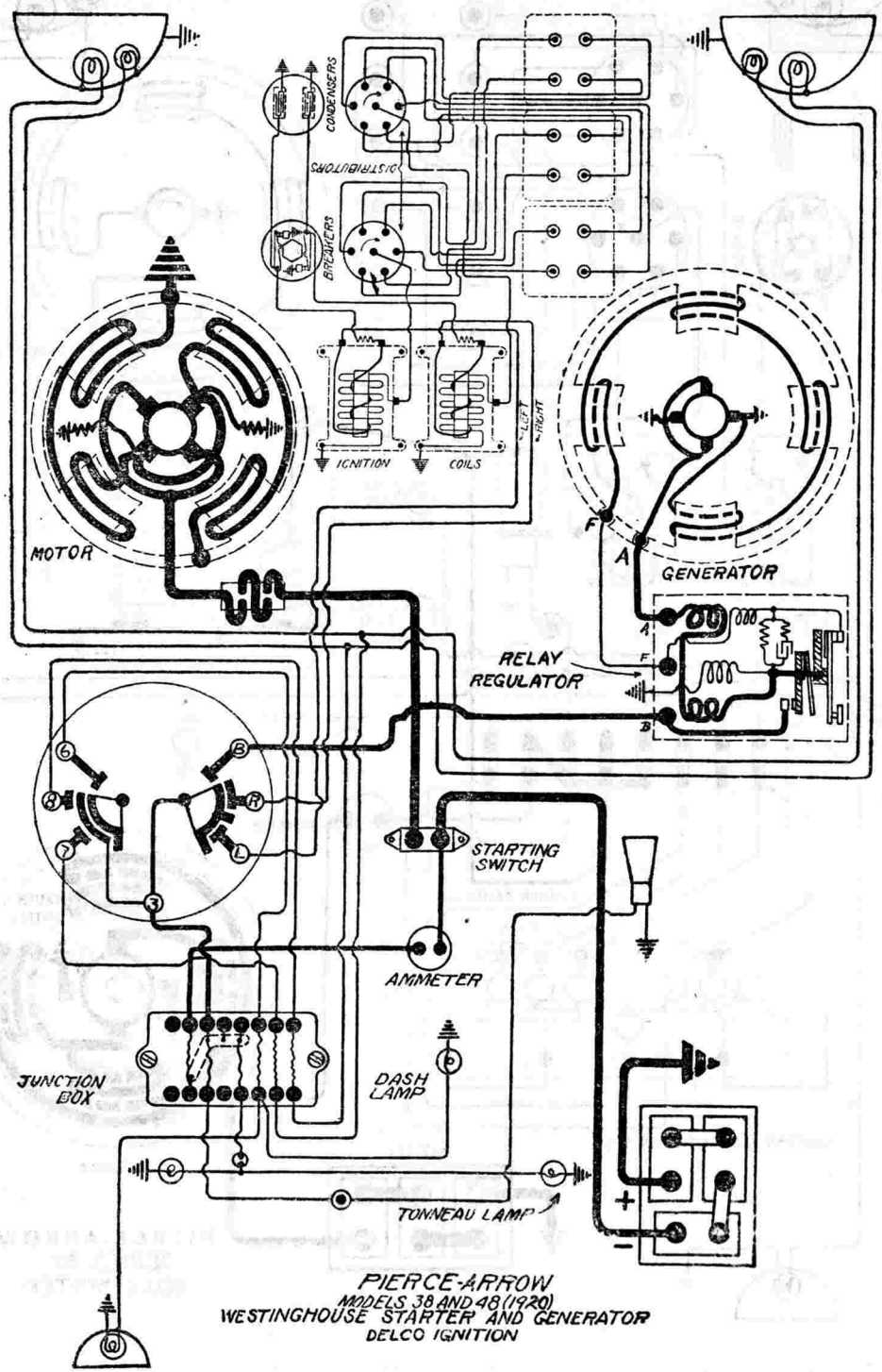
RELAY-REGULATOR.—Relay closes at 8-10 miles per hour and opens at 6-8 miles per hour. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Side lamps are 6-8 volt, 4 cp. Dash and trouble lamps are 6-8 volt, 4 cp. Tail lamp is 6-8 volt, 4 cp. Dome lamp is 6-8 volt, 6 cp. Pillar and tonneau lamps are 6-8 volt, 4 cp.





PIERCE-ARROW
SERIES 4 AND 5, 38 AND 48 H.P.
STARTER AND GENERATOR CIRCUITS.



PIERCE-ARROW

MODELS 38 AND 48 (1919-20-21)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Willard, SJR-6, 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coils Model No. 2171, Distributor Model No. 5202. A dual battery ignition system is provided. Breaker contacts separate .015 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 5 or 6 drops of light engine oil in each of the distributor unit oilers every two weeks. If the rotor buttons and their tracks are not well polished apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles. Repack distributor driving gear compartment with soft cup grease every year.

TIMING.—Breaker contacts begin to separate when the flywheel mark "Ignition" is at the indicator, spark control lever and breaker assembly in the fully retarded position. This is the firing order for No. 1 cylinder. Both sets of contacts must open at the same time. The "Ignition" mark is 2 inches after top dead center.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Frame No. 777, S-284,833. Starter is connected to the engine through a magnetic pinion shift. Lock torque is 27.5 pound-feet, current 750 amperes at 4 volts. Torque at 1250 R.P.M. is 3.5 pound-feet, current 230 amperes at 5.5 volts. Running freely, armature revolves at 5000 R.P.M., current 80 amperes at 5.5 volts. Brush pressure is 2½ to 3 pounds. Pinion must be pulled into mesh by a current of 125 amperes or less, and must not be held in by 80 amperes. When the plunger in the "In" position, the air gap between the plunger and the cover of the pull-in coil is 5/16 inch, including the micarta washer. With the plunger in the "In" position, the spring is compressed into an over-all length of 1 11/32 inches, and exerts a pressure of 7 pounds. With the plunger in the "Out" position, the spring measures 2 13/32 inches and exerts a pressure of 2 pounds.

OILING.—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers and in the oiler over the pinion every month.

GENERATOR.—Frame 781-R, S-285,412. Generator voltage regulation is by vibrating regulator. Maximum generator otuput is 20 amperes at 6.5 volts, reached at 1200 R.P.M. of armature or 20 miles per hour. Charging rate reduces to 4 amperes as battery becomes fully charged. Shunt field current is 1.4 to 1.6 amperes at 6 volts. Operating freely as a motor, generator takes 5 amperes at 6 volts.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY-REGULATOR.—Relay and regulator are combined into one unit and mounted on the engine side of the dash. Relay closes at 550-600 R.P.M. of armature or 8-10 miles per hour, and opens at 500-550 R.P.M or 6-8 miles per hour. To adjust the relay, regulate the spring tension until the contacts open with a discharge current of 1 to 3 amperes. Then disconnect the battery and vary the air gap between relay armature and coil core by bending the lower prong, until relay contacts just close when a voltmeter connected from the "A" generator terminal to ground indicates 6.5 to 7 volts. This air gap between the relay armature and coil core is .055 to .060 inch. To adjust the regulator, disconnect the wire from terminal "B" and connect a voltmeter between this post and ground. Operate the engine at a speed corresponding to 20 miles per hour, or drive the generator at 1200 R.P.M. and adjust the spring tension on the regulator armature by turning the thumb screw until the voltmeter indicates 8.75 volts. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 20 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and trouble lamps are 6-8 volt, 4 cp. Tail, dome, pillar and tonneau lamps are each 6-8 volt, 4 cp. All lamps have single contact base.

PIERCE-ARROW

SERIES 32 (1921-1922)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Willard, Type SJRN-6, 6 volt, 162.5 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coils Model No. 2171. Distributor Model No. 5216. A dual battery ignition system is provided. Breaker contacts separate .020 to .027 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oilstone.

Oiling.—Put 5 or 6 drops of light engine oil in each of the distributor unit oilers every two weeks. If the rotor buttons and their tracks are not well polished apply a small amount of vaseline with a soft cloth. If the car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles. Repack distributor driving gear compartment with soft cup grease every year.

Timing.—Breaker points begin to separate when the mark "Ignition" on the flywheel is 1⅜ inches past top dead center, spark control lever and breaker assembly in a fully retarded position. Exhaust breaker opens 3° to 7° ahead of the intake breaker, measured on the flywheel.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .030 inch.

STARTER.—Model No. 191. Rotation, looking at the commutator end, is clockwise. Cranks the engine at 115 R.P.M., taking 180 amperes current. Running free the starter takes 42 to 52 amperes at 5000 R.P.M. Locked, the current is 450 amperes. The brush tension is 1½ to 2 pounds.

Oiling.—Put 5 drops of light engine oil in the starter oiler every 500 miles.

GENERATOR.—Model No. 192. Rotation, looking at the commutator end, is counter-clockwise. Current regulation is by the third brush system, combined with a vibrating voltage regulator. The maximum charging rate is 20 amperes, reached at 1600 R.P.M. of armature, or 27 miles per hour, car in high gear. Tension of all brushes is 24 to 28 ounces.

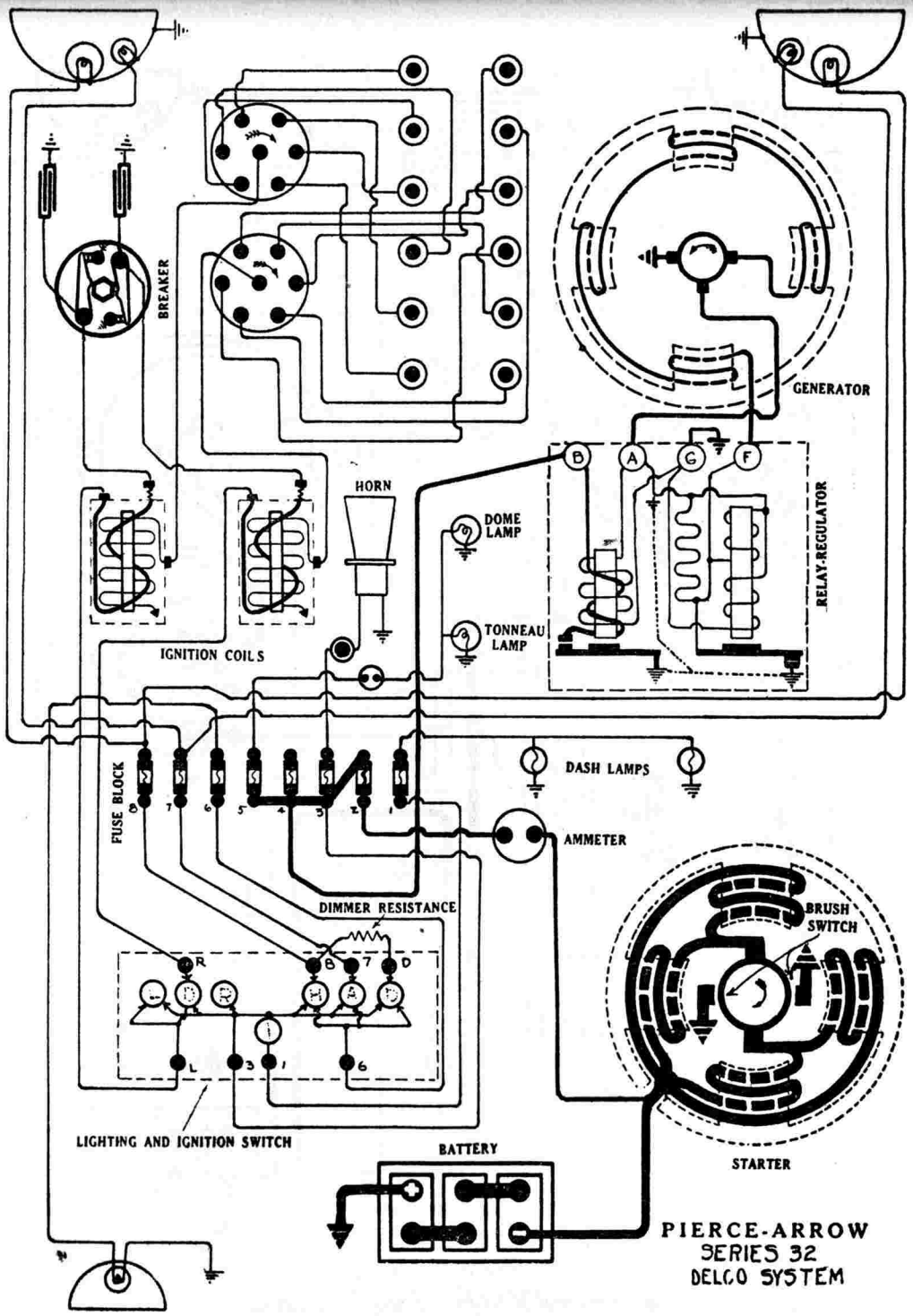
Generator Test Data. No. 192

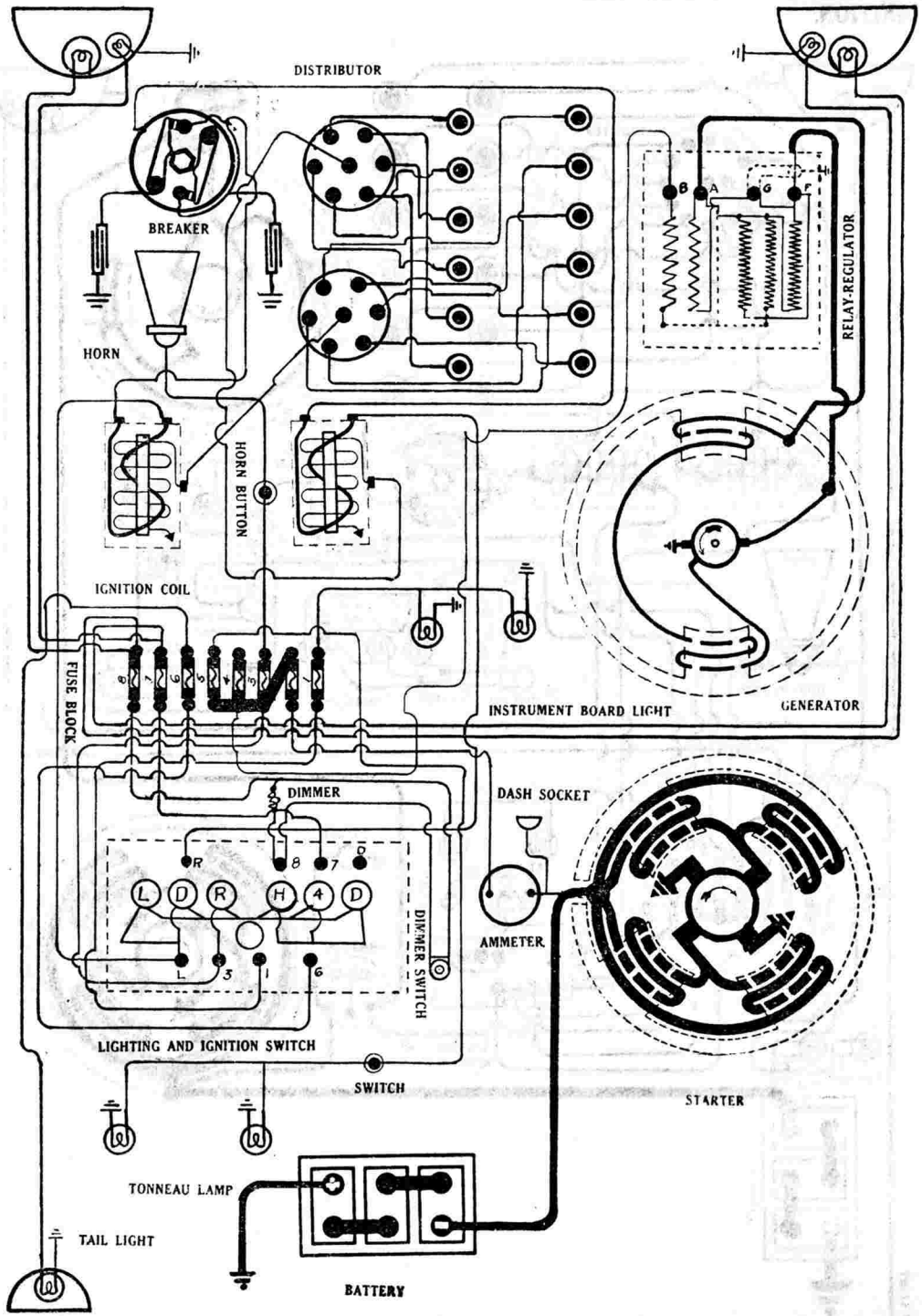
Hot Test		Cold Test	
Amperes	R.P.M.	Amperes	R.P.M.
2 Min.	600	5	600
8 Min.	800	10	800
16-18	1200	19-21	1200
16-18	1600	19-21	1600
17 Max.	2400	20 Max.	2400

Oiling.—Put 5 drops of light engine oil in each of the two generator oilers every 500 miles.

RELAY-REGULATOR.—Model No. 5513. The relay and regulator are combined into one unit, mounted on the forward side of the dash. The relay closes at 8 miles per hour, or 475 R.P.M. of armature, and opens at 6 miles per hour, or 425 R.P.M. of armature. The air gap between the coil core and the relay armature is .025 to .035 inch, contacts closed. Adjust the spring tension of the relay so that it closes at 6¼ to 6½ volts. To adjust the voltage regulator (vibrator), disconnect the battery and connect a voltmeter between the generator main terminal and the frame. Vary the vibrator spring tension until the maximum voltage of the generator at any speed is 7¾ volts. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 20 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 4 cp. Tail, dome, pillar and tonneau lamps are each 6-8 volt, 4 cp. All lamps have single contact base.





PIERCE ARROW

SERIES 33 (1922-23)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SJRN-6, 6 volts, 162.5 ampere hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model No. 2171. Distributor Model No. 5216. A dual battery ignition system is provided. Breaker contacts separate .020 to .0275 inches. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a hard oilstone, No. 53 (medium) India.

Oiling.—Put 8 to 10 drops of light engine oil in each distributor unit oilers every 500 miles. If rotor buttons and their tracks are not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 1000 miles a month, these attentions must be given every 1000 miles. Repack distributor driving gear compartment with 8 ounces of medium soft cup grease once a year.

Timing.—Breaker points begin to separate when the mark "Ignition" on the flywheel is 1¼ inches past top dead center, spark control lever and breaker assembly in fully retarded position. Exhaust breaker opens 3° to 7° ahead of intake breaker, measured on the flywheel.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .030 inches.

STARTER.—Model No. 191-252. Rotation looking at commutator end is clockwise. Cranks the engine at 115 R.P.M., taking 180 to 300 amperes current. Running free the starter takes 42 to 45 amperes at 5000 R.P.M. Locked, the current is 550 to 600 amperes.

Oiling.—Put 8 to 10 drops of light engine oil in the starter oiler every 500 miles.

GENERATOR.—Model No. 238. Rotation, looking at commutator end, is counter-clockwise. Current regulation is by the third brush system combined with a vibrating voltage regulator. The maximum charging rate is 20 amperes, reached at 1400 R.P.M. of armature or 25 miles per hour of the car in high gear. Tension of all brushes is 20 to 28 ounces.

Generator Test Data

Amperes	Hot Test R.P.M.	Amperes	Cold Test R.P.M.
3 min.	600	5 min.	600
8 min.	800	10 min.	800
16-18	1200	18-20	1200
16-18	1600	18-20	1600
17	2400	19	2400

Note.—These readings do not take into account the 4 amperes taken for ignition and which do not show on ammeter on dash.

Oiling.—Put 5 or 6 drops of light engine oil in each of the two generator oilers every 500 miles.

RELAY REGULATOR.—Model No. 5513. The relay and regulator are combined into one unit, mounted on the forward side of the dash. The relay closes at 8 miles per hour or 475 R.P.M. of the armature. The air gap between coil core and the relay armature is .025 to .035 inch, contacts closed. Adjust the spring tension of the relay so that it closes at 6.5 volts. Clean relay and regulator (vibrator), disconnect the battery and connect a voltmeter between the generator "A" terminal and the frame. Vary the vibrator spring tension until the maximum voltage of the generator at any speed is 8.5 volts. Clean relay and regulator contacts, if slightly dirty, with well worn No. 00 sandpaper, but if the points are badly burned, disassemble points at pivot point and resurface with a No. 53 (medium) India oilstone. Be careful that there is no grit or oil on the points when assembled again. If points are stoned, readjustment of gap will be necessary.

LAMPS.—Head lamps are 6-8 volts, 21 cp. Dimmer lamps are 6-8 volts, 4 cp. Dash and tail lamps are each 6-8 volts, 4 cp. Tail, dome and tonneau lamps are 6-8 volts, 4 cp. All lamps have single contact base.

FUSES.—Main circuit fuse is 30 amperes. Lighting circuit fuses are 10 amperes.

PIERCE ARROW

SERIES 33 (1924-25-26)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM.
DELCO IGNITION.

BATTERY.—Willard, Type SJR-6. 6 volt, 155 ampere hour. The starting capacity is 165 amperes for 20 minutes. The lighting capacity is 5 amperes for 31 hours. The positive (+) terminal is grounded.

IGNITION: — Coil Model No. 2178. Distributor Model No. 5265. A dual battery ignition system is used. The breaker contacts separate .020 to .025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone. Manual advance is 24-29° Automatic advance starts at 575 R.P.M. and reaches a maximum of 14½-17½° at 2000 R.P.M. Contact arm spring tension should be 13-16 ounces.

Mounting.—Distributor is mounted at right of engine. To remove, disconnect manual advance rod and coupling and remove two hold-down screws in base of distributor. Then lift unit from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles. If the track of the distributor button in the head is not well polished, apply a small amount of vaseline, removing all excess with a soft, clean cloth. Once each year repack the gear compartment with meduim soft cup grease.

TIMING: — Breaker contacts begin to separate when the mark "Ignition" on the flywheel is 1¼ inches past top dead center with the spark control lever and the breaker assembly in the fully retarded position. The breaker controlling the right hand coil which fires the spark plugs on the exhaust side of the motor opens 3° to 7° (measured on the flywheel) before the intake breaker.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .030 inch.

STARTER:—Model No. 252. The starter is connected to the engine through a mechanical gear shift. The two grounded motor brushes serve as a starter switch and are allowed to come in contact with the commutator when the gear shift is operated. This completes the circuit and permits the starter to crank the engine. When the starter button is released, a spring reverses these operations. The starter cranks the engine at 115 R.P.M., taking 180 to 300 amperes. Running free, the current is 50 amperes at 6 volts. Lock torque is 40 lb. ft., the current being 550-600 amperes at 2.75 volts. The brush tension should be 2¼ to 2¾ pounds.

Mounting:—Starter is mounted at right of engine on a special bracket mounting. To remove, disconnect pedal return spring and pedal rod and remove two hold-down screws in motor base. Then lift starter from place.

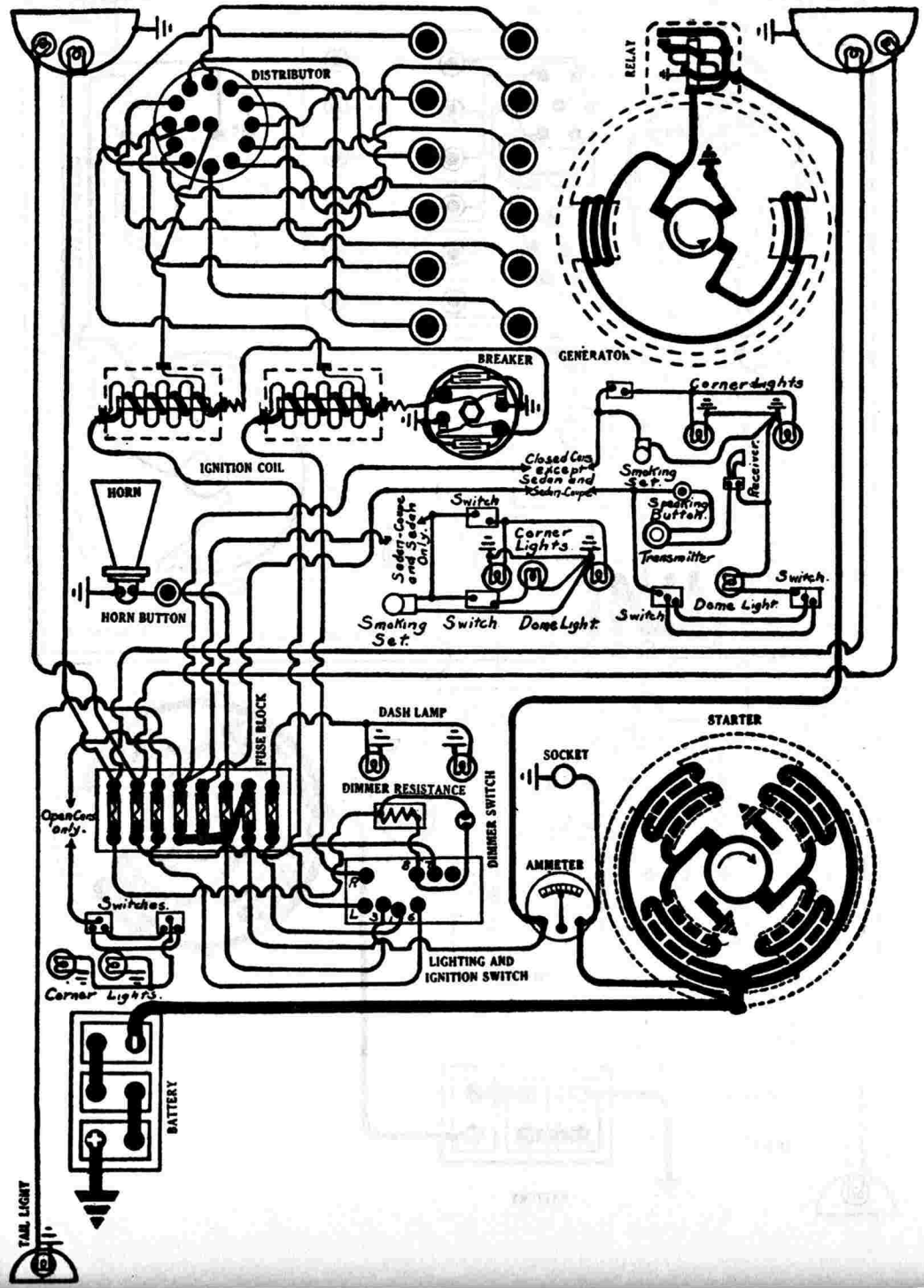
Oiling:—Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles. Once each year disassemble, clean and repack starter clutch with pure vaseline. At the same time remove grease plug in reduction gear case and repack compartment with medium heavy cup grease.

GENERATOR:—Model No. 279. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. The maximum charging rate is 22 amperes reached at 1600 R.P.M. of the generator armature or 20 M.P.H.

Generator Data

Amperes	R.P.M.
3	600
22	1600

The average output required is 15 amperes. To adjust the charging rate, loosen the generator cover band and the lock nut on the commutator end of the generator. Then shift the third brush mounting plate, by means of the handle at-



PIERCE ARROW

SERIES 33 (1924-25-26)

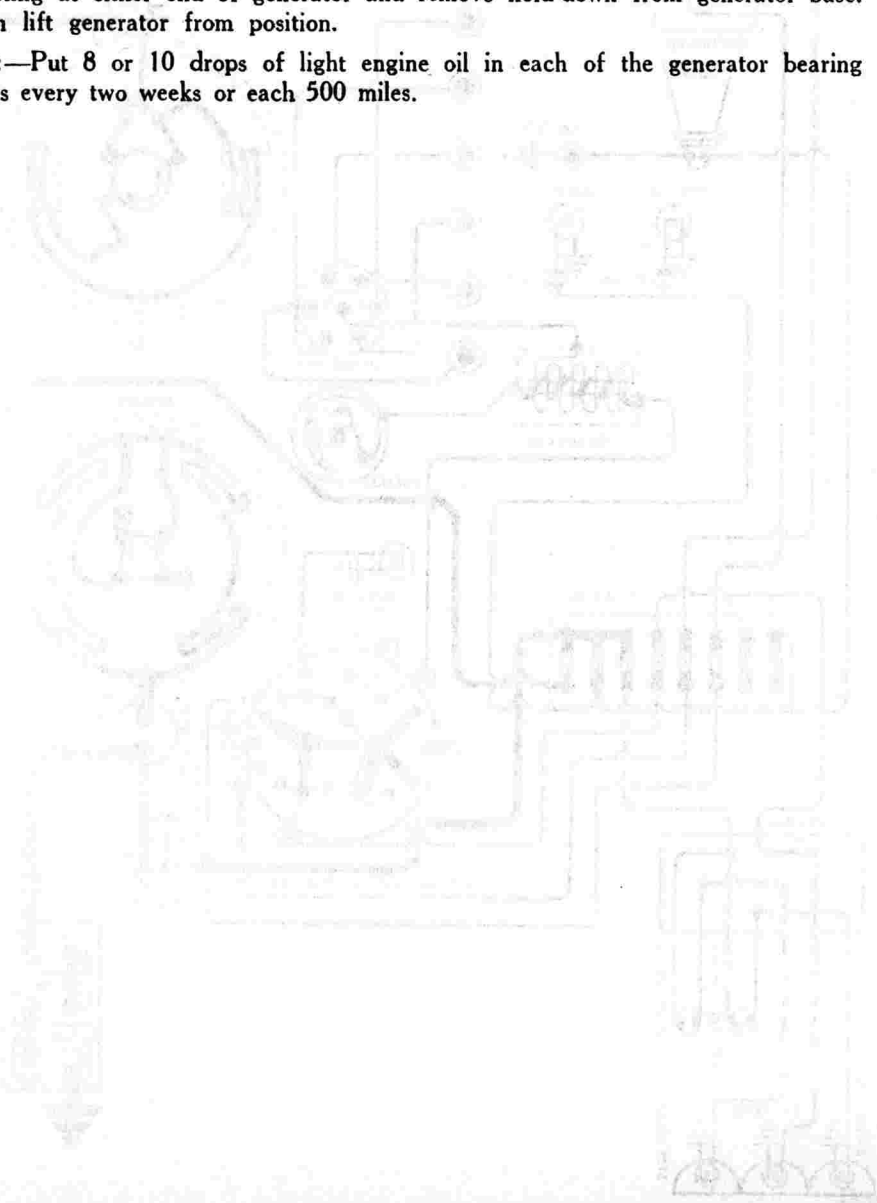
DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

tached, in a counter-clockwise direction to increase the charging rate and the opposite direction to decrease the charging rate. Tighten the locknut after making the adjustment. The tension of the generator brushes should be 1¾ pounds each.

Mounting:—Generator is mounted at right of engine. To remove, disconnect coupling at either end of generator and remove hold-down from generator base. Then lift generator from position.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.



RELAY:—Relay contacts close when the voltage of the generator reaches 6.75 to 7.5 volts, which is reached at a car speed of approximately 8 M.P.H., and open when the discharge current reaches 0 to 3 amperes. Contacts separate .030 inch. The air gap between the relay armature and the coil core is .015-.020 inch, contacts closed.

LIGHTING:—Combination Switch Model No. 1186. Head lamps are each 6-8 volt, 21 cp. Auxiliary head lamps are 6-8 volt, 4 cp. Dash and tail lamps are each 6-8 volt, 4 cp. Dome and tonneau lamps are 6-8 volt, 4 cp. All lamps have the single contact base.

FUSES:—Main circuit fuse is 30 amperes. All other fuses are 10 amperes.

PIERCE ARROW

SERIES 80 (1925-26)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SJR-4. 6 volt, 120 ampere hour. The starting capacity is 125 amperes for 20 minutes. The lighting capacity is 5 amperes for 22 hours. The positive (+) termina! is grounded.

IGNITION:—Coil Model No. 2178. Distributor and Generator Model No. 300. The breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone. Manual advance is 40°. Automatic advance begins at 600 R.P.M. and reaches a maximum of 14½-17½° at 2000 R.P.M. The tension of the contact arm spring is 16-20 ounces.

Mounting:—Distributor is mounted on the generator. To remove, disconnect manual advance rod and remove manual advance stop screw. Then lift distributor from position.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles. If the track of the distributor button in the head is not well polished, apply a small amount of vaseline, removing all excess with a soft, clean cloth. Once each year repack the gear compartment with medium soft cup grease.

Timing:—Breaker contacts begin to separate when the mark "Ignition" on the flywheel is 2¼ inches past top dead center with the spark control lever and the breaker assembly in the fully retarded position. To check timing, crank engine over until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. See that the spark control lever is fully retarded. Continue to crank engine until the ignition mark on the flywheel is 2¼ inches past top dead center. Breaker contacts should separate at this point. If they do not, loosen the lock screw in the center of the cam and rotate cam until contacts separate. Tighten the screw. Make certain that the rotor is opposite the segment connected to the spark plug in cylinder No. 1 and connect the remaining plugs in order 5-3-6-2-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .030 inch.

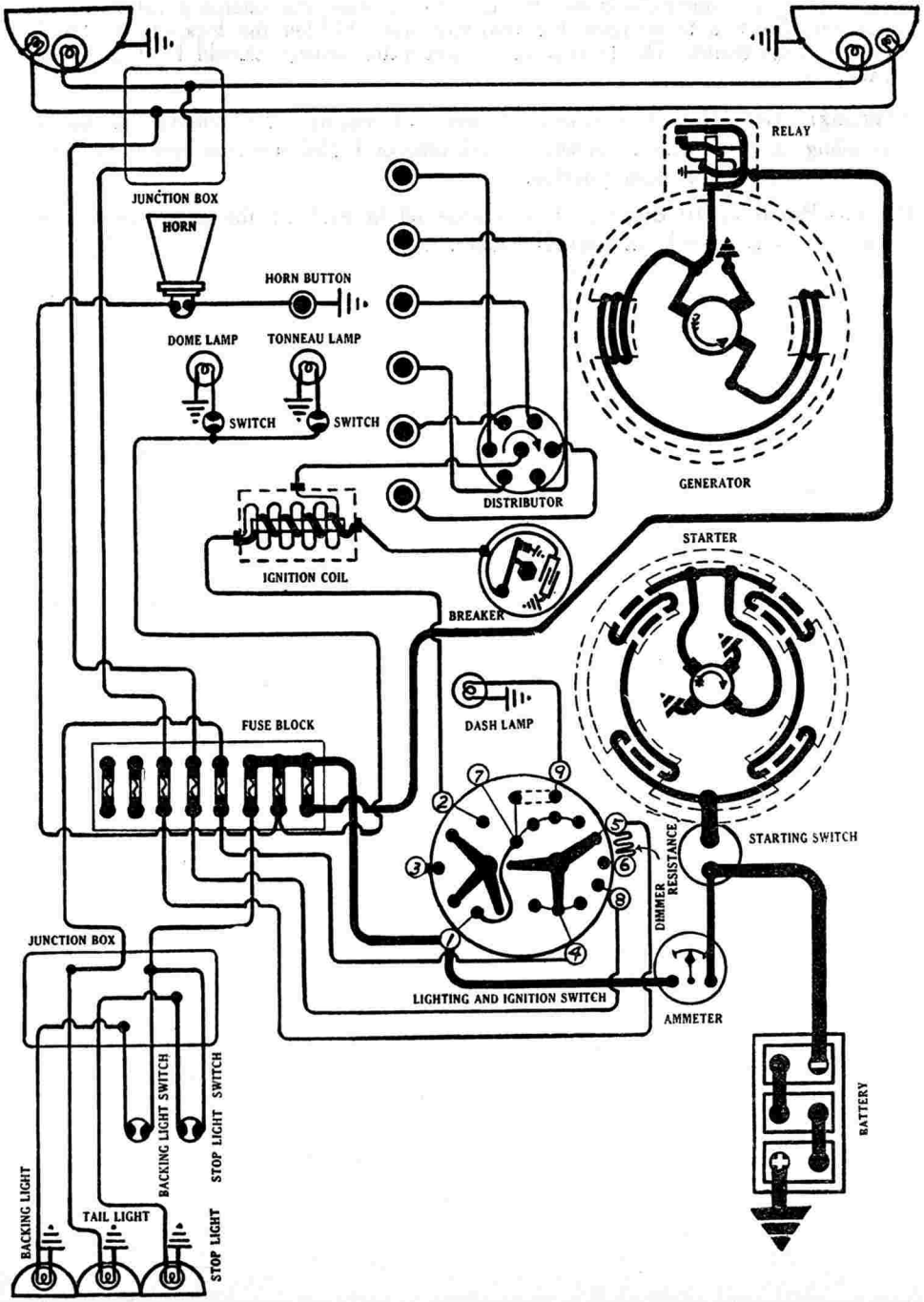
Valve Timing:—INLET VALVES:—Head diameter is 1⅞ inches; stem diameter is .3715 inch; stem length is 6 inches. Tappet clearance is .003 inch. Inlet valves open at top dead center and close 50 degrees after lower dead center.
EXHAUST VALVES:—Head diameter is 1⅝ inches; stem diameter is .3715 inch; stem length is 6 inches. Tappet clearance is .003 inch. Exhaust valves open at 45 degrees before lower dead center and close 5 degrees after top dead center.

STARTER:—Model No. 297. The starter is connected to the engine through a mechanical gear shift. The starter cranks the engine at 130 R.P.M. taking 150 to 300 amperes. Running free, current is 60 amperes at 6 volts. Lock torque is 19.5 lb. ft. with a motor terminal voltage of 3.5 volts. Brush spring tension should be 2¼-2¾ pounds each.

Mounting:—Starter is mounted at right of engine. To remove, disconnect pedal rod and remove three hold-down screws. Then slide starter forward and lift out.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR.—Model No. 300. The direction of generator rotation is clockwise, looking at the commutator end. The third brush system is used for current regulation. The maximum charging rate is 18 amperes reached at 1500 R.P.M. of the generator armature or 20-25 M.P.H.



PIERCE ARROW

SERIES 80 (1925-26)

DELCO GENERATING, STARTING, AND LIGHTING SYSTEM

DELCO IGNITION

Generator Data.

Amperes	R.P.M.
4	800
17	2000

The average output required is 15 amperes. To adjust the the charging rate, loosen the generator cover band and shift the third brush mounting plate, by means of the handle attached in the direction of armature rotation to increase the charging rate and in the opposite direction to decrease the charging rate. Generator brush spring tension should be 1¾ pounds each.

Mounting:—Generator is mounted at right of engine. To remove, disconnect coupling at either end of generator and remove two hold-down screws in base. Then lift generator from position.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Relay contacts close when the voltage of the generator reaches 6.75 to 7.5 volts, which is reached at a car speed of approximately 8 M.P.H. and open when the discharge current reaches 0 to 3 amperes. Contacts separate .030 inch. The air gap between the relay armature and the coil core is .015-.020 inch, contacts closed.

LIGHTING:—Combination Switch Model No. 1271. Head lamps are 6-8 volts, 21 cp Auxiliary lamps are 6-8 volt, 4 cp. Dash and tail lamps are each 6-8 volt, 4 cp. Dome and tonneau lamps are 6-8 volt, 4 cp. All lamps have the single contact base.

FUSES:—Main circuit fuse is 30 amperes. All other fuses are 10 amperes.

PIERCE ARROW

MODEL 80 (1927) SERIAL NOS. 801,001 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type SJRR-4. 6 volt, 111 ampere hour. Starting capacity is 125 amperes for 20 minutes. Lighting capacity is 5 amperes for 22 hours. The positive (+) terminal is grounded. Battery is mounted at the right side of the chassis under the front seat.

IGNITION:—Coil Model 2178. Distributor and Generator Model 300. Breaker contacts separate .020-.025 inch. They are made of tungsten. Resurface condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone. Manual advance is 40°. Automatic advance begins at 600 R.P.M. and reaches a maximum of 14½-17½° at 2000 R.P.M. The tension of the contact arm spring is 16-20 ounces.

Mounting.—Distributor is mounted on the generator. To remove, disconnect manual advance rod and remove manual advance stop screw. Then lift distributor from position.

Oiling:—Put 8 or 10 drops of light engine oil in each of the two oilers on the side of the distributor housing every two weeks or each 500 miles. Place a small bit of vaseline on the face of the breaker cam under the fiber bumper of the contact arm and wipe out the distributor head with vaseline removing all excess. Twice each year remove the plug and repack the distributor gear case with medium soft cup grease.

Timing:—Breaker contacts begin to separate when the mark "Ignition" on the flywheel is 2¼ inches past top dead center with the spark control lever and the breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are 1/32 inch.

Valve Timing:—INLET VALVES:—Head diameter, 1.870 inches; stem diameter, .3715 inch; stem length, 6 1/16 inches; tappet clearance, .003 inch; spring pressure, 70 pounds (valve closed); valve lift, 11/32 inch. Intake opens at top dead center and closes at 50° after lower dead center.
EXHAUST VALVES.—Head diameter, 1.620 inches; stem diameter, .3715 inch; tappet clearance, .003 inch; spring pressure, 70 pounds (valve closed); valve lift, 11/32 inch; exhaust opens at 45° before lower dead center and closes at 5° after top dead center. Oversize valves are not made.

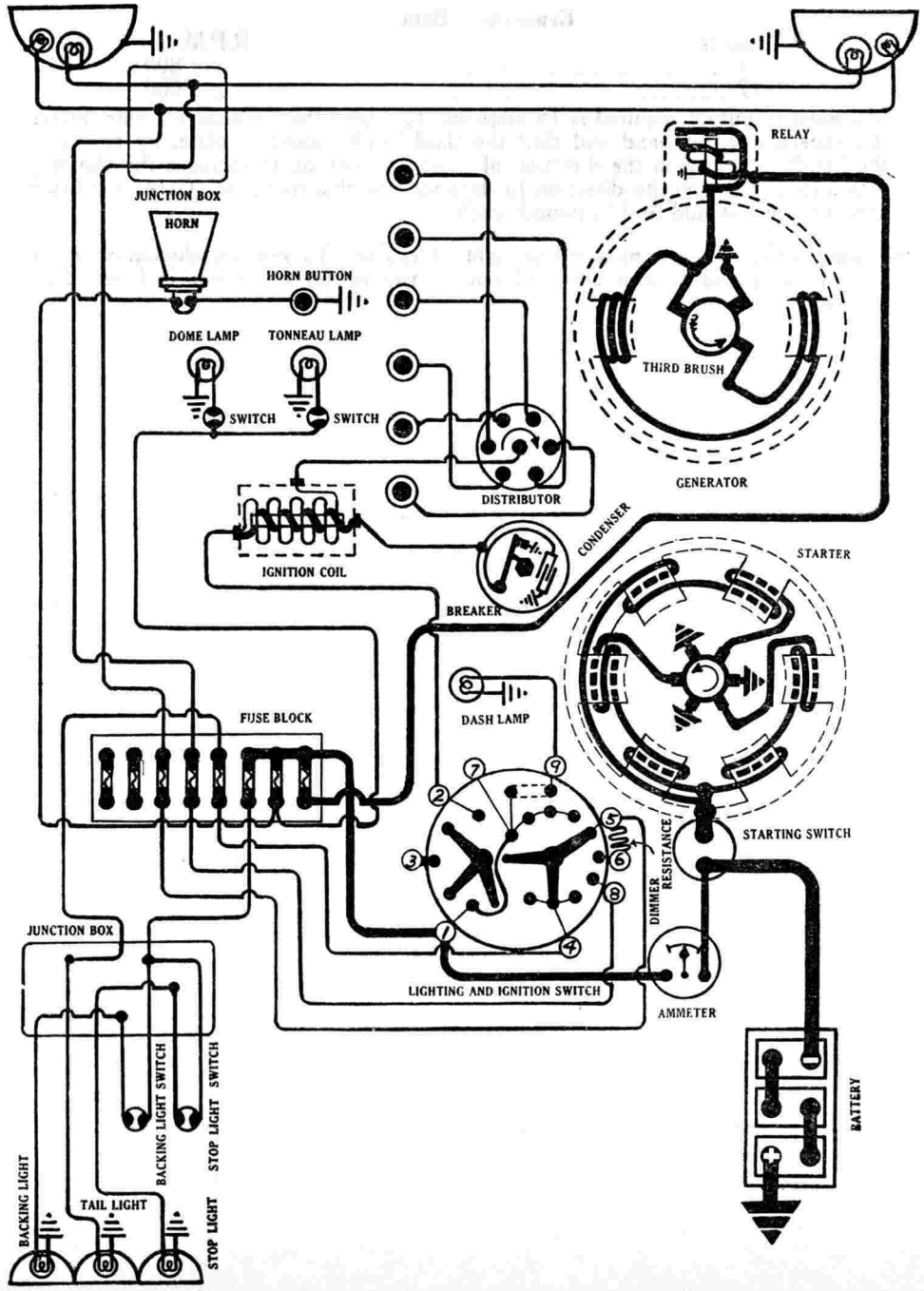
STARTER:—Model 336. Starter is connected to the engine through a manually operated gear shift and an overrunning clutch. The direction of rotation is counterclockwise, looking at the commutator end. Starter brush tension should be 2¼-2½ pounds each. Starter cranks engine at 110-120 R.P.M. taking 280-450 amperes at 4.5 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	4	60
4.5 "	700	5	200
19. "	Lock	3	500

Mounting.—Starter is mounted at right of engine. To remove, disconnect pedal rod and remove three hold-down screws. Then slide starter forward and lift out.

Oiling.—Starter bearings are oilless. They require no attention.



PIERCE ARROW

MODEL 80 (1927) SERIAL NOS. 801,001 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

GENERATOR:—Model 300. The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, loosen the commutator cover band and shift the third brush mounting plate by the handle on the plate. Shift the third brush in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The maximum charging rate is 18 amperes (generator cold) reached at 1600 R.P.M. or approximately 20-25 M.P.H. The average output required is 15 amperes. Generator brush tension should be 1¾ pounds each.

Generator Data

Amperes	Volts
5	800
11	1000
15	1600

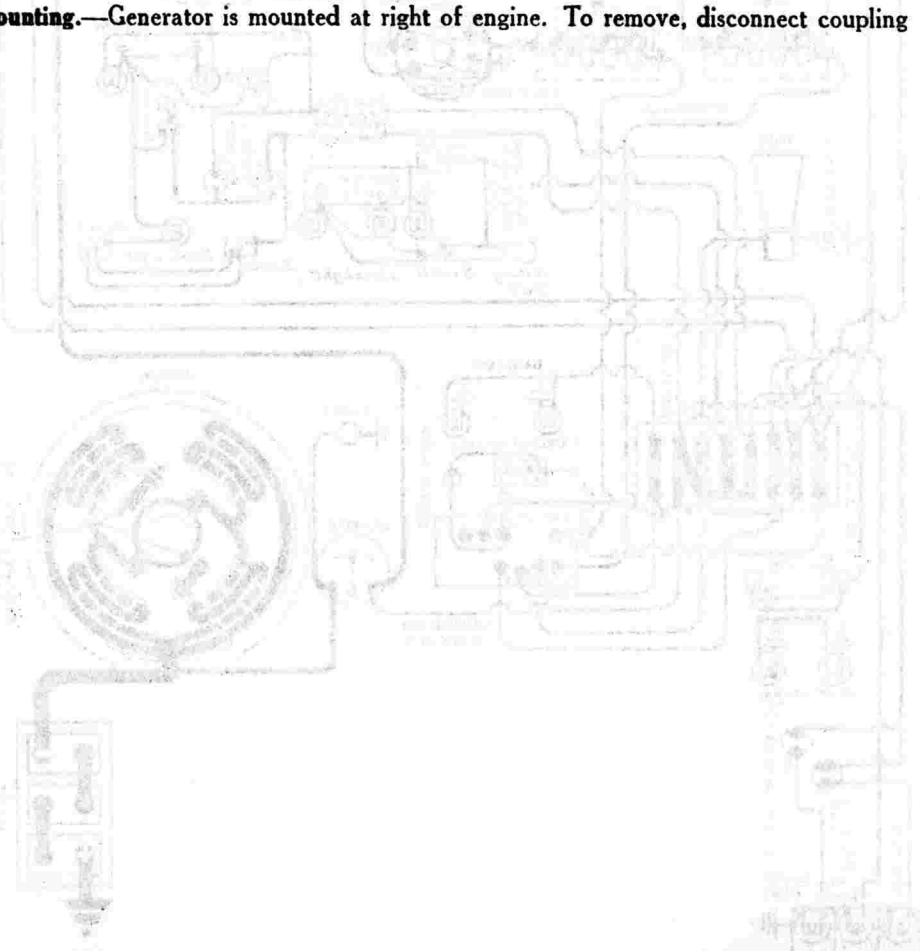
Mounting.—Generator is mounted at right of engine. To remove, disconnect coupling at either end of generator and remove two hold-down screws in base. Then lift generator from position.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Relay contacts close when the voltage of the generator reaches 6.75 to 7.5 volts, which is reached at a car speed of approximately 8 M.P.H. and open when the discharge current reaches 0 to 3 amperes. Contacts separate .030 inch. The air gap between the realy armature and the coil core is .015-020 inch, contacts closed.

LIGHTING:—Switch Model No. 1271. Head, stop and backing lamps are each 6-8 volt, 21 cp. S.C. Auxiliary head lamps are 6-8 volt, 4 cp. S.C. Dash, tail and tonneau lamps are each 6-8 volt, 4 cp. S.C. Dome lamp is 6-8 volt, 15 cp. S.C.

FUSES:—Main circuit fuse is 30 amperes. All other fuses are 10 amperes.



PIERCE ARROW

MODEL 36 (1927-28) SERIAL NUMBERS 361000 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type SJRR-6. 6 volt, 160 ampere hour. Starting capacity is 165 amperes for 20 minutes. Lighting capacity is 5 amperes for 31 hours. The positive (+) terminal is grounded. Battery is mounted on right chassis member in right front fender.

IGNITION:—Coil Model 2178 (Two used). Distributor Model 5265. A dual battery ignition system is used. Two ignition coils are mounted on the engine side of the dash. The right hand coil is controlled by the rear breaker in the distributor housing and fires the spark plugs at the right of the engine block over the exhaust valves. The left coil is controlled by the front breaker and fires the plugs at the left of the block over the intake valves. Breaker contacts separate .020-.025 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone. The distributor is of the semi-automatic type. Manual advance is 24-29°. Automatic advance begins at 575 R.P.M. and reaches a maximum of 14½°-17½° at 2000 R.P.M. The tension of the breaker arm spring should be 13-16 ounces. The ignition current is 4-4½ amperes at 6.5 volts with engine running, and 4-4¼ amperes at 6.2 volts with engine stopped.

Mounting:—Distributor is mounted at left of engine. To remove distributor, disconnect breaker leads and high tension cables or remove distributor head. Then disconnect manual advance rod and distributor drive coupling. Remove two base mounting screws and lift distributor from place.

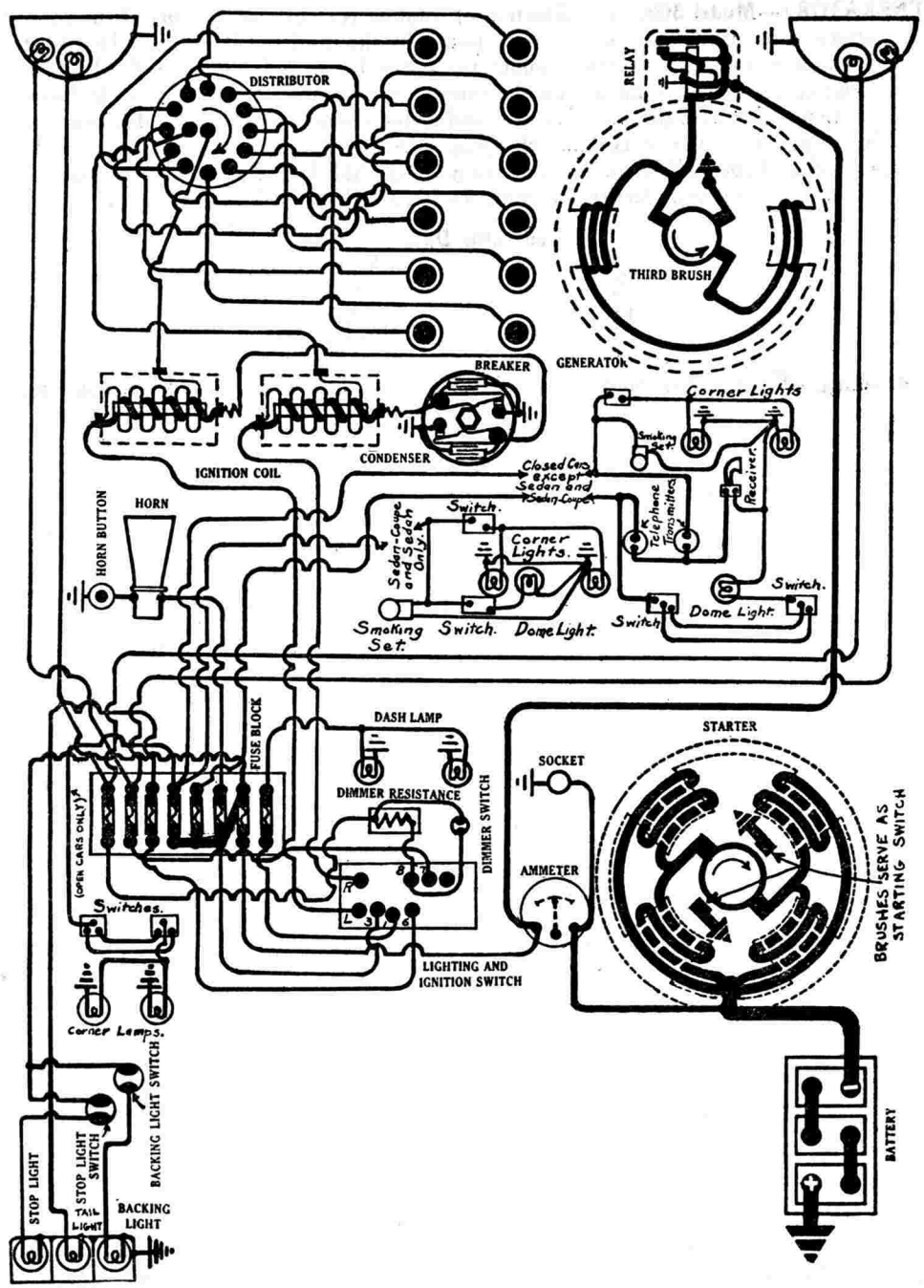
OILING: — Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles. If the track of the distributor button in the head is not well polished, apply a small amount of vaseline, removing all excess with a soft, clean cloth. Once each year repack the gear compartment with medium soft cup grease.

Timing:—Rear breaker contacts firing spark plugs over exhaust valves begin to separate when the flywheel marking "Ignition" is opposite the indicator on the flywheel case with piston No. 1 entering power stroke and the manual advance lever and breaker assembly in the fully retarded position. The front breaker contacts firing spark plugs over intake valves open 3°-9° later than this when the flywheel mark is approximately 1⅜ inches past the indicator. To set timing, retard spark lever and crank engine until piston No. 1 reaches top dead center on compression stroke (the upward stroke with both valves closed). The top dead center mark on the flywheel will then be opposite the indicator on the flywheel case. Crank engine over until the ignition mark is opposite the indicator. This is slightly after top dead center. Then loosen lock screw in center of breaker cam and rotate cam until rear set of breaker contacts begin to separate. Tighten the screw and check the front breaker contacts to see that they open after 3-9° of crankshaft rotation.

Valve Timing:—INLET VALVES:—Head diameter, 1⅞ inches; stem diameter, .406 inches; stem length, 7 9/16 inches; tappet clearance, .003 inch; spring pressure, 74 pounds (valve closed); valve lift, 11/32 inch; intake opens at 5° before top dead center and closes 45° after lower dead center.

EXHAUST VALVES:—Head diameter, 1.468 inches; stem diameter, .4060 inch; stem length, 7 9/16 inches; tappet clearance, .003 inch; spring pressure, 74 pounds (valve closed); valve lift, 11/32 inch; exhaust opens at 45° before lower dead center and closes 5° after top dead center. No oversize valve stems are made.

Motoring freely, generator draws 4.25 amperes at 6.5 volts. Shuntfield current is



PIERCE ARROW

MODEL 36 (1927-28) SERIAL NUMBERS 361000 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

2 to 3.5 amperes at 8 to 9.75 volts. Generator brush spring tension is 1¾ pounds each.

FIRING ORDER: — The firing order is 1-5-3-6-2-4.

SPARK PLUGS: — Spark plug diameters are ⅞ inch. Gaps are .030 inch.

STARTER: — Model No. 252. The starter is connected to the engine through a mechanical gear shift. The two grounded motor brushes serve as a starter switch and are allowed to come in contact with the commutator when the gear shift is operated. This completes the circuit and permits the starter to crank the engine. When the starter button is released, a spring reverses these operations. The starter cranks the engine at 115 R. P. M. taking 180 to 300 amperes. Running free, the current is 50 amperes at 6 volts. Lock torque is 40 lb. ft. the current being 550-600 amperes at 2.75 volts. The brush tension should be 2¼ to 2¾ pounds.

Mounting.—Starter is mounted at right of engine on a special bracket mounting. To remove, disconnect pedal return spring and pedal rod and remove two hold-down screws in motor base. Then lift starter from place.

OILING: — Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles. Once each year disassemble, clean and repack starter clutch with pure vaseline. At the same time remove grease plug in reduction gear case and repack compartment with medium heavy cup grease.

GENERATOR: — Model No. 279. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. The maximum charging rate is 22 amperes reached at 1600 R. P. M. of the generator armature or 20 M. P. H.

Generator Data.

Amperes	R. P. M.
3	600
22	1600

The average output required is 15 amperes. To adjust the charging rate, loosen the generator cover band and the lock nut on the commutator end of the generator. Then shift the third brush mounting plate, by means of the handle attached, in a counter-clockwise direction to increase the charging rate and the opposite direction to decrease the charging rate. Tighten the locknut after making the adjustment. The tension of the generator brushes should be 1¾ pounds each.

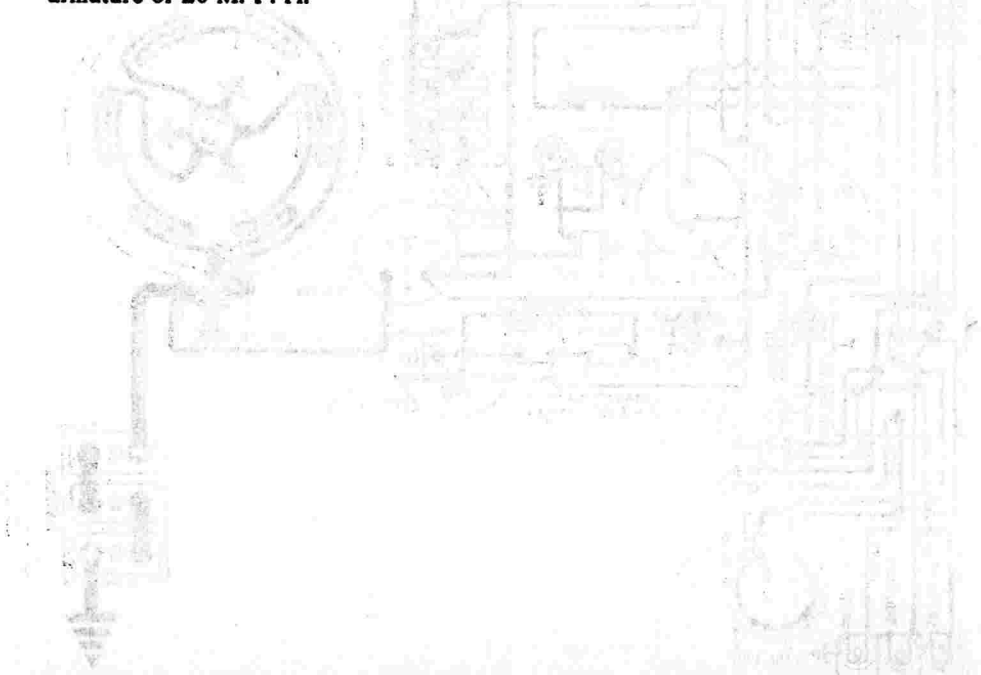
Mounting.—Generator is mounted at right of engine. To remove, disconnect coupling at either end of generator and remove hold-down from generator base. Then lift generator from position.

OILING: — Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY: — Relay contacts close when the voltage of the generator reaches 6.75 to 7.5 volts, which is reached at a car speed of approximatety 8 M. P. H., and open when the discharge current reaches 0 to 3 amperes. Contacts separate .030 inch The air gap between the relay armature and the coil core is .015 - .020 inch, contacts closed.

LIGHTING:—Switch Model 1186. Head lamps and stop lamp are each 6-8 volt, 21 cp. S.C. Backing and stop lamps are each 6-8 volt, 21 cp. S.C. Dome lamp is 6-8 volt, 15 cp. S.C. Dash, tail, auxiliary head lamps and tonneau lamp are each 6-8 volt, 4 cp. S.C.

FUSES: — Main circuit fuse is 30 amperes. All other fuses are 10 amperes.



PIERCE ARROW

MODEL 81 (1928) SERIAL NOS. 8101001 UP

Production Started November 3, 1927

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—Willard, Type SJRR-4, 6 volt, 13 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours. Battery is mounted under front floor boards on the right frame member.

IGNITION:—Coil Model 552-B. Ignition current is 2 amperes at 6 volts with engine running and 3.5 amperes at 6 volts with engine stopped. Ignition coil is mounted on the dash with the ignition switch in the base of the coil.

Distributor:—Number 17042 (integral with generator). Breaker contacts separate .020-.025 inch with breaker arm on lobe of cam. Adjust contact opening by loosening lock screw on stationary contact stud and turning up stud until proper gap is secured. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 40 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 16 degrees reached at 2000 R.P.M.

Mounting:—Distributor is mounted on rear of generator at right of engine. To remove distributor, disconnect manual advance rod and primary lead and remove distributor head with cables intact. Then remove manual advance stop screw in advance arm and lift distributor from place.

Oiling:—Put 8 or 10 drops of light oil in each of the two oilers on the side of the distributor housing every two weeks or each 500 miles. Twice each year remove the plug in the gear compartment and repack gears with medium soft cup grease. Once a month put a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 2¼ inches (on the flywheel) past top dead center with the spark control lever in the fully retarded position. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully retard spark lever. Continue to crank engine until 'ignition' mark on flywheel is in line with mark on flywheel housing. This mark is 2¼ inches past the top dead center mark. Loosen screw in center of breaker cam and turn cam with rotor in place until contacts begin to separate with rotor in position opposite No. 1 terminal in head. Opening of contacts can be checked with ignition turned on by watching dash ammeter. Ammeter pointer will move from 'Discharge' to '0' as contacts open. Tighten the screw in the cam and connect No. 1 terminal in head opposite rotor to spark plug in cylinder No. 1. Connect remaining plugs in order 5-3-6-2-4 clockwise around the distributor head.

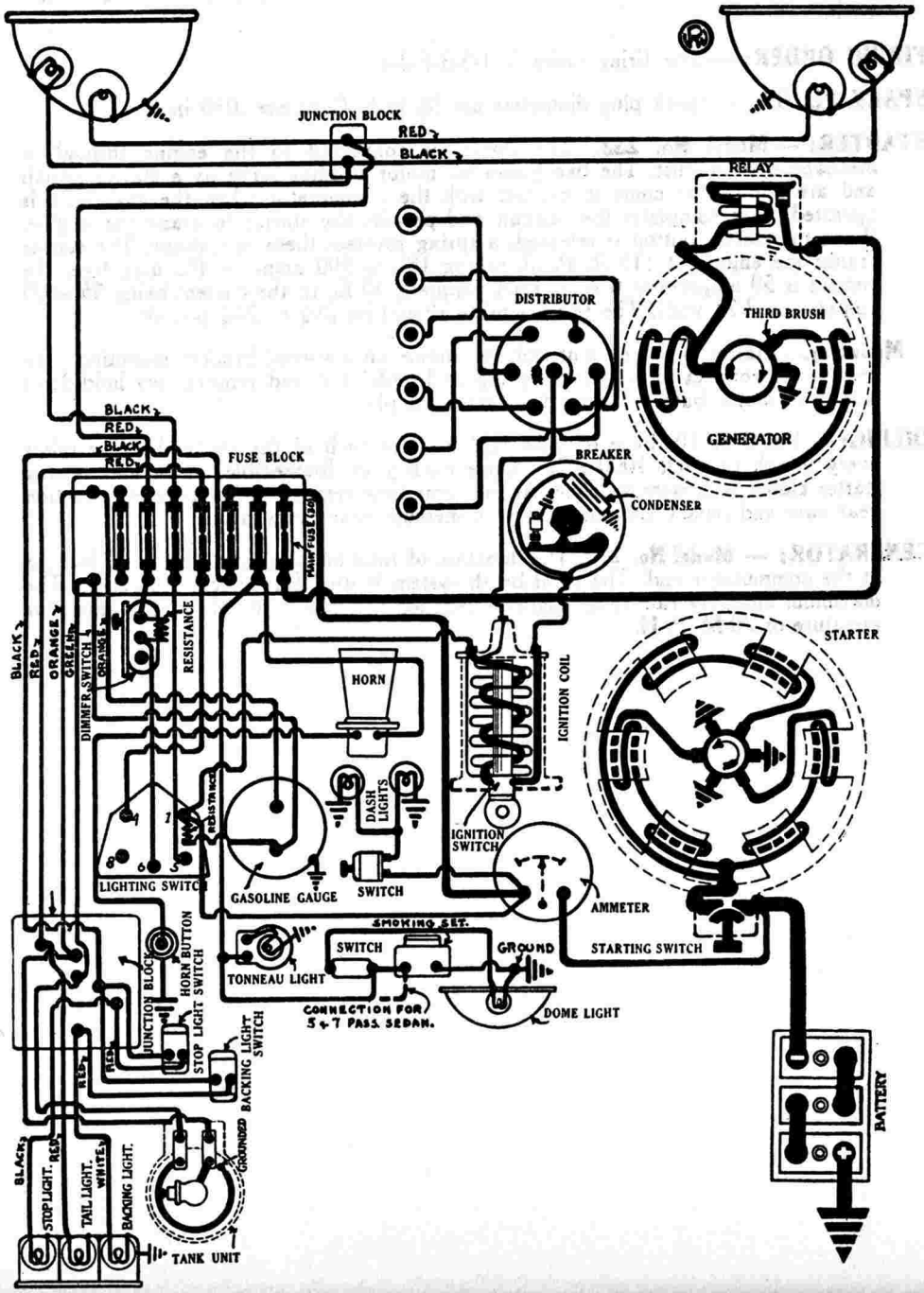
Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are 1/32 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1.75 inches; stem diameter, .3715 inch; stem length, 6 1/16 inches. Valve lift, 11/32 inch. Spring pressure, 71 pounds. Tappet clearance, .003 inch. Inlet valves open 17 degrees before top dead center and close 67 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1.50 inches; stem diameter, .3715 inch; stem length, 6 inches. Valve lift, 11/32 inch. Spring pressure, 71 pounds. Tappet clearance, .003 inch. Exhaust valves open 62 degrees before lower dead center and close 22 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

STARTER:—Model 336. Starter is connected to the engine through a manually operated gear shift and an overrunning clutch. The direction of rotation is counter-



PIERCE ARROW

MODEL 81 (1928) SERIAL NOS. 8101001 UP
Production Started November 3, 1927
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

clockwise, looking at the commutator end. Brush spring tension is 2¼-2½ pounds each. Starter cranks the engine at 110-120 R.P.M. drawing 280-450 amperes at 4.5 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	40
4.5 "	700	5	200
19 "	Lock	3	500

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and pedal rod and remove 3 flange mounting cap screws. Then slide starter forward and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model 300. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen the commutator cover band and shift the third brush by means of the handle on the brush mounting plate. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush is held in any desired position by friction washers. Maximum charging rate is 24 amperes (cold) reached at 1600 R.P.M. or approximately 20-25 M.P.H. Average output required is 15 amperes.

Generator Data

Amperes	Volts	R.P.M.
5		800
11		1000
15	7.5-8	1600

Motoring generator draws 5 amperes at 6 volts. Shunt field current is 2.5 amperes at 6 volts. Brush spring tension is 20-28 ounces.

Mounting:—Generator is base mounted at right of engine. To remove generator, disconnect lead and remove distributor cap with cables intact. Then disconnect coupling at each end of generator and remove 2 hold-down screws in base. Lift generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close when the generator voltage reaches 6.75 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Head, stop and backing lights are each 6-8 volt, 21 cp. S.C. Mazda No. 1129. Auxiliary head lights are 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash, tail, tonneau lights are each 6-8 volt, 6 cp. S.C. Mazda No. 81. Dome light is 6-8 volt, 15 cp. S.C. Mazda No. 87.

Switches:—Lighting switch is Delco-Remy Model 1320. It is mounted on the dash panel. Dimmer switch is Delco-Remy Model 465-B. It is mounted on the toeboard.

FUSES:—Main circuit fuse is 30 amperes capacity. All other fuses are 10 amperes.

PILOT

MODEL 6-45 (1916-17-18-19)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY:—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2158. Breaker contacts separate .018 to .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 3 or 4 drops of light engine oil in the distributor shaft bearing every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering the power stroke is on top dead center, spark control lever and breaker assembly advanced one-third on the 1919 cars and in the fully retarded position on the 1916-17-18 cars.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER:—86 & 104. Starter is connected to engine through a Bendix drive. Lock torque is 16 pound-feet, at 3.5 to 3.8 volts. Running freely, starter takes 40 amperes.

OILING:—Put several drops of light engine oil in the starter oilers on Model 86. Model 104 is of the oiless type.

GENERATOR:—89 & 103. Generator current regulation is by the third brush system. Generator begins to supply current at 500 R.P.M. of the armature or 8 miles per hour and reaches the maximum current output of 16 amperes at 1400 R.P.M. of the armature or 22 miles per hour.

Generator Data

Amperes	R.P.M.	Amperes	R.P.M
Neutral	500	Neutral	500
10.5-12.5	900	10-12	900
15.5-18.0	1400	14-16	1400
13.0-17.0	2000	11-13	2000

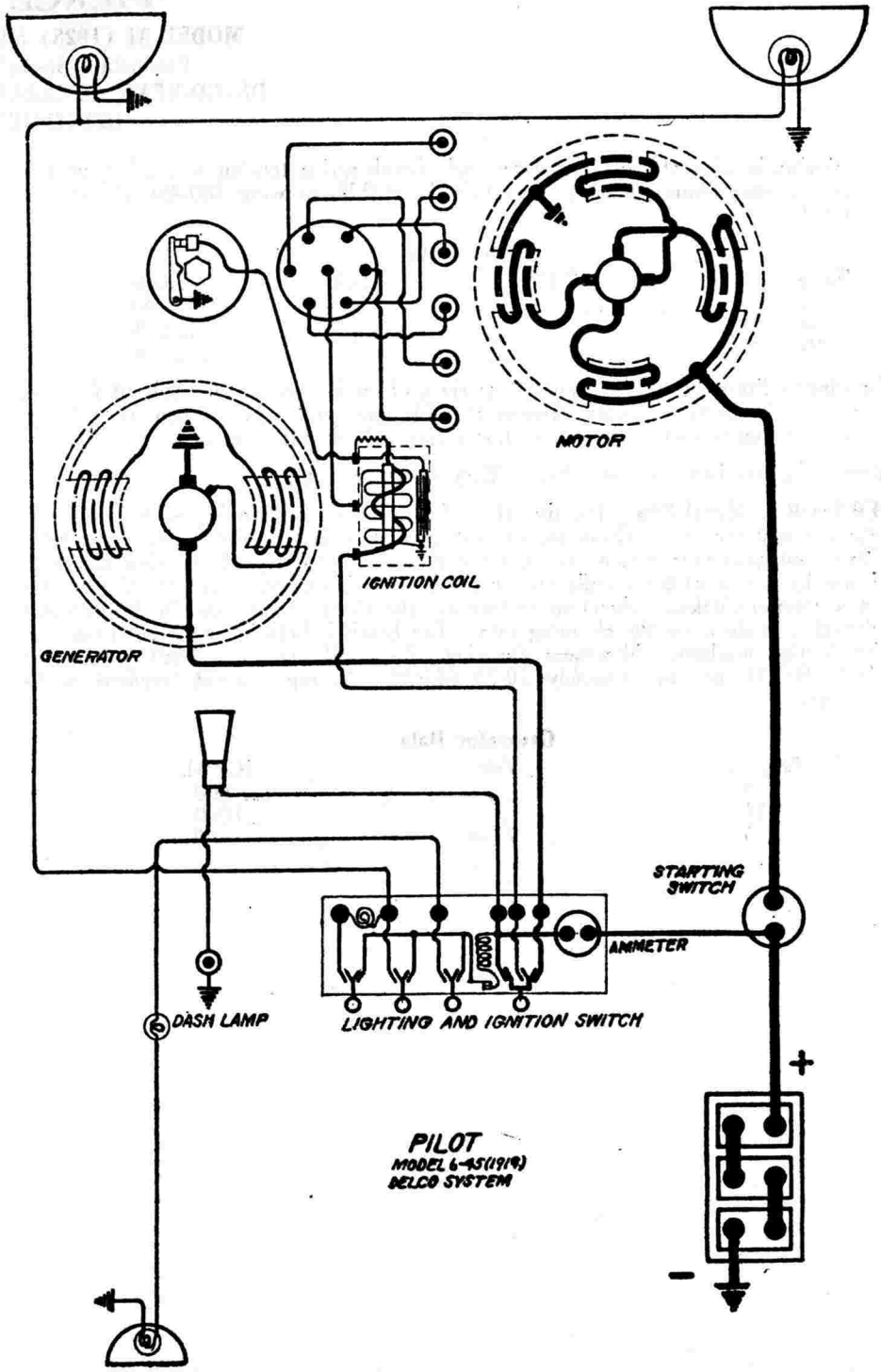
Charging rate is varied by adjusting third brush setting. Loosen the two screws holding the third brush arm, and move the brush in a counter-clockwise direction (looking at commutator end) to increase the charging rate. Move the brush in a clockwise direction to decrease the charging rate. Tighten the holding screws and reseat brush after adjusting position.

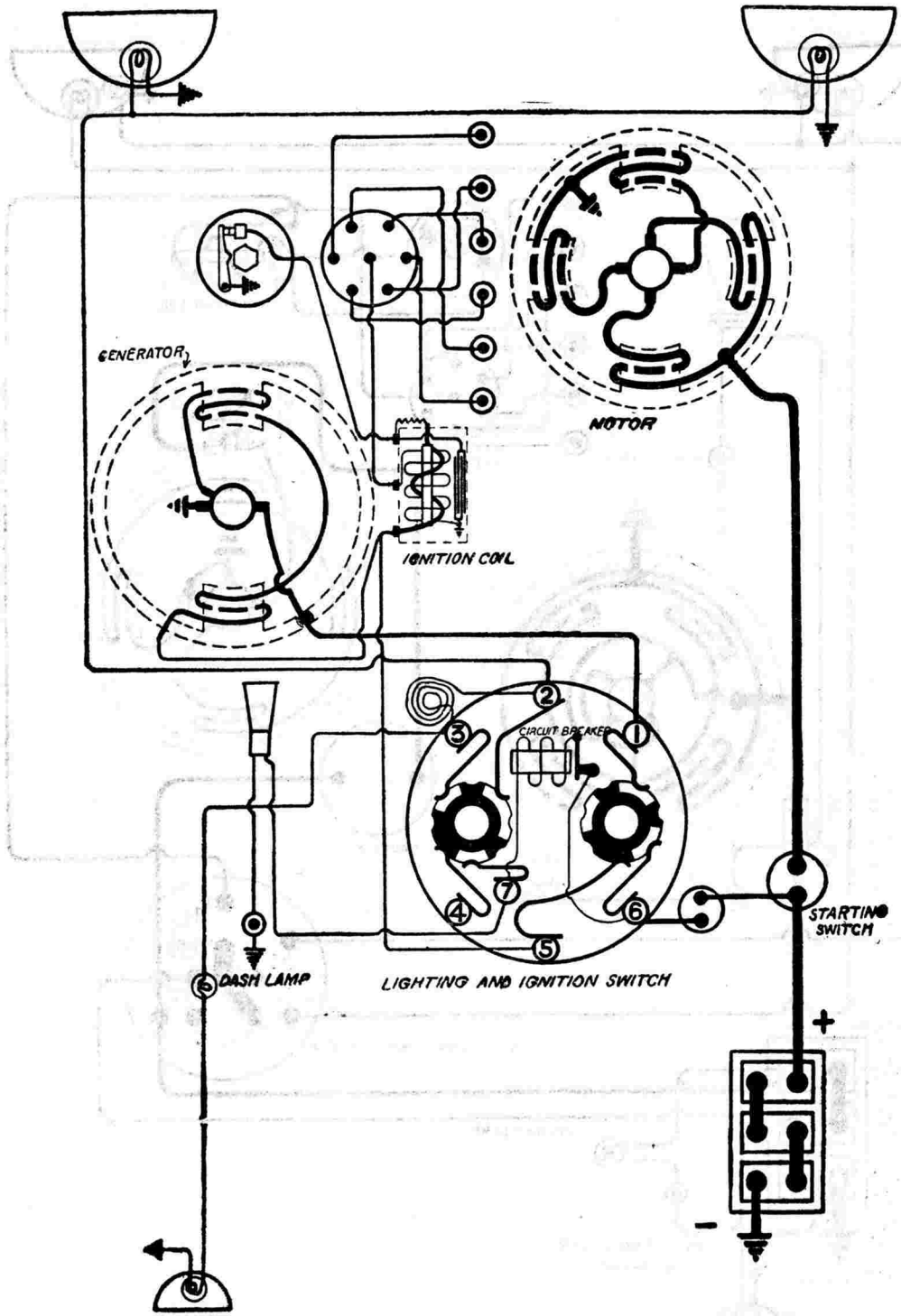
OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are connected in series and are each 3-4 volt, 2 cp.

CIRCUIT-BREAKER.—A vibrating circuit-breaker takes the place of fuses. It requires 25 amperes to start the vibrator, but 3-5 amperes will cause it to continue.





PILOT

MODEL 6-45 (1919-20)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY:—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. 2158. Breaker contacts separate .018 to .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oilstone.

Oiling:—Put 3 or 4 drops of light engine oil in the distributor shaft bearing every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing:—Break contacts begin to separate when the piston entering the power stroke is on top dead center, spark control lever and breaker assembly advanced one third.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plug Gaps:—Spark Plug gaps are .030 inch.

STARTER:—Model No. 104. Starter is connected to the engine through a Bendix drive. Lock torque is 16 pound-feet, at 3.5 to 3.8 volts. Running freely, starter takes 40 amperes.

Oiling:—Oilless bearings are used. They require no attention.

GENERATOR:—Model No. 103. Generator current regulation is by third brush system. Generator begins to supply current at 500 R.P.M. of the armature or 8 miles per hour and reaches the maximum current output of 16 amperes at 1400 R.P.M. of the armature or 22 M.P.H.

Generator Data

Amperes	R.P.M.	Amperes	R.P.M.
Neutral	500	Neutral	500
10.5-12.5	900	10-12	900
15.5-18.0	1400	14-16	1400
13.0-17.0	2000	11-13	2000

Charging rate is varied by adjusting third brush setting. Loosen the two screws holding the third brush arm, and move the brush in a counter-clockwise direction (looking at commutator end) to increase the charging rate. Move the brush in a clockwise direction to decrease the charging rate. Tighten the holding screws and reseat brush after adjusting position.

Oiling:—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY:—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch.

LAMPS:—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are connected in series and are each 3-4 volt, 2 cp.

CIRCUIT BREAKER:—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start the vibrator, but 3-5 amperes will cause it to continue.

PILOT

MODEL 6-50 (1921-23)
BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—Prest-O-Lite, Type 611-RHN, 6 volts, 90 ampere-hours capacity. The starting capacity is 95 amperes for 20 minutes. The lighting capacity is 5 amperes for 16 hours. The negative (—) terminal is grounded.

IGNITION.—The ignition is **Connecticut Battery Ignition.** The contact gaps are adjusted to .020 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone.

Oiling.—Every 1000 miles remove the breaker box cover and put 4 or 5 drops of light engine oil around the distributor shaft. This will lubricate the lower bearing. Use care not to let oil reach the contact points.

Timing.—The breaker contact points begin to separate when piston No. 1 is slightly past top dead center, on power stroke, spark control lever and breaker assembly one-third advanced.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plugs.—The spark plug diameters are 7/8 inch, and the gaps are .030 inch.

STARTER.—Model M-1808. The starter is connected to the engine by a Bendix drive The direction is clockwise, looking at commutator end. Starter running free at 6800 R.P.M., takes a current of 30 amperes, 5.8 volts. Cranks the engine at 125-150 R.P.M., requiring a current of 150-175 amperes, 5 volts. Lock torque is 16.5 pound-feet, the current being 665 amperes, 3.6 volts.

Oiling.—Place 4 or 5 drops of light engine oil in each starter oiler once a month. If the car is driven over 1000 miles in a month, this care must be given every 1000 miles.

GENERATOR.—Model M-1807. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current reguation. The third brush is adjusted through a rachet engagement by the use of a special toothed wrench inserted in the adjusting hole at the commutator end of generator. Turn the wrench to the right to increase the charging rate, after first loosening the nut. The field test current is 4-6 amperes, 6 volts.

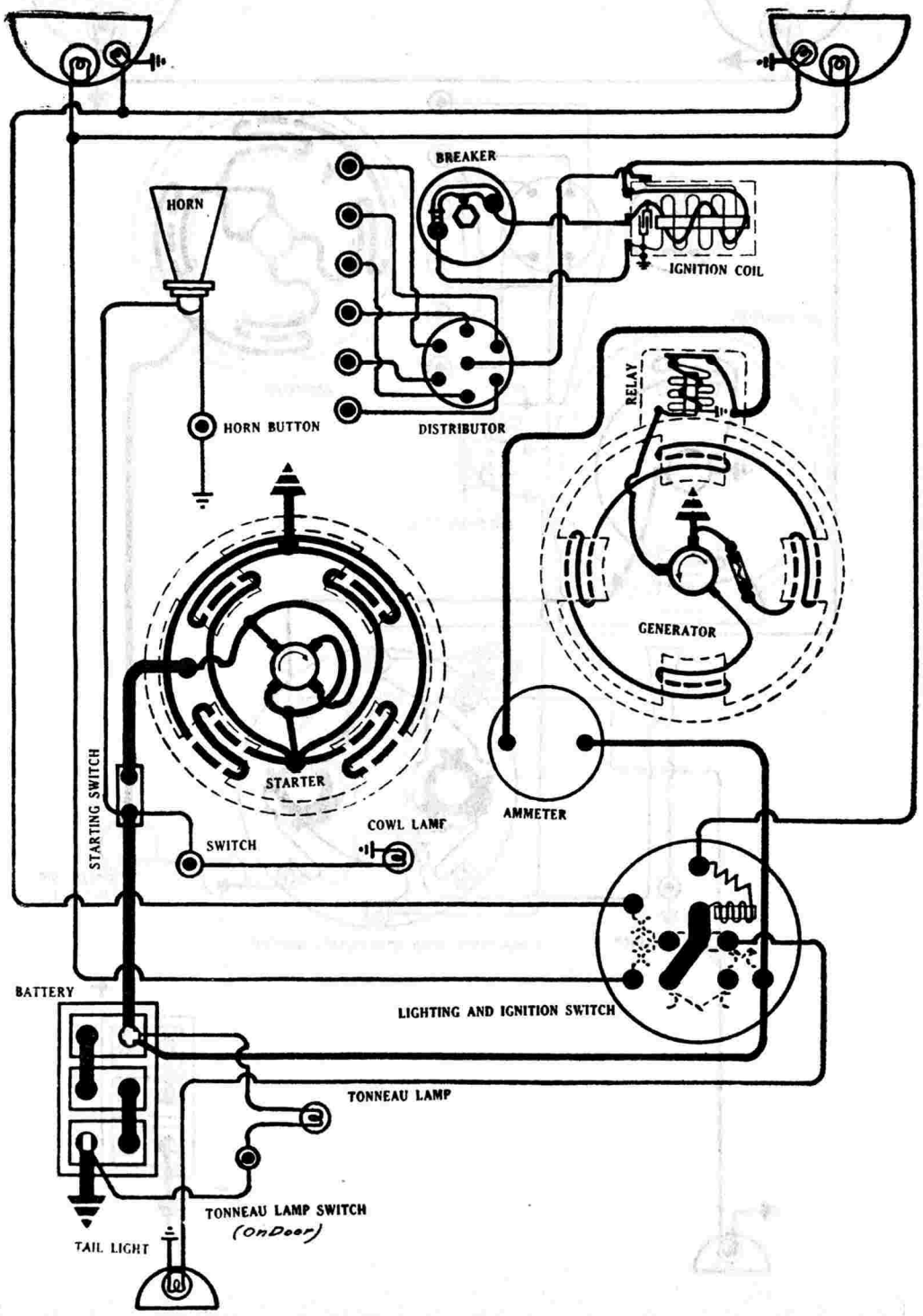
Generator Test Data

Amperes	R.P.M.
0	550- 600
12-16	1400-1600

Oiling.—Place 4 or 5 drops of light engine oil in each of the generator oilers once in two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—The relay closes at 550-600 R.P.M. of armature or 8-10 M.P.H., or 6.5 volts and opens at 500-550 R.P.M. of armature, or 6-8 M.P.H., 0-1 ampere discharge. The relay contact gap is .045 inch. The air gap between the relay armature and coil core is .035 inch, contacts closed. Relay tension spring is adjusted by a special wrench inserted in the relay adjusting hole at the commutator end of generator. Generator is connected to battery through ignition switch, when switch is turned on.

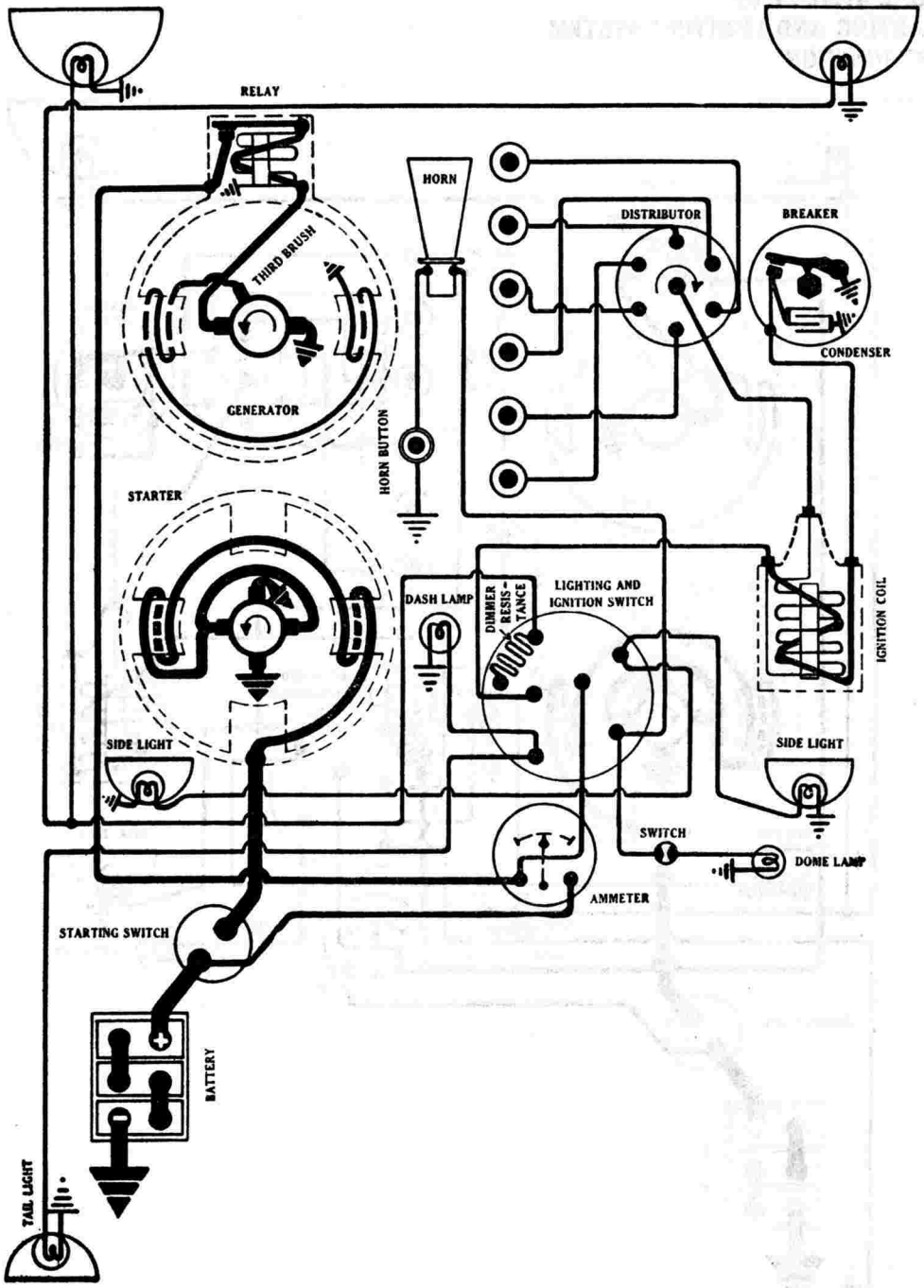
LIGHTING.—Connecticut Toggle Switch is used. Head lamps are 6-8 volts, 21 cp., S.C. Dash and tail lamps are 6-8 volts, 2 cp. ,S.C.



PONTIAC

SIX (1926)

REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION



BATTERY.—Prest-O-Lite, Type 613-JFKA. 6 volt. Starting capacity is 102 amperes for 20 minutes. Lighting capacity is 5 amperes for 17 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model 525-C. Distributor Model 637-L. Breaker contacts separate .020-.024 inch. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Distributor is of the full automatic type. Automatic advance is 18°.

Mounting.—Distributor is mounted on top of the engine block. To remove distributor, first remove distributor clamp screw then lift unit from place.

Oiling.—Refill the grease cup on the side of the distributor shaft and turn down one turn every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

Timing.—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center and the flywheel marking "IGN 1-6" is opposite the indicator in the crankcase peephole. To set timing, crank engine until piston No. 1 reaches top dead center on compression stroke (upward movement of piston with both valves closed). Then loosen the distributor clamp screw and rotate distributor housing until breaker contacts begin to separate. Tighten the clamp screw after making the adjustment.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .022 inch.

STARTER.—Model 714-C. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush tension is 24-28 ounces each. Starter switch is Model 405-C.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
12 "	Lock	3.63	475

Mounting.—Starter is mounted at left of engine by S. A. E. No. 1 flange mounting. To remove starter, first remove two flange mounting screws then lift starter from place.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month. The drive end bearing is self-lubricating.

GENERATOR.—Model 943-C. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, loosen the small round headed screw on the generator end plate. Then remove the commutator cover band and shift the third brush mounting arm in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The maximum charging rate is 17 amperes, reached at 1700 R.P.M. or 25 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7-7.3	850			
15-17	7.95-8.05	1600	11-13	7.55-7.85	1800
11		2500			

Shunt field current is 5 amperes at 6 volts. Generator brush tension should be 16-18 ounces.

Mounting.—Generator is mounted at left of engine by special mounting and is driven by the fan belt.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY.—Model 265-B. Relay is mounted on top of the generator. Relay contacts close at approximately 660 R.P.M. when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING.—Head lamps are 6-8 volt, 21 cp. S. C. Dash, tail, side and dome lamps are each 6-8 volt, 3 cp. S. C.

FUSES.—Lighting fuse on switch is 20 amperes.

PONTIAC

6-27 (1927) SERIAL 41716-27 UP

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 613-JFKA, or 613-JFK, 6 volt. Starting capacity is 102 amperes for 20 minutes. Lighting capacity is 5 amperes for 17 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model 525-C. Distributor Model 637 C, L, M. Breaker contacts separate .020-.028 inch. Spring tension at contacts is 15-20 ounces. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Distributor is of the full automatic type. Automatic advance starts at 400 engine R.P.M. and reaches maximum at 1800 R.P.M.

Mounting:—Distributor is mounted on top of the engine block. To remove distributor, first remove distributor clamp screw then lift unit from place.

Oiling:—Refill the grease cup on the side of the distributor shaft and turn down one turn every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center and the flywheel marking 1&6 UDC is opposite the indicator in the crankcase peephole. To set timing, crank engine until piston No. 1 reaches top dead center on compression stroke (upward movement of piston with both valves closed). Then loosen the distributor clamp screw and rotate distributor housing until breaker contacts begin to separate. Tighten the clamp screw after making the adjustment.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .022 inch.

Valve Timing:—INLET VALVES:—Head diameter, 1 3/16 inches; stem diameter, 5/16 inch; stem length, 4 47/64 inches; tappet clearance, .007-.009 inch; spring pressure, 32-37 pounds; valve lift, 9/32 inch; intake opens at 7° past top dead center and closes at 33° past lower dead center.

EXHAUST VALVES:—Head diameter, 1 3/16 inches; stem diameter, 5/16 inch; stem length, 4 47/64 inches; tappet clearance, .007-.009 inch; spring pressure, 32-37 pounds; valve lift, 9/32 inch; exhaust opens 42° before lower dead center and closes at upper dead center.

STARTER:—Model 710-C or 714-C. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush tension is 20-28 ounces each.

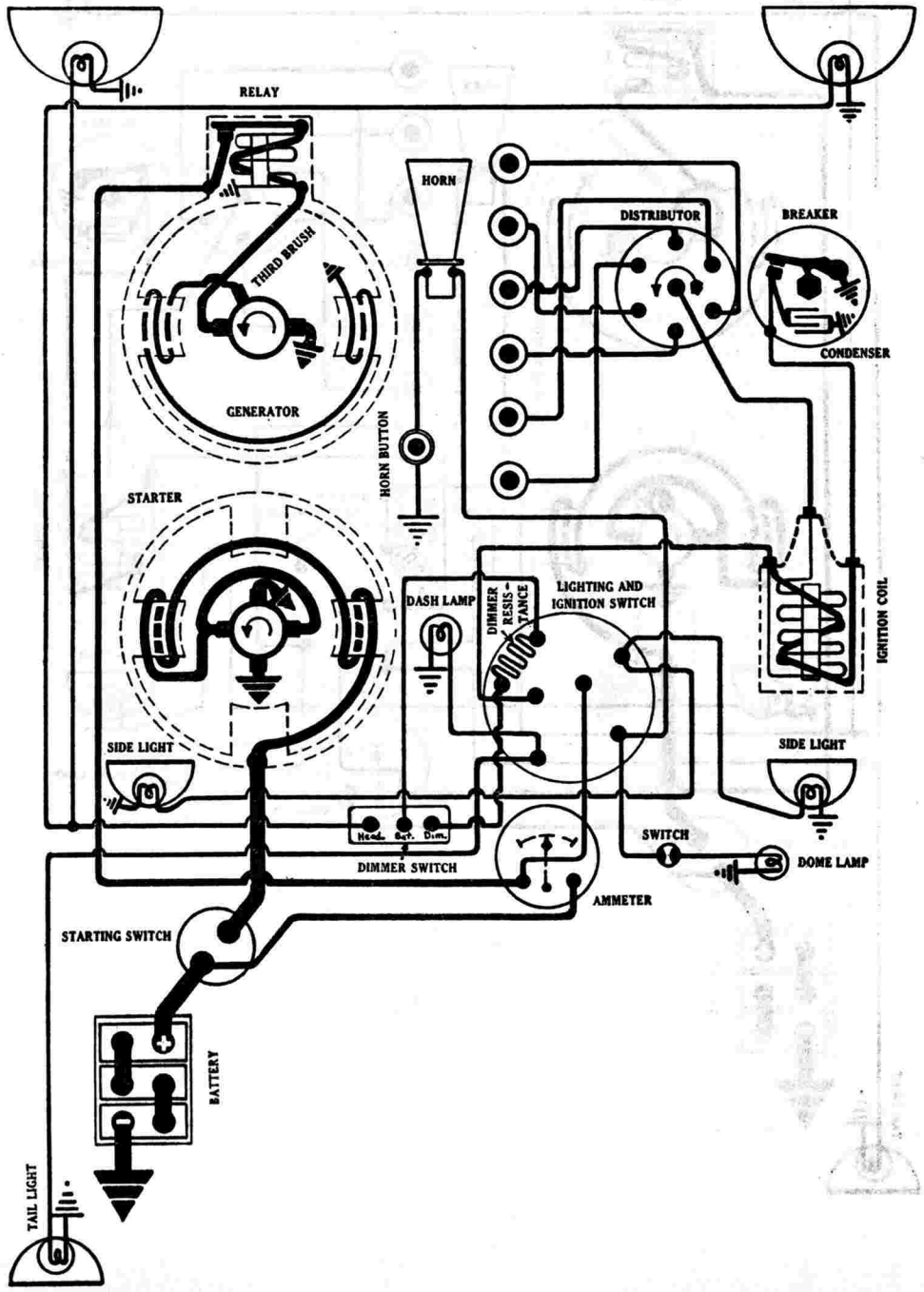
Starter Data (Motor 710C)

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4500	5	70
10 "	Lock	3.7	450

Starter Data (Motor 714C)

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
12 "	Lock	3.63	475

Mounting:—Starter is mounted at left of engine by S.A.E. No. 1 flange mounting. To remove starter, first remove two flange mounting screws then lift starter from place.



PONTIAC

6-27 (1927) SERIAL 41716-27

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

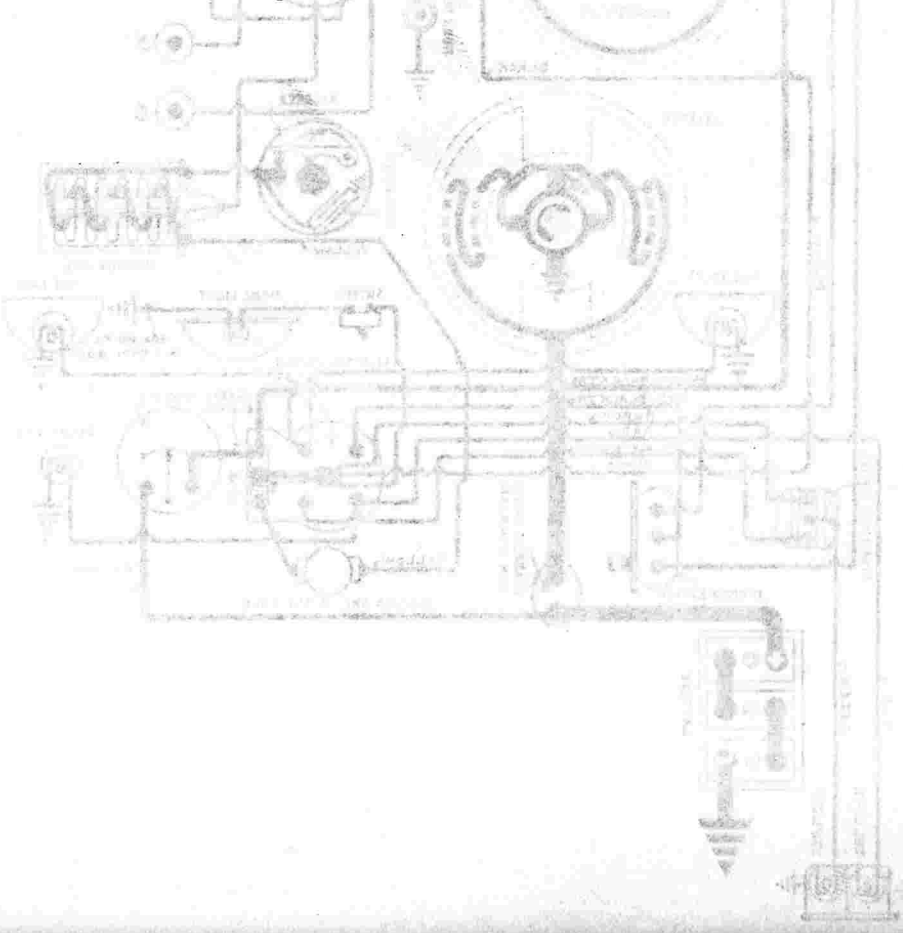
Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month. The drive end bearing is self-lubricating.

GENERATOR:—Model 943-B,C. The direction of rotation is counter-clockwise looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, loosen the small round headed screw on the generator end plate. Then remove the commutator cover band and shift the third brush mountig arm in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The maximum charging rate is 17 amperes, reached at 1600 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7-7.3	850			
15-17	8	1600	11.3	7.7	1800
11		2500			

Shunt field current is 5 amperes at 6 volts. Generator brush tension should be 16-8 ounces.



Mounting:—Generator is mounted at left of engine by special mounting and is driven by the fan belt.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay contacts close at approximately 660 R.P.M. when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING:—Clum Switch Model 10598. Guide "Tilt Ray" Dimmer System used. Head lamps are 6-8 volt, 21-21 cp. Dash, tail, side and dome lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Lighting fuse on switch is 20 amperes.

PONTIAC

MODEL 6-28 (1928)
SERIAL NUMBERS 204001 UP
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—U.S.L., Type XY-13X-6, 6 volt, 13 plates. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 102 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted under the front floor boards on the left frame member.

IGNITION:—Coil Model 525-C. Ignition coil is mounted on the engine block. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

Distributor Model 639-A. Breaker contacts separate .020-.025 inch. Adjust contact opening by loosening lock screw on stationary contact plate and turning eccentric adjusting screw to secure correct contact opening. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is full automatic. Maximum automatic advance is 18 degrees (engine).

Mounting:—Distributor is mounted on the top of the engine block. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Then loosen clamp screw and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft and turn down one turn every 500 miles. Every 1000 miles remove the head and rotor and put 4 or 5 drops of light oil in the wick oiler in the center of the shaft.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the breaker assembly in the fully retarded position. To set timing, crank engine until piston No. 1 reaches top dead center on compression stroke (the upstroke with both valves closed). At this point the flywheel mark '1-6 UDC' will be opposite the indicator. Loosen clamp screw and turn distributor until contacts begin to separate. Tighten the clamp screw and connect segment opposite rotor to spark plug in cylinder No. 1. Connect remaining plugs in order 5-3-6-2-4 around distributor head in a counter-clockwise direction.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Gaps are .022 inch.

VALVE TIMING:—Specifications:—Head diameter, 1 11/32 inches; stem diameter, .310 inch; stem length, 3 7/8 inches. Valve lift, 6/32 inch. Spring pressure, 32-37 pounds. Tappet clearance, .007-.009 inch. Valve stem guides are removable. Oversize valve stems are not made.

Valve Timing:—Inlet valves open 7° after top dead center and close 39° after lower dead center. Exhaust valves open 42° before lower dead center and close 7° after top dead center.

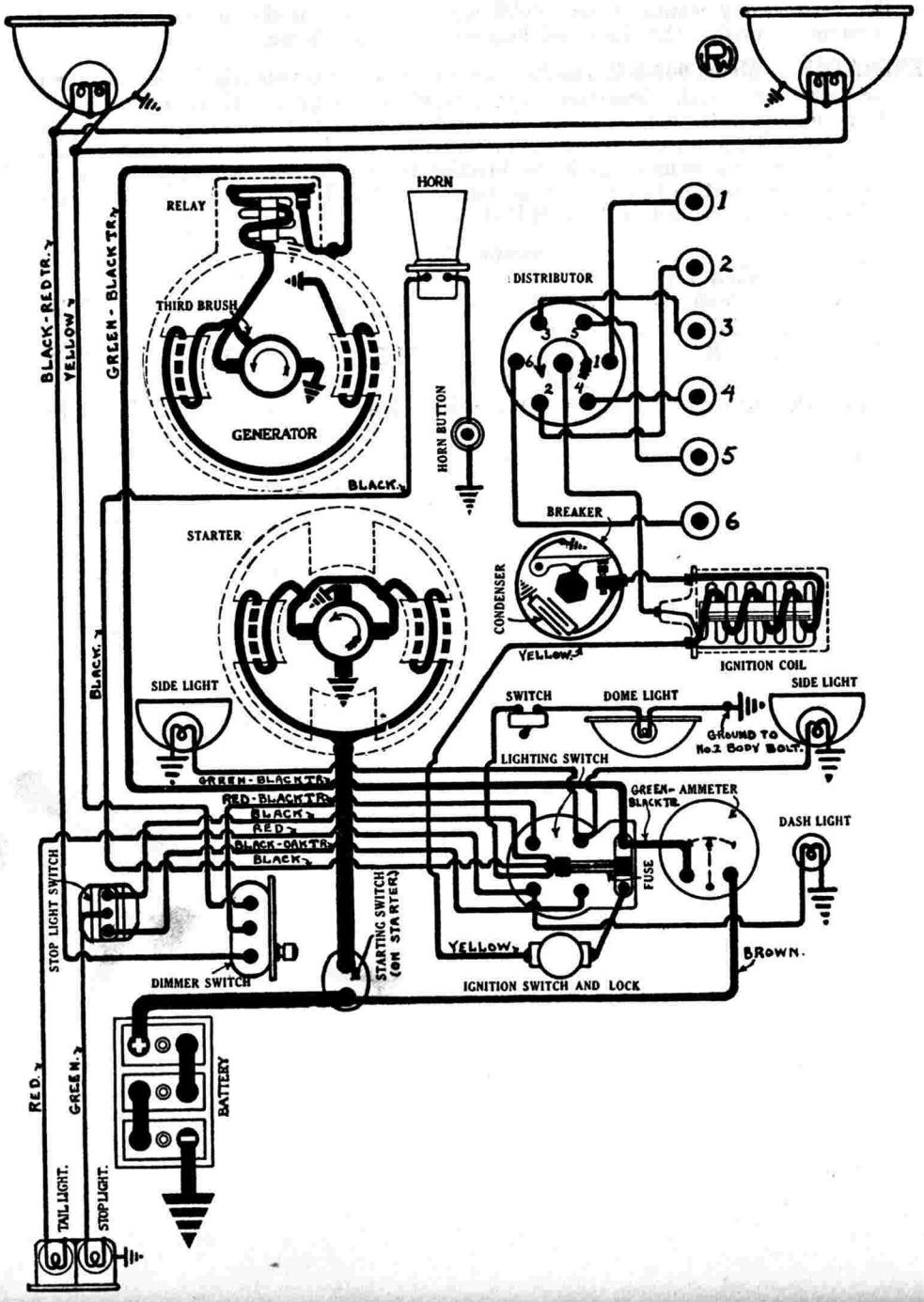
STARTER:—Model 714-F. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 100-175 R.P.M. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
12 "	Lock	3.63	475

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove flange mounting cap screws. Pull starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light oil in the commutator end oiler every 1000 miles The drive end bearing is oilless.



PONTIAC

MODEL 6-28 (1928)
SERIAL NUMBERS 204001 UP
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

GENERATOR:—Model 943-B. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, maximum charging rate is 17 amperes (cold) reached at 1600 R.P.M. or 20 miles per hour.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7.3	850			
17	8.0	1700	11.3	7.7	1800
11		2500			

Motoring generator draws 6 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 16-18 ounces.

Mounting:—Generator is flange mounted at right of engine at rear of timing chain case. To remove generator, disconnect lead and remove flange mounting cap screws. Pull generator to rear and lift from place.

Oiling:—Put 4 or 5 drops of light oil in each of the generator oilers every 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 7-10 M.P.H. or 575 R.P.M. when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current is approximately 2 amperes at closing of contacts. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Switch is mounted on the instrument board. Dimming is by double filament bulbs controlled by switch on toeboard. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base) Mazda No. 1110. Side, dash, stop and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

Switches:—Lighting switch is Clum Model 10707. Stop light and back light switch is Clum Model 8665. Choke and throttle control (to match switch) is Clum Model 8730.

FUSES:—Lighting fuse on switch is 20 amperes capacity. A spare fuse is also mounted on the switch.

PORTER

MODEL 46 (1920-21-22) SERIAL NOS. 100 UP.
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
BERLING IGNITION

BATTERY.—Prest-O-Lite, 613-RHV, 12 volt, 118 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .016 to .020 inch. They are made of platinum. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper. See that the brush in the back of the breaker base makes a good contact with the surface on which it rubs.

OILING.—Put 10 drops of light engine oil in each of the magneto oil cups every month. Put a small amount of vaseline on the cam and rubbing surfaces of the fiber lever, applying with a toothpick. If the car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—The spark plug gaps are .028 inch.

STARTER.—Frame 751. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 120-200 R.P.M., taking 180 amperes. Lock torque is 20 pound-feet, current being 575 amperes at 5.5 volts. Torque at 2200 R.P.M. is 3.5 pound-feet, current being 195 amperes at 10.5 volts. Running freely, starter takes 35-55 amperes at 5.5 volts, armature revolving at 3500-5500 R.P.M. The no-load test must be made with a 6 volt battery. Pressure of brushes on the commutator is 2.5 to 3 pounds.

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

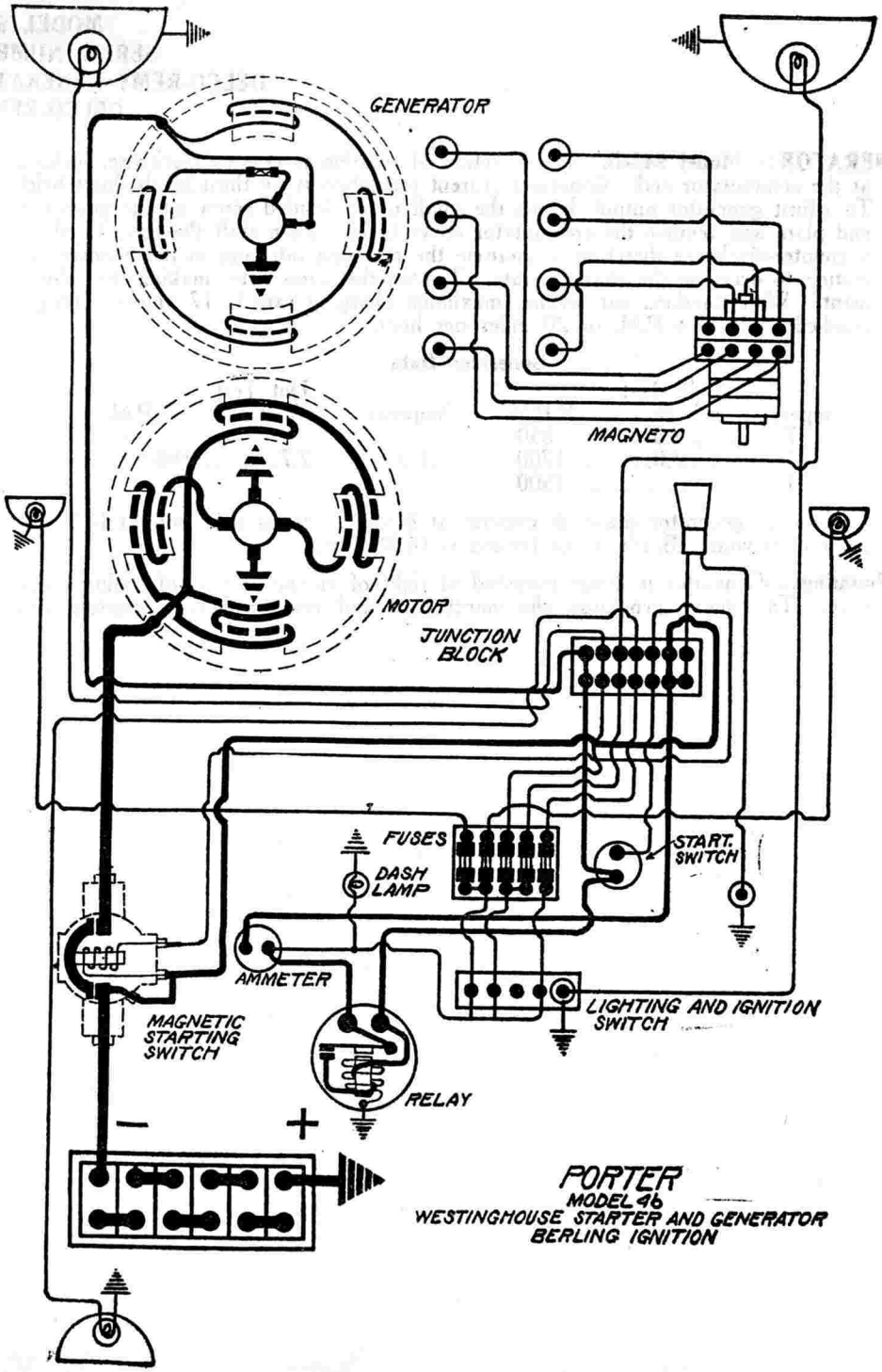
GENERATOR.—Frame 765. Generator current regulation is by the third brush system. Maximum current output is 9-10 amperes at 13 volts, reached at 750-950 R.P.M. of the armature or 20 miles per hour. Charging rate is varied by adjustment of the third brush setting.

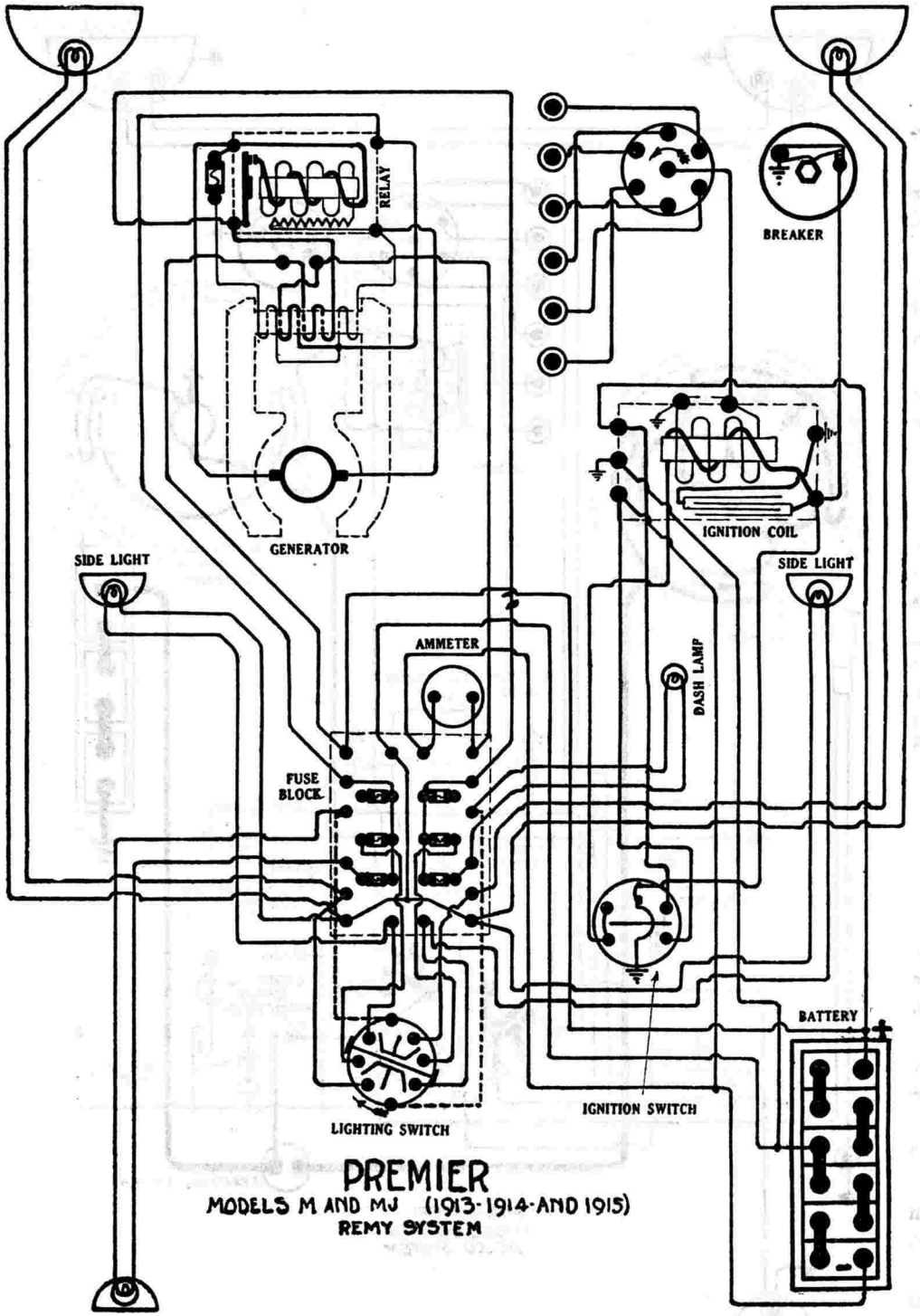
OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 9 miles per hour or 390-420 R.P.M. of the armature, and opens at 7 miles per hour or 360-390 R.P.M. of the armature. To adjust the relay, vary the spring tension until the relay opens with a discharge current of 0-3 amperes. Then bend the armature stop (which determines the air gap between the armature and coil core) until the contacts close when the voltage of the generator reaches 12.4-13 volts. Air gap between relay armature and coil core is .005 inch, contacts closed. Contacts separate .030 to .035 inch. The resistance of the shunt winding of the relay is 274 ohms. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 12-16 volt, 20 cp. Dimmer and tail lamps are 12-16 volt, 4 cp. Dash lamp is 12-16 volt, 2 cp.

FUSES.—Generator fuse is 5 ampere. Lighting circuit fuses are 15 ampere.





PREMIER
MODELS M AND MJ (1913-1914-AND 1915)
REMY SYSTEM

PREMIER

MODELS M AND MJ (1913, 1914, 1915)

REMY GENERATING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY.—Battery is 12 volt, 35 ampere-hour. The two wire system is used. A tap is taken off the middle connector to supply 6 volts for lights and ignition.

IGNITION.—Breaker contacts separate .025 to .030 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper.

Oiling.—See generator oiling.

Timing.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 4, 2, 6,, 3, 5.

Sparp Plug Gaps.—Spark plug gaps are .025 to .030 inch.

GENERATOR.—Model M or MJ. Generator current regulation is by reverse series field. There are three field windings: The shunt of 1000 turns of No. 24 wire, and two series coils, of 40 turns each, one of No. 12 and the other of No. 13 wire.

Maximum charging rate is reached at 25-30 miles per hour. Shunt field current 1.5 amperes at 12 volts.

Generator Data

Amperes	R.P.M.
0	325
3.5	500
4.5-6.5	2000

Oiling.—Put several drops of light engine oil in each of generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Model M. Relay closes at 350-400 R.P.M. of armature or 6-8 miles per hour, and opens at 275-325 R.P.M. of armature or 4-6 miles per hour. There is a 1¼ ampere fuse on relay base. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, rersurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Side lamps are 6-8 volt, 6 cp. Dash and tail lamps are 6-8 volt, 2-4 cp.

FUSES.—Generator fuse is 1¼ ampere. Lighting fuses are 10 ampere.

PREMIER
MODEL 6-D (1920)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SJRN-4, 6 volt, 120 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2145. Breaker contacts separate .018-.020 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel.

OILING.—Put 4 or 5 drops of light engine oil in the distributor shaft bearing every two weeks. If the track of the rotor button is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1½ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model No. 110. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 125 R.P.M., with a current of 125-175 amperes. Running freely, armature revolves at 2000 R.P.M., current 50 amperes. Lock torque is 16 pound-feet, current 450 amperes at 3.4 volts.

OILING.—Put 3 or 4 drops of light engine oil in starter bearings every month.

GENERATOR.—Model No. 118. Generator current regulation is by third brush system. Generator begins to supply current at 500 R.P.M. of the armature or 8 miles per hour, and reaches its maximum current output at 1400 R.P.M. of armature or 20-25 miles per hour.

Generator Data

Cold Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
Neutral	500	Neutral	500
10.5	900	10	900
15.5-18	1400	14-16	1400
13.0-17	2000	11-13	2000

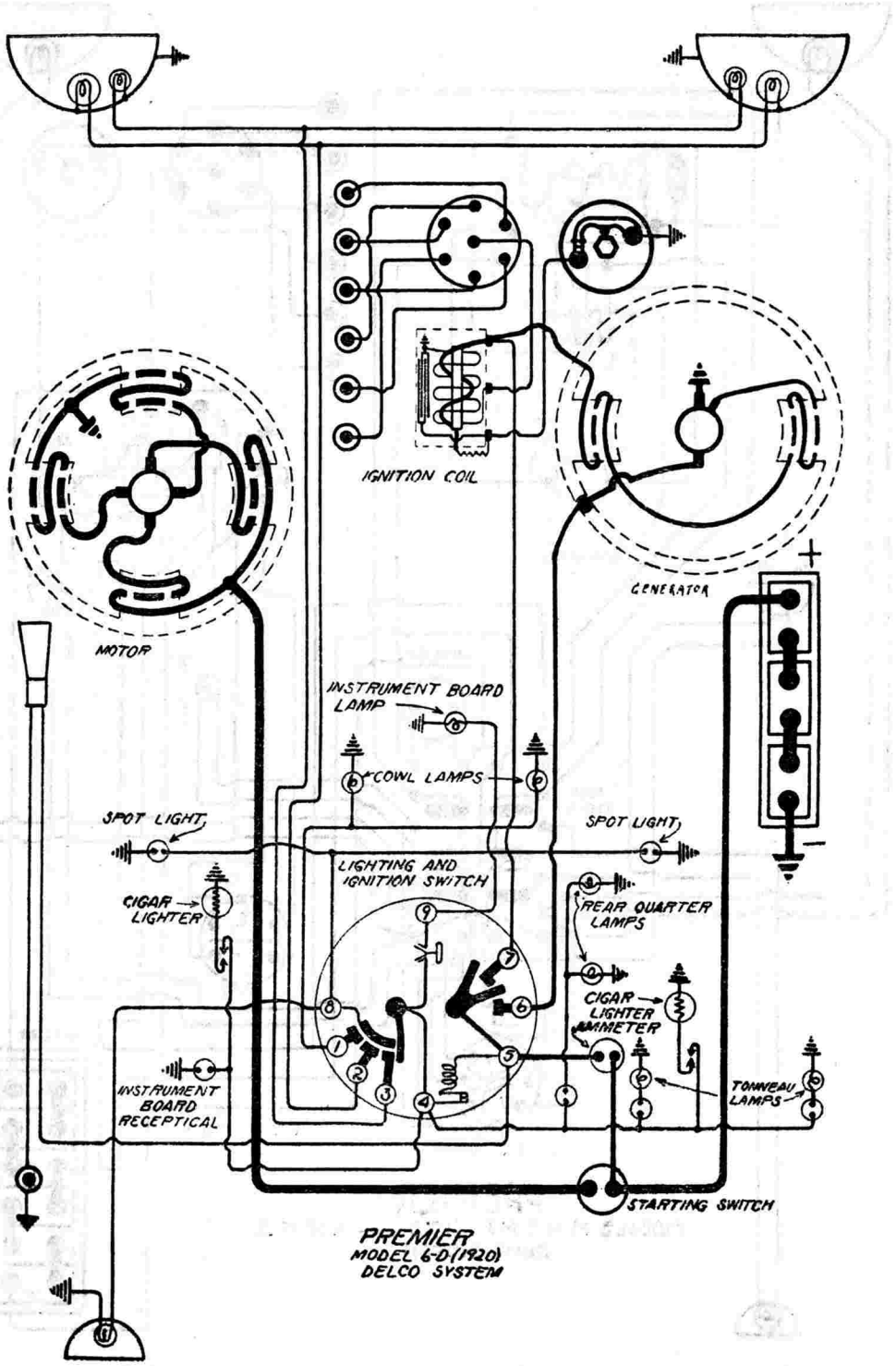
To adjust the third brush position, loosen the two screws in the third brush arm, Move the brush in a clockwise direction (looking at commutator end) to increase the charging rate, and in a counter-clockwise direction to decrease the charging rate. Tighten the two screws and reseat the third brush after adjusting position.

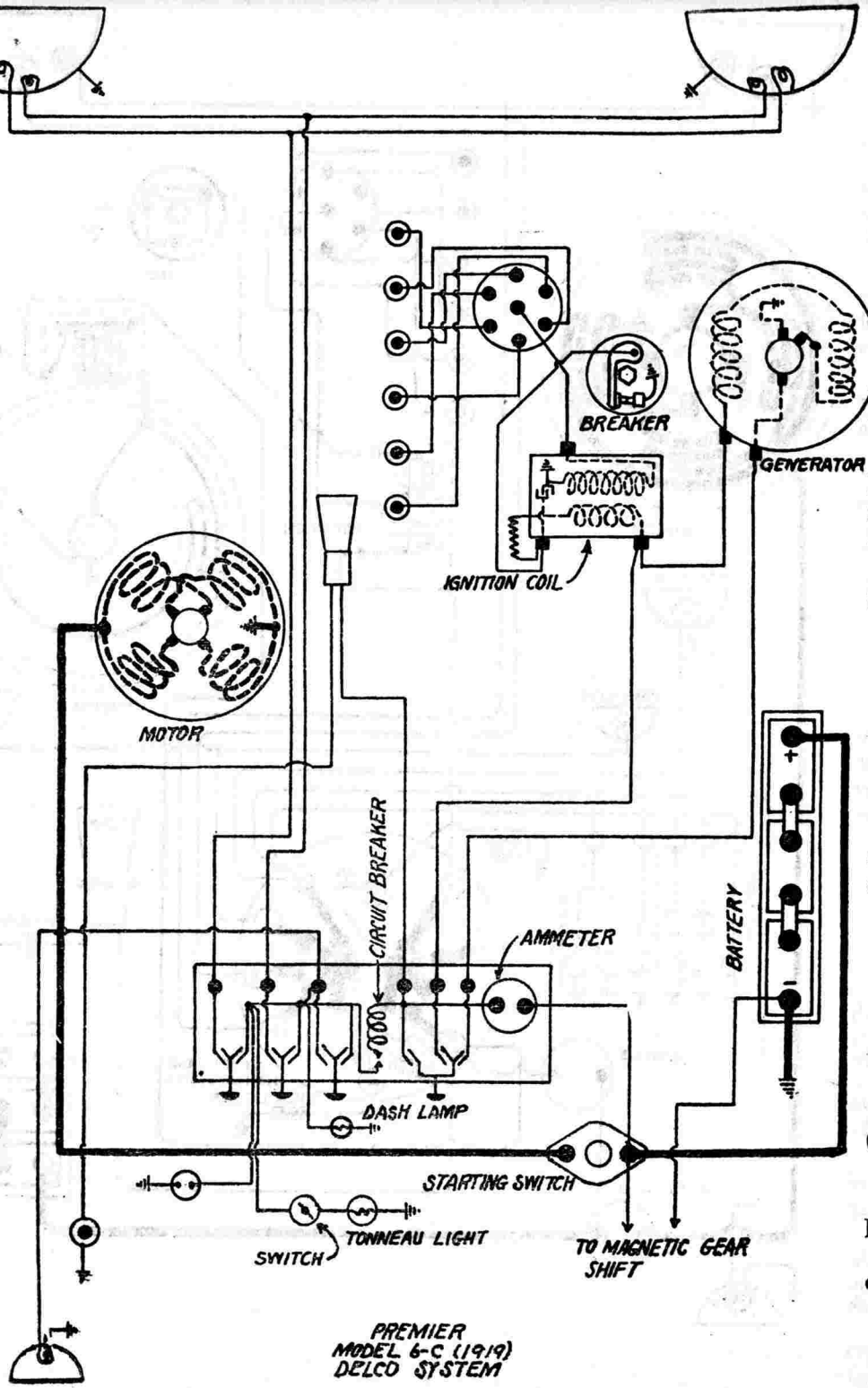
OILING.—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volt, 20 cp. Dimmer lamps are 6-8 volt, 12 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp. Rear-quarter lamps are 6-8 volt, 2 cp. Spot lamp is 6-8 volt, 20 cp. Tonneau lamp is 6-8 volt, 2 cp.

CIRCUIT-BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires a current of 25 amperes to start this device vibrating. While vibrating, the current is 3-5 amperes.





PREMIER
MODEL 6-C (1919)
DELCO SYSTEM

PREMIER

Model 6-B And 6-C (1917-18-19)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

Battery:—**(1917-18)** 6 volt, 100 ampere-hour. **(1919)** 6 volt, 120 ampere-hour. The negative (-) terminal is grounded.

Ignition.—Breaker contacts should separate .018 inch. They are made of tungsten. They will operate properly even though very irregular, due to the fact that the rough surfaces fit each other perfectly. Their natural color is dark grey, not silver. Should they become badly burned or pitted, affecting the ignition, remove and resurface them by drawing across a piece of fine emery cloth laid on a flat surface, as on the bed of a drill press, finishing on a very hard oil stone. Clean all oil from contacts before again putting into service.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be .025 inch to .028 inch.

Oiling.—Put 3 or 4 drops of light engine oil in distributor oilers every week. If car is driven more than 250 miles in a week, the oiling must be done every 250 miles.

Starter.—Starting motor is No. 110. It is connected to the engine by a Bendix drive and should deliver at least 16 pound feet lock torque. When running free it should not take over 40 amperes at 3.5 to 3.8 volts. Excessive current indicates damp, grounded or short circuited motor windings or commutator bars, tight bearings or armature striking pole pieces. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars, or open circuits are the chief causes of low speed and current. Starter rotates clockwise, viewed from driving end.

Oiling.—Starter requires absolutely no oil.

Generator.—Generator current regulation is by third brush system. There is no relay. Circuit between generator and battery is controlled by the ignition switch.

Cold		Warm	
Amperes	R. P. M.	Amperes	R. P. M.
Neutral	500	Neutral	500
10.5	900	10-12	900
15.5-18	1400	14-16	1400
13 - 17	2000	11-13	2000

Generator rotates clockwise when viewed from driving end.

Oiling.—Put several drops of light engine oil in each of the generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 21 cp. Dimmer lamps are 6-8 volts, 4 cp. Dash lamp is 6-8 volts, 2 cp. Tonneau lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.

Circuit Breaker.—There is a vibrating circuit breaker in the lighting circuit to take the place of fuses. A current of 25 amperes is required to start this device vibrating, but 3 to 5 amperes will cause it to continue vibrating.

PREMIER

MODEL 6-D (1921-22-23)
MODEL 6-D-24 (1924). SERIAL NOS. 8001 UP
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Prest-O-Lite, Type 613-SHC, 6 volt, 100 ampere-hour. The starting capacity is 130 amperes for 20 minutes. The lighting capacity is 5 amperes for 22.5 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2159. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or on the flat side of an emery wheel finishing on a hard oil stone.

Oiling.—Put 4 or 5 drops of light engine oil in the distributor shaft bearing every two weeks. If the track of the rotor button is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1½ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug diameters are ⅞ inch. Gaps should be .025-.028 inch.

STARTER.—Model No. 194. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 120 R.P.M., taking 75 to 175 amperes at 5 volts. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data

Torque.	R. P. M.	Volts.	Amperes.
0	4500	5.5	40-50
24 lb. ft.	0	3.4	450

Oiling.—Self oiling graphite bushings are used.

GENERATOR.—Model No. 195. Generator current regulation is by the third brush system, direction of rotation being counter-clockwise, looking at commutator end. The maximum charging rate is 16 amperes, reached at 1200 R.P.M. of the armature or 17 miles per hour, car speed in high gear. Motoring freely, the generator takes 3-5 amperes at 6 volts. The field current is 2 amperes at 6 volts.

Generator Test Date.

Amperes.	Volts	R. P. M.
3	6.6	600.
6	6.8	700
9	7.0	800
11.5	7.2	900
17.5	7.5	1400

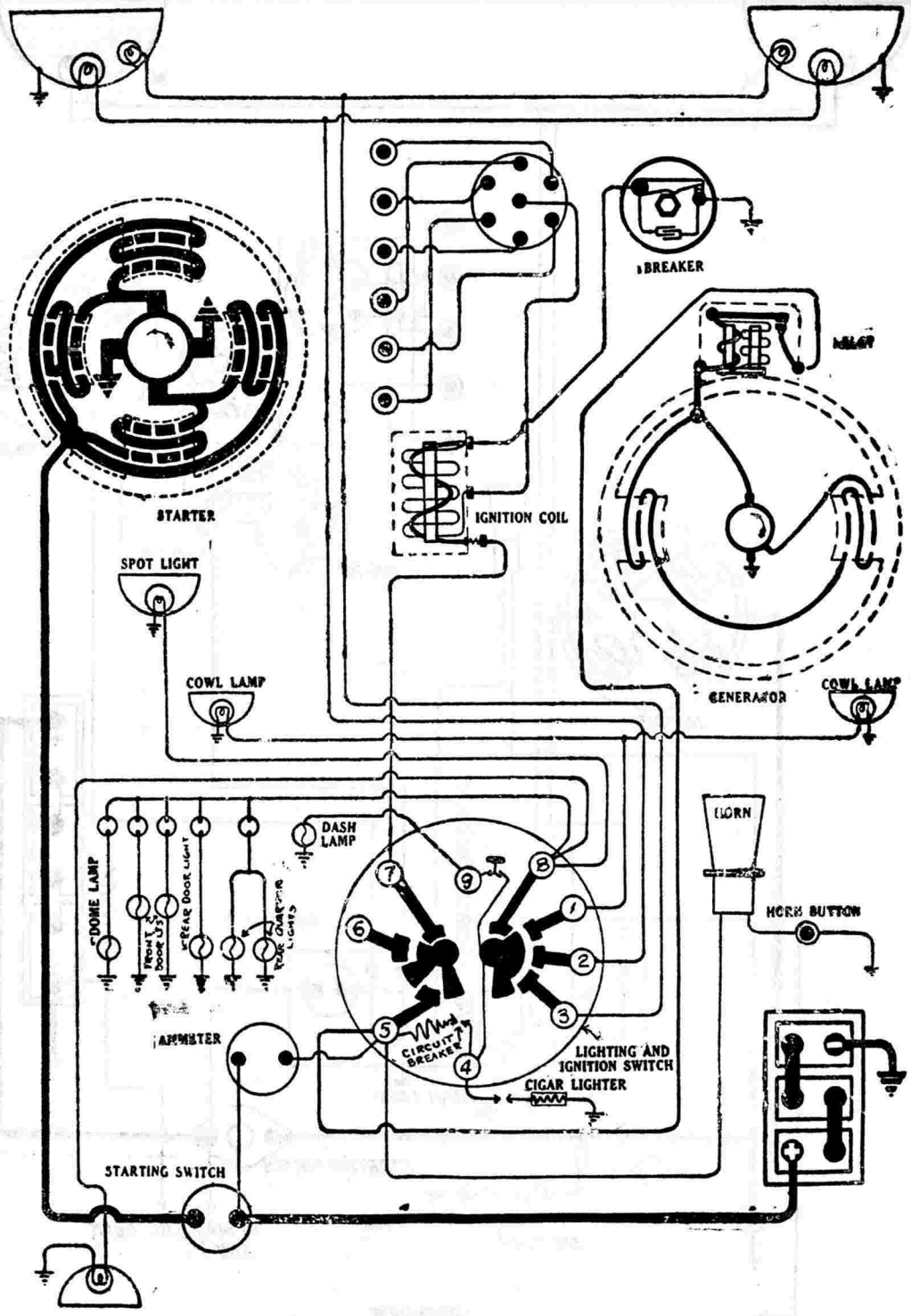
To adjust the charging rate, loosen the three screws which hold the third brush mounting plate and shift the third brush. Shift the brush in the direction of generator rotation (counter-clockwise) to increase the charging rate and in the opposite direction to decrease the charging rate.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on generator frame. Relay closes at 8-9 and opens at 5-7 miles per hour. Relay contacts separate .046 to .062 inch. Air gap between relay armature (moving member) and coil core is .020 to .035 inch, contacts closed.

LIGHTING: — Combination Switch Model No. 1155. Head lamps are 6-8 volt, 20 cp. S. C. Dimmer lamps are 6-8 volt, 4 cp. S. C. Dome lamp is 6-8 volt, 4 cp. D. C. Stop lamp is 6-8 volt, 20 cp. S. C. Dash, tail and tonneau lamps are each 6-8 volt, 2 cp. S. C.

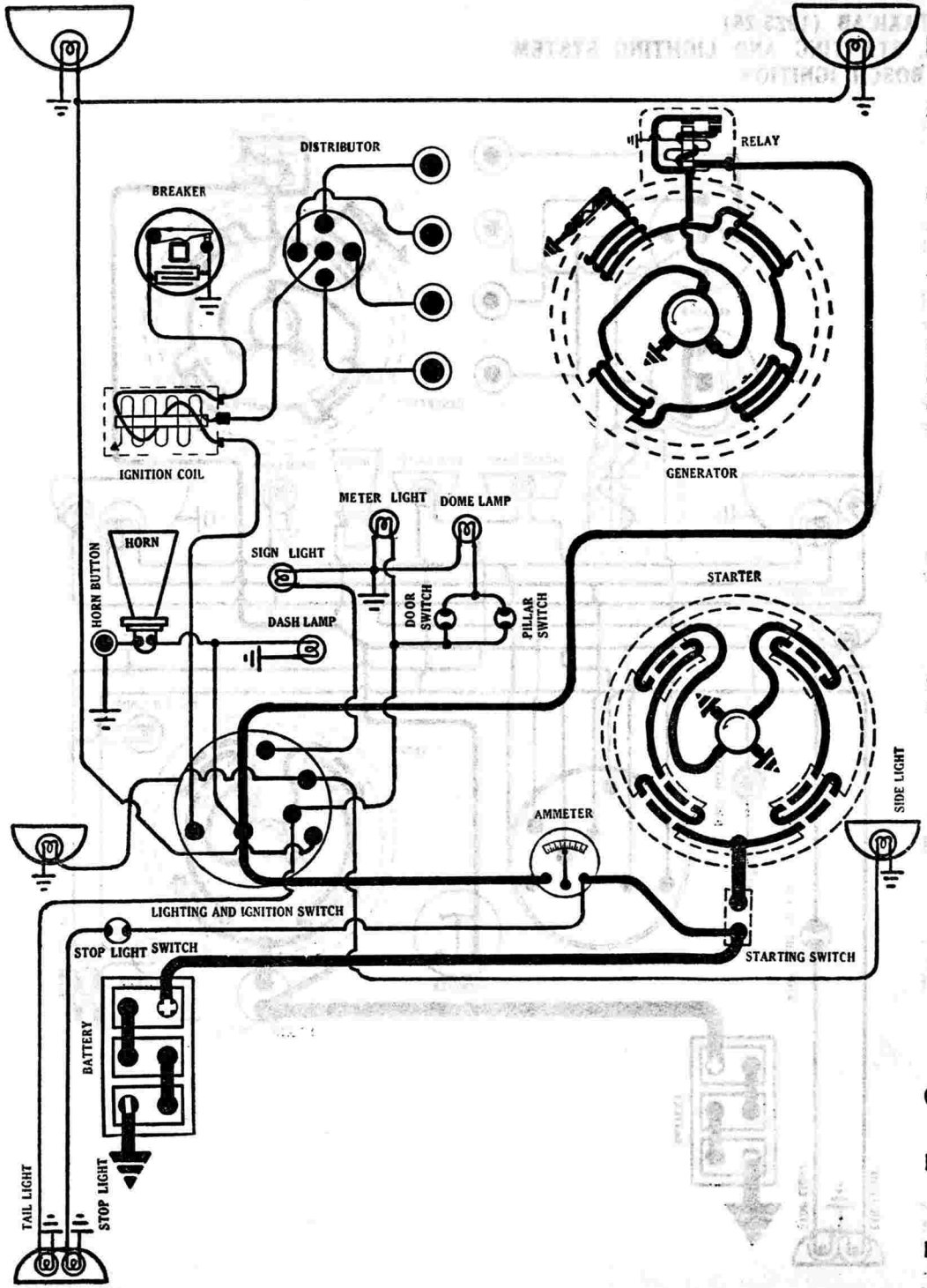
CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires a current of 25 amperes to start this device vibrating. While vibrating, the current is 3-5 amperes.



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PREMIER

MODEL 4-A (1923-24) SERIAL NOS. T-0001 UP
MODEL 4-B (1925) SERIAL NOS. T-2001 UP.
AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM.
AMERICAN BOSCH IGNITION.



BATTERY:—Prest-O-Lite, Type 611-KPC. 6 volt, 137.5 ampere hour. The starting capacity is 100 amperes for 20 minutes. The lighting capacity is 5 amperes for 27.5 hours. The negative (-) terminal is grounded.

IGNITION:—Coil Model TC-30. Distributor Model T-4234. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone or with a fine flat jeweler's file.

OILING: — Fill the oiler on the side of the distributor housing with light engine oil once each month or each 1000 miles. Put one drop of oil on the interrupter lever pivot pin and place a small bit of grease on the fiber bumper of the interrupter lever at the same time.

TIMING: — The breaker contacts begin to separate when the piston entering power stroke is on top dead center with the spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER: — The firing order is 1-3-4-2.

SPARK PLUGS: — The spark plug diameters are 7/8 inch. The gaps are .028 inch.

STARTER:—Model No. 917 or 1213. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data.

Torque.	R. P. M.	Volts.	Amperes.
Free	4000	6	50 to 60
1.2 lb. ft.	1900	5.5	100
3.7	1000	5.0	200
6.5	550	4.5	300
10.0	200	4.0	400
12.5	Lock.	3.5	490

The pressure of each of the starter brushes on the commutator should be 2 pounds.

OILING: — The starter bearings are of the oilless type. They require no attention.

GENERATOR:—Model No. 1229. The direction of rotation is counter-clockwise, the commutator end. The third brush system is used for current regulation. The maximum charging rate is 18 amperes reached at 1200 to 1300 R. P. M. of the generator armature.

Generator Data.

Cold Test.			Hot Test,		
Amperes	Volts	R. P. M.	Amperes	Volts	R. P. M.
0	6.5	550	0	6.5	650
8	7.5	780	8	7.5	850
16-18	8.0	1300	12-13	8.0	1400
8-10	7.8	3000	7-9	7.5	3000

To adjust the charging rate shift the third brush. Shifting the brush in the direction of generator rotation (counter-clockwise) increases the output and in the opposite direction, decreases the charging rate. Motoring freely the generator takes 6 amperes at 6 volts. The shunt field current is 6.5 amperes at 6 volts. The pressure of the main brushes on the commutator should be 1.5 pounds. The third brush pressure should be 1.25 pounds.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY: — Bosch, Model No. 21560. The relay contacts close when the voltage of the generator reaches 6.5 to 7.5 volts and open with a discharge current of 1 to 3 amperes. Relay contacts separate .015 inch. The air gap between the relay armature and the coil core is .010 inch.

LIGHTING: — Clum Combination Switch Model No. 10361, Head lamps are 6 volt, 21 and 10 cp. (Double filament). Stop lamp is 6 volt, 21 cp. S. C. Side lamps and dome lamp are 6 volt, 4 cp. S. C. and D. C. Sign lamp is 6 volt, 18 cp. S. C. Meter lamp is 6 volt, 2 cp. D. C. Vacant lamp is 6 volt. 4 cp. Dash and tail lamps are each 6 volt, 2 cp. S. C.

PREMIER

MODEL 4-B TAXICAB (1925-26)

AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM

AMERICAN BOSCH IGNITION

BATTERY:—Prest-O-Lite, Type 611-KPC. 6 volt. 137.5 ampere hour. The starting capacity is 100 amperes for 20 minutes. The lighting capacity is 5 amperes for 27.5 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model TC-30. Distributor Model T-4234. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone or with a fine flat jeweler's file.

Oiling:—Fill the oiler on the side of the distributor housing with light engine oil once each month or each 1000 miles. Put one drop of oil on the interrupter lever pivot pin and place a small bit of grease on the fiber bumper of the interrupter lever at the same time.

Timing:—The breaker contacts begin to separate when the piston entering power stroke is on top dead center with the spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-3-4-2.

Spark Plugs:—The spark plug diameters are 7/8 inch. The gaps are .028 inch.

STARTER.—Model No. 959. The starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data

Torque	R.P.M.	Volts	Amperes
Free	4000	6	50 to 60
1.2 lb. ft.	1900	5.5	100
3.7 "	1000	5.0	200
6.5 "	550	4.5	300
10.0 "	200	4.0	400
12.5 "	Lock	3.5	490

The pressure of each of starter brushes on the commutator should be 2 pounds.

Mounting.—Starter is mounted at the right side of the engine. Mounting is by a standard S. A. E. No. 2 flange.

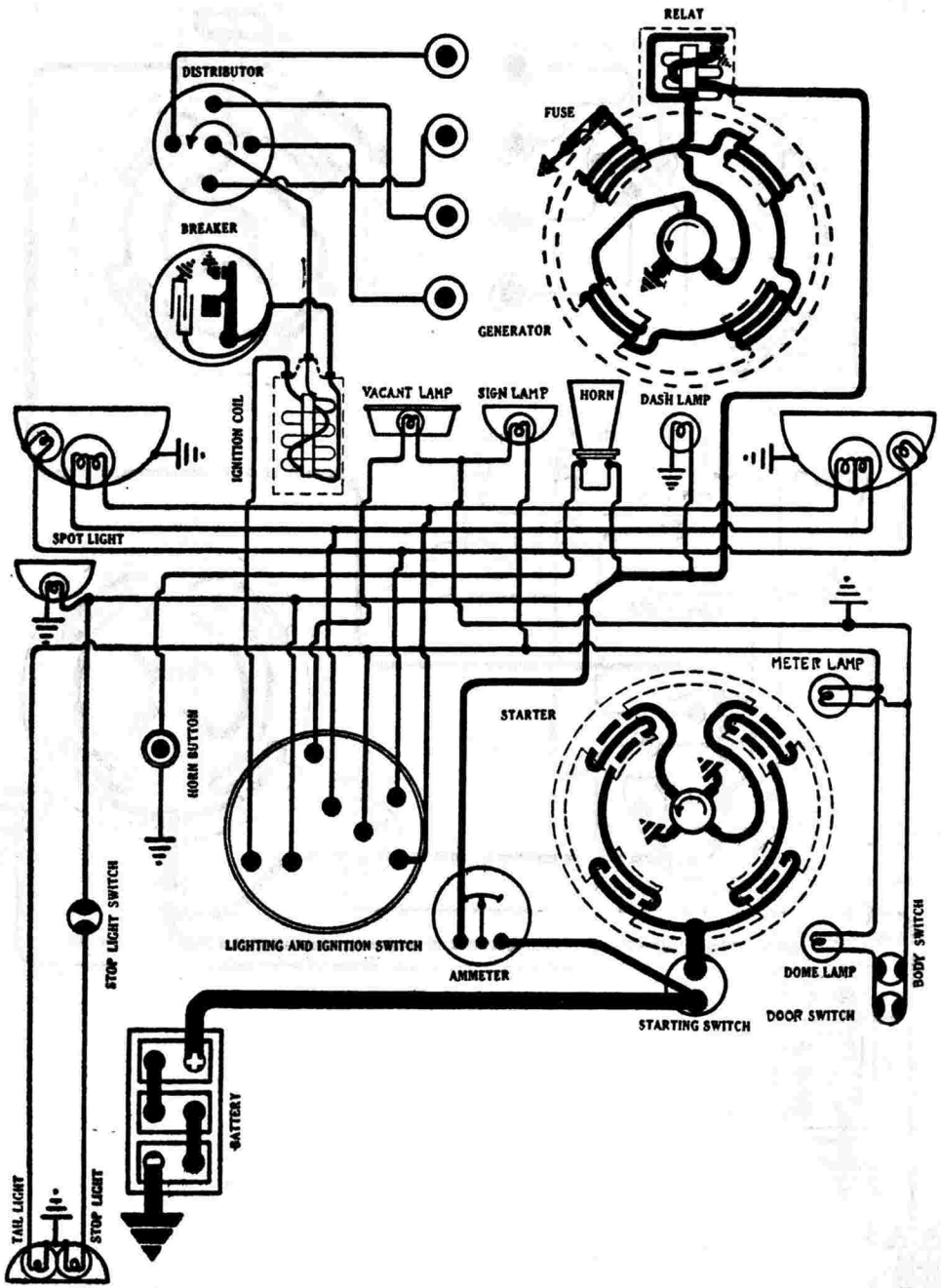
Oiling:—The starter bearings are of the oilless type. They require no attention.

GENERATOR:—Model No. 1229. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. The maximum charging rate is 18 amperes reached at 1200 to 1300 R.P.M. of the generator armature.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	550	0	6.5	650
8	7.5	780	0	7.5	850
16-18	8.0	1300	12-13	8.0	1400
8-10	7.8	3000	7-9	8.0	3000

To adjust the charging rate shift the third brush. Shifting the brush in the direction of generator rotation (counter-clockwise) increases the output and in the opposite direction, decreases the charging rate. Motoring freely the generator takes 6 amperes at 6 volts. The shunt field current is 6.5 amperes at 6 volts. The pressure of the main brushes on the commutator should be 1.5 pounds. The third brush pressure should be 1.25 pounds.



PREMIER

MODEL 4-B TAXICAB (1925-26)
AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

Mounting.—Generator is mounted on the right side of the engine by a standard S. A. E. No. 2 flange mounting.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY:—Bosch, Model No. 21560. The relay contacts close when the voltage of the generator reaches 6.5 to 7.5 volts and open with a discharge current of 1 to 3 amperes. Relay contacts separate .015 inch. The air gap between the relay armature and the coil core is .010 inch.

LIGHTING:—Clum Combination Switch Model No. 10361. Head lamps are 6 volt, 21 and 10 cp. (Double filament). Stop lamp is 6 volt, 21 cp. S.C. Side lamps and dome lamp are 6 volt, 4 cp. S.C. and D.C. Sign lamp is 6 volt, 18 cp. S.C. Meter lamp is 6 volt, 2 cp. D.C. Vacant lamp is 6 volt, 4 cp. Dash and tail lamps are each 6 volt, 2 cp. S.C.

FUSES:—Generator field fuse is 7.5 ampere capacity.

Pullman

Model 434 (1917)

Splitdorf-Apelco Starting and Lighting System
Atwater-Kent Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The positive (+) is grounded.

Ignition.—Breaker contacts should separate .006 inch. Degree of advance is controlled both automatically and by hand. Contacts are made of tungsten. If badly burned or corroded, affecting the ignition, resurface by drawing across a piece of fine emery cloth laid on a flat surface, as on the bed of a drill press, finishing on an oil stone. They will operate properly even though quite rough. The natural color of these contacts is dark gray.

Oiling.—Put several drops of light engine oil in the oil hole at side of breaker, and a small amount of vaseline on the breaker cam every two weeks. If car is driven more more than 500 miles in two weeks, the oiling must be done every 500 miles.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 2, 4, 3.

Spark Plug Gaps.—The spark plug gap should be about .025 inch.

Starter.—Starter is connected to engine through a Bendix drive.

Oiling.—Put several drops of light engine oil in each of the motor oilers every two weeks.

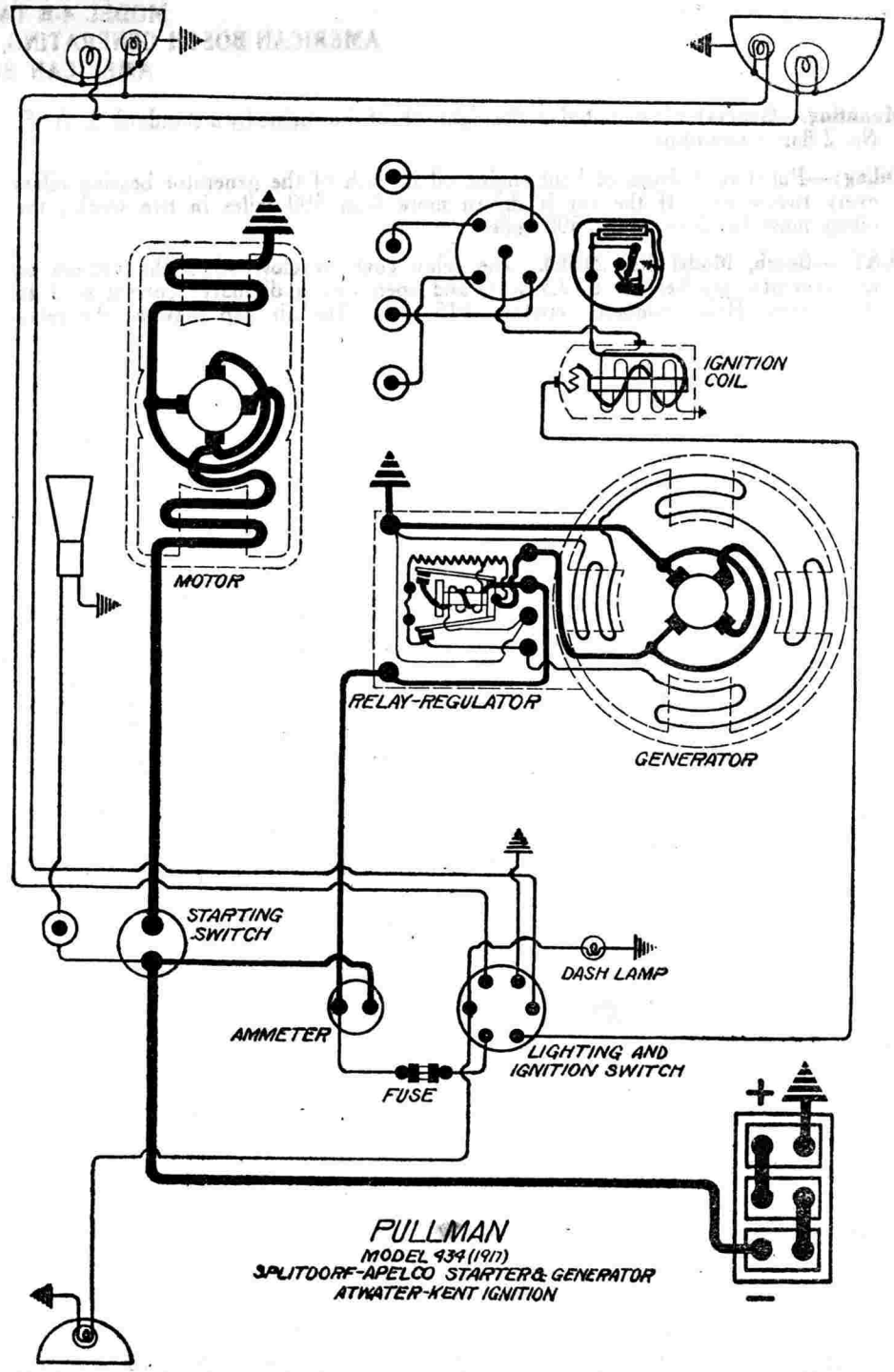
Generator.—Generator voltage regulation is by a vibrating type regulator. Relay is combined with the regulator. Clean relay and regulator contacts by drawing a piece of soft paper between them. Should they become burned or pitted, resurface them by drawing a piece of worn No. 00 sand paper between them.

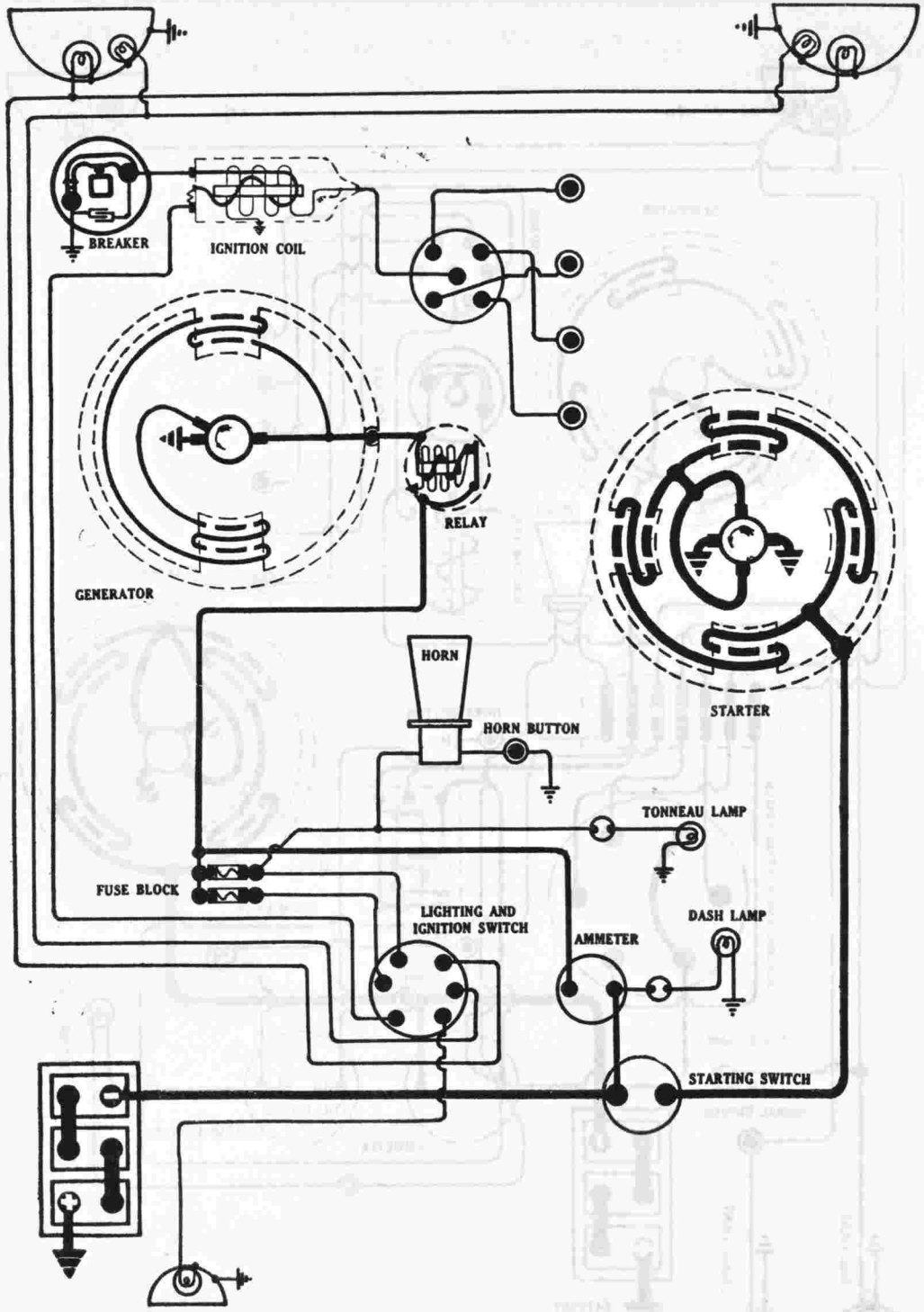
Output.—The normal generator output should be 7-10 amperes. The rate may be increased or decreased as required by adjusting the spring tension on the armature (moving member). The charging rate will vary with the state of charge of the battery, sometimes reaching 12-14 amperes if battery is nearly discharged, but reducing to 5 or 6 amperes when nearly fully charged.

Oiling.—Put several drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Fuses.—There is a fuse on the regulator base, to protect the shunt field. It will burn out, opening shunt field circuit, if generator is run at high speed with excessive resistance in the charging circuit.

Lamps.—Head lamps are 6-8 volts, 17 cp. Dimmer lamps are 6-8 volts, 5 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.





Note:—Cut of starter shown is Auto-Lite. For Wagner diagram see Page 760. On 1920 cars only one fuse is used and one connection from battery to switch. Dash lamp is grounded to relay.

R. & V. KNIGHT

MODEL "J" (SIX CYLINDER) (1920-21-22)
MODEL "R" (FOUR CYLINDER) (1920-21-22)
WAGNER GENERATING AND LIGHTING SYSTEM
WAGNER IGNITION—WAGNER AND AUTO-LITE STARTER

BATTERY.—Willard, Type SJRN-4, 6 volt, 117 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .020 to .025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, renew the contact screw and lever arm.

Oiling.—Screw up the grease cup under the breaker head one-half turn every two weeks. If the car is driven more than 500 miles in two weeks, this must be done every 500 miles. Put 3 or 4 drops of light engine oil on the wick in the breaker lever spindle every six months.

Timing.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1½ inches before the indicator, spark control lever and breaker assembly in the fully advanced position.

FiringOrder:—The firing order is 1, 4, 2, 6, 3, 5, or 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps are .025 to .030 inch.

STARTER:—(J-1920-21-22 AND R. 1920) Wagner, Model EM-322, Type 46-T (R) (1921-22) Auto-Lite, Model ML-4001. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise looking at the commutator end. On Model "J" car, starter cranks the engine at 95 R.P.M. taking 180 amperes at 5.2 volts. On the Model "R" starter cranks the engine at 139 R.P.M. taking 175 amperes at 5.3 volts.

Starter Data (Auto-Lite, Model ML-4001.)

Running Torque	R.P.M.	Amperes
2 lb. ft.	1600	135
6 lb. ft.	950	260
10 lb. ft.	610	365
22 lb. ft.	Lock	4 volts.

Starter Data (Wagner, Model EM-322, Type 46-T)

Torque	R.P.M.	Volts,	Amperes
0 lb. ft.	1700		80-100
18 „	Lock	2.7	640

The brush tension on the commutator is 2 pounds.

Oiling.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Model EM-189, Type 45-W. Generator current regulation is by the third brush system. Maximum current output is 18 amperes, reached at 1500 R.P.M. of the armature or 20 miles per hour.

Generator Data

Hot Test Amperes	Hot Test R.P.M.	Cold Test Amperes	Cold Test R.P.M.
2.25	740	0	500
5.80	800	6	670
11.20	1142	12	950
12.00	1600	15	1180
9.00	2100	16-18	1500
7.50	2368	10	2500

Shunt field winding takes 7 amperes at 4.5 volts. Move the third brush in the direction of armature rotation to increase the charging rate, and in the opposite direction to decrease the charging rate.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 9-11 miles per hour or 500-550 R.P.M. of the armature and opens at 6-8 miles per hour or 450-500 R.P.M. of the armature. Relay contacts separate .030 inch. Air gap between relay armature and coil core is .015 inch.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are 6-8 volt, 4 cp.

FUSES.—Fuses are 20 ampere.

R. & V. KNIGHT

MODEL H (1923-24)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

BATTERY.—Willard, Type SJR-6, 6 volt, 152 ampere--hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .020 to .025 inch. They are made of tungsten. When the condiion of the contacts affects the ignition, renew the contact screw and lever arm.

Oiling.—Screw up the grease cup under the breaker head one-half turn every two weeks. If the car is driven more than 500 miles in two weeks, this must be done every 500 miles. Put 3 or 5 drops of light engine oil on the wick in the breaker lever spindle every six months.

Timing.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1½ inches before the indicator, spark control lever and breaker assembly in the fully advanced position.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—Spark plug gaps are .025 to .030 inch.

STARTER:—Model ML-4001. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter cranks the engine at 139 R.P.M., the current being 175 amperes at 5.3 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	5.5	60
1.1 "	1950	5.5	100
4.25 "	1050	5.0	200
7.8 "	650	4.5	300
11.4 "	350	4.0	400
22.5 "	Lock	4.0	730

The brush tension on the commutator is 2 pounds.

Oiling.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Model GJ-4020 Generator current regulation is by the third brush system. Maximum current output is 16 amperes, reached at 1700 R.P.M. of armature or 20 miles per hour.

Generator Test Data

Hot Test		Cold Test	
Amperes	R.P.M.	Amperes	R.P.M.
2.0	650	0.0	500
5.4	800	5.3	650
10	1150	12	950
12.6	1600	14	1150
12.3	2100	16	1700
11.6	2400	14.7	2500

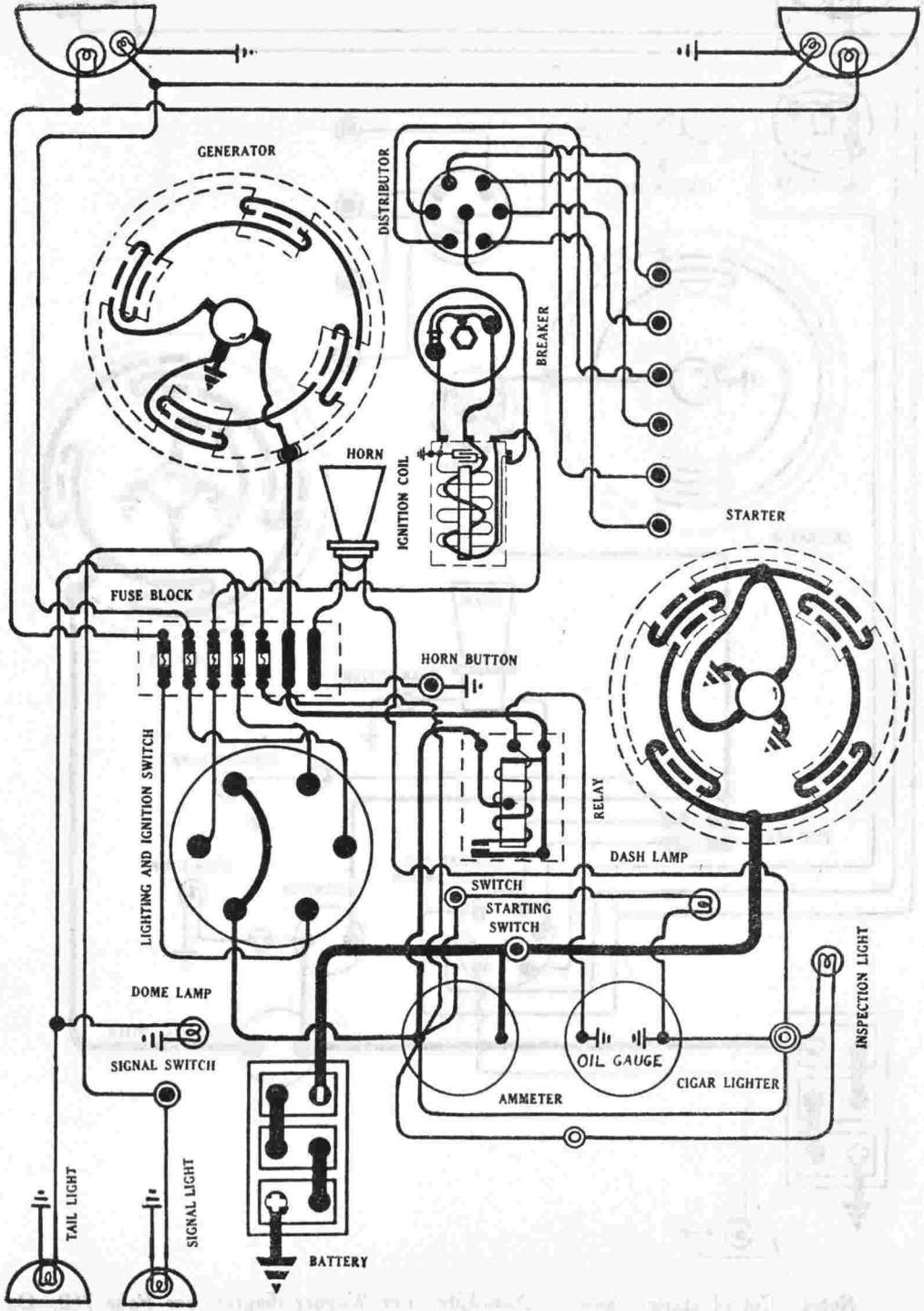
Move the third brush in the direction of armature rotation to increase the charging rate, and in the opposite direction to decrease the charging rate.

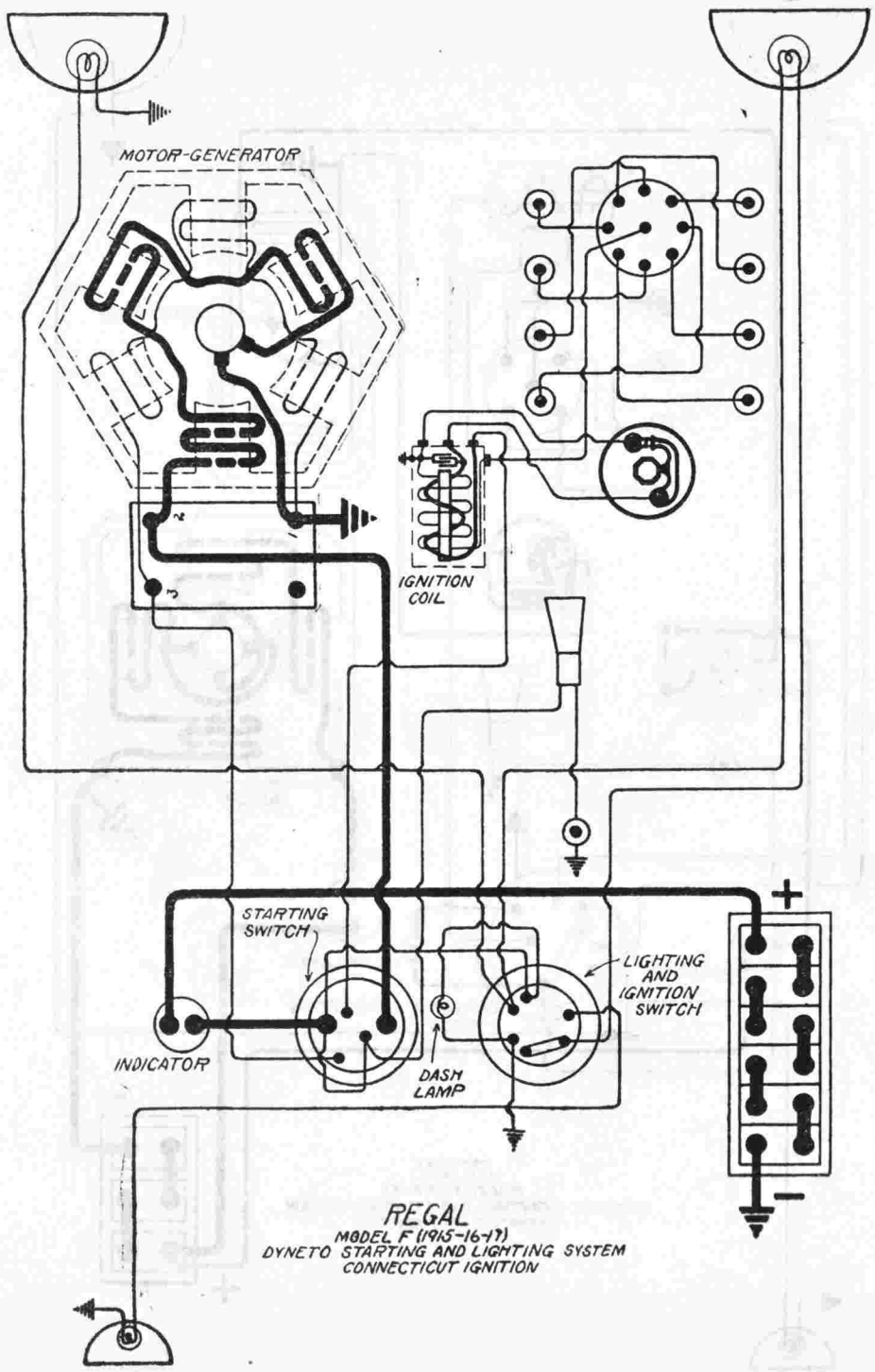
Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Model CB-1072. Relay contacts separate .030 inch. Air gap between relay armature and coil core is .015 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6 volt, 21 cp. Dimmer and tail lamps are 6 volt, 4 cp. Dash lamp is 6-8 volt, 2 cp.

FUSES.—Fuses are 20 ampere.





REGAL
MODEL F (1915-16-17)
DYNETO STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

REGAL

MODELS D, E, F AND R (1915-16-17)
DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—Battery is 12 volt, 35 ampere hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .018 to .020 inch. When the condition of the contacts affects the ignition, renew the inner breaker mechanism. For temporary service resurface contacts with fine emery cloth.

OILING.—Refill the grease cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order of the 1915-16 four-cylinder cars is 1, 3, 4, 2. The firing order of the 1917 four-cylinder cars is 1, 2, 4, 3. The firing order of the eight cylinder cars is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

SPARK PLUG GAPS.—Spark plug gaps are .028 to .030 inch.

STARTER-GENERATOR.—Starter and generator are combined into one unit. The unit is permanently chain connected to the engine crankshaft. Starter delivers 1.5 pound-feet torque at 400 R.P.M., and 10 pound-feet lock torque.

GENERATOR.—Generator current regulation is by a reverse series field. Generator begins to supply current at 1100 R.P.M., and reaches the maximum charging rate of 10 amperes at 1700 R.P.M. of the armature or 18 miles per hour.

Generator Data

Amperes	R.P.M.
2	1100
5	1400
10	1700

OILING.—Put 4 or 5 drops of light engine oil in the starter-generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

LAMPS.—Head lamps are 12-16 volt, 20-24 cp. Dash and tail lamps are 12-16 volt, 2 cp.

Regal

Model J (1917-18)
Auto-Lite Starting and Lighting System
Atwater-Kent Ignition
Used After First 1500 Cars

Battery.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded at the starting motor.

Ignition.—Breaker contacts should open not less than .005 inch nor more than .008 inch. The standard setting is .006 inch.

Timing.—Contacts should begin to separate when the top dead center mark on the flywheel is at the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 2, 4, 3.

The distributor rotor should just clear the high tension distributor points, but not quite touch them. The frame of the breaker is grounded.

Oiling.—Put a very small amount of vaseline on the breaker cam every month. At the same time put several drops of light machine oil in each of the oil cups. If car is driven more than 1000 miles in a month, oiling must be done every 1000 miles.

Care.—Should the tungsten contacts become badly burned or corroded, affecting the ignition, remove them and resurface by drawing across a piece of fine emery cloth laid on a flat surface as on the bed of a drill press, finishing on an oil stone. They will operate properly even though quite irregular.

Spark Plug Gaps.—Spark plug gap should be about .023 inch.

Starter.—The starter is connected to the engine through a Bendix drive. The bearings are packed with soft cup grease which should be renewed once a season.

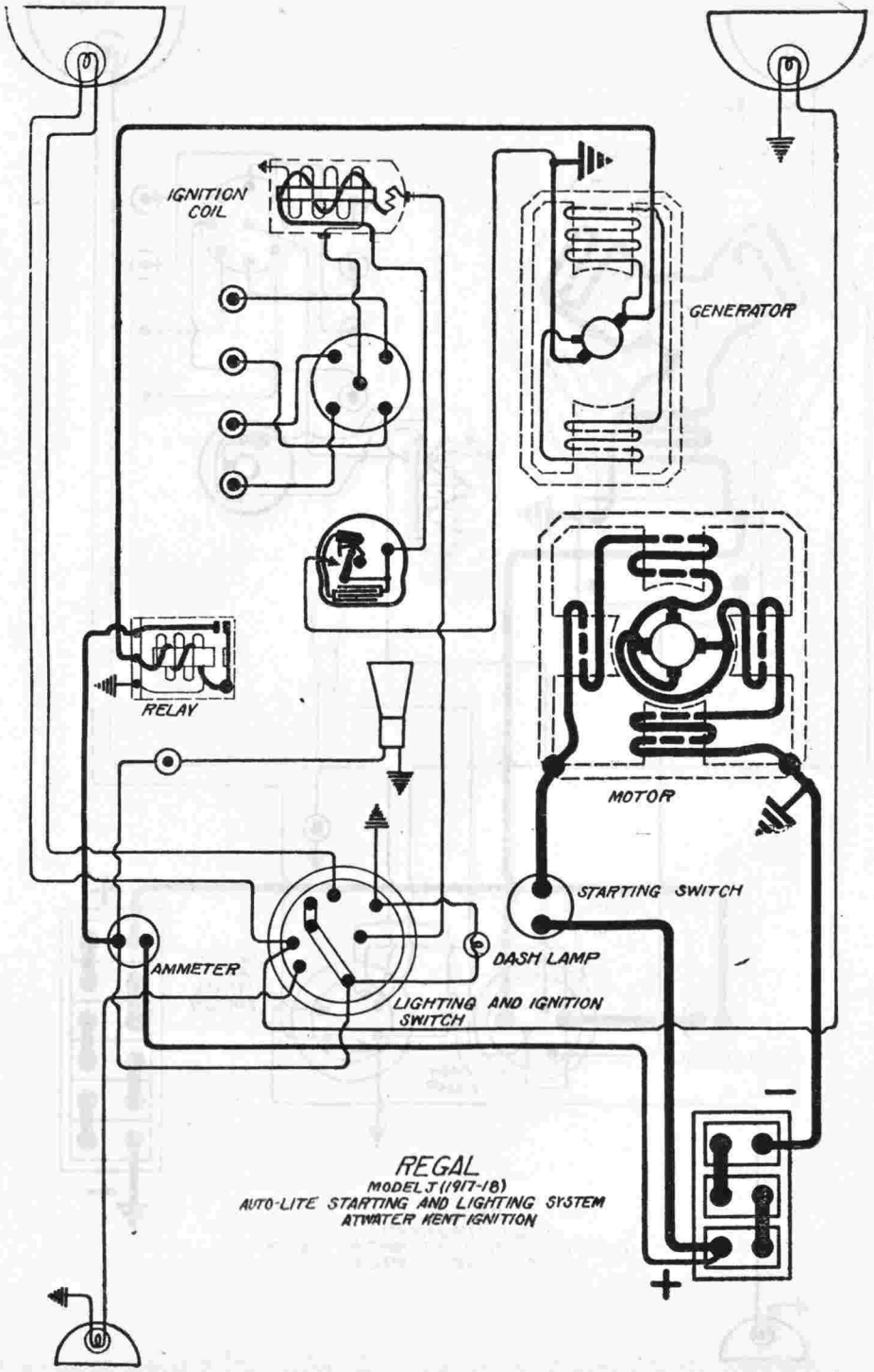
Generator.—Generator current regulation is by third brush. Relay should close at 8-10 miles per hour.

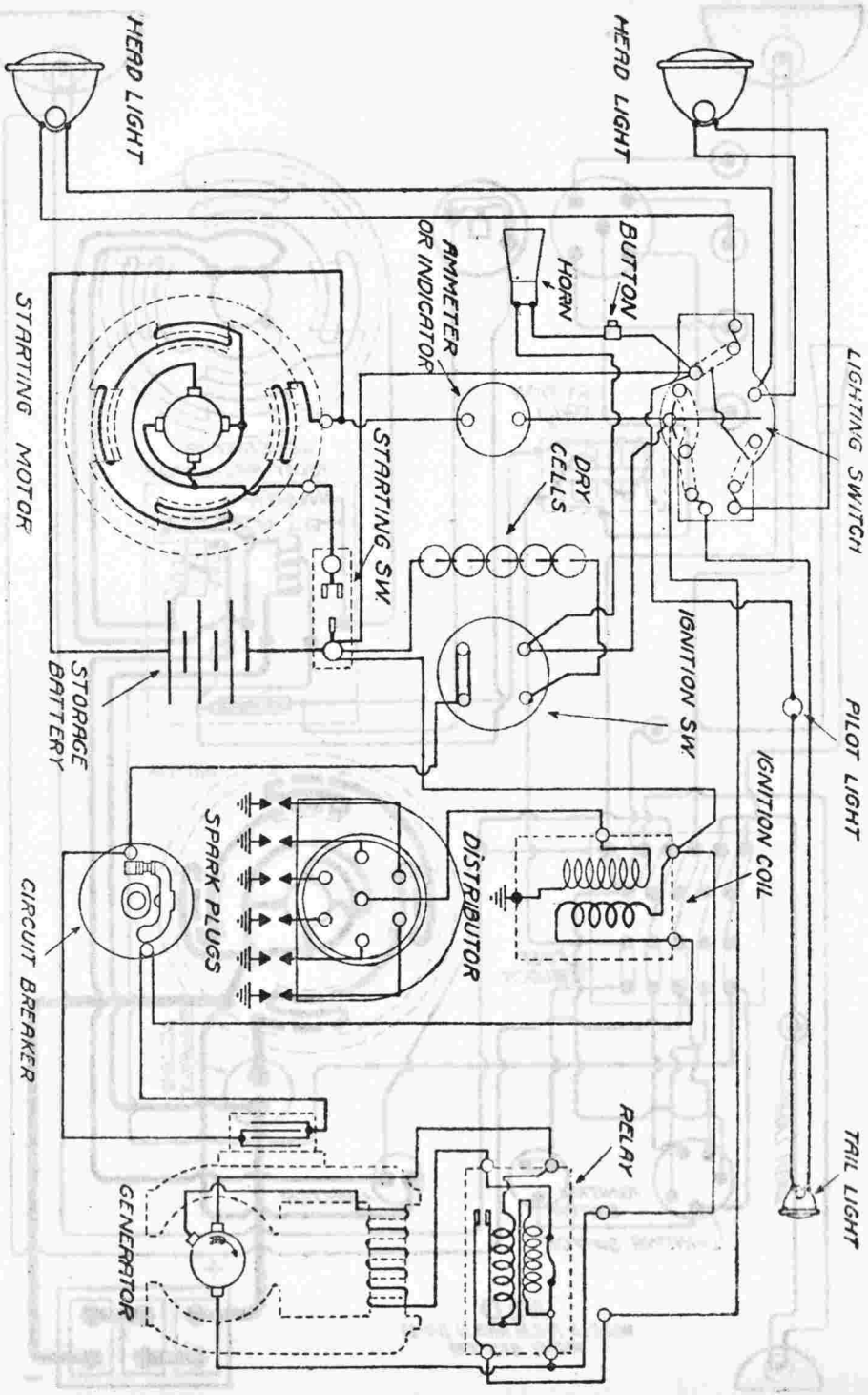
The maximum charging rate should not exceed 14-16 amperes at 18-20 miles per hour.

Care.—If it is necessary to run the car with the battery disconnected, the generator terminals must be short circuited. Use only the special copper-carbon composition type of brushes supplied, as ordinary carbon brushes will cause trouble.

Oiling.—Put 5 to 8 drops of light engine oil in each of the generator oilers every month. If the car is driven more than 1000 miles in a month, oiling must be done every 1000 miles.

Lamps.—Head lamps are 6-8 volts, 20 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp. Trouble lamp is 6-8 volts, 2-4 cp.





Reo

MODELS R, S, M AND N (1915)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. The two-wire system is used.

IGNITION.—Breaker contacts separate .015 to .020 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put a very small amount of vaseline on breaker cam, applying with a toothpick every month. Ignition unit bearings are lubricated by oil in rear generator oiler.

TIMING.—Breaker contacts begin to separate when the mark "UDC 1 and 4" on flywheel of the four-cylinder cars is ½ inch before indicator, or when mark "UDC 1 and 6" on flywheel of the six-cylinder cars is one inch past indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order of the four-cyliinder cars is **1, 3, 4, 2.** The firing order of the six-cylinder cars is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Starter is connected to the engine through a set of worm gears and ratchet clutch. Starter takes 95 amperes, cranking the engine at 125 R. P. M.

Starter Data. Model 4-A
(Used on Four-Cylinder Cars)

R. P. M.	Amperes	Volts
3800-5000	35-50	5.8-6
1700	100	——.
1500	120	——.

Torque is 1 pound foot at 1700-2000 R. P. M., current being 105 amperes at 5.6-5.8 volts.

Starter Data. Model 181-A
(Used on Six-Cylinder Cars)

Torque	R.P. M.	Amperes	Volts
0.00 lb. ft.	2000-2300	80- 90	5.8-5.9
1.75 lb. ft.	1700-1900	95-105	5.5-5.8
2.25 lb. ft.	1520-1650	100-120	5.0-5.5
4.25 lb. ft.	1000-1200	200-210	4.0-4.5
18.00 lb. ft.	Lock	500-550	3.2-3.4

OILING.—Put several drops of light engine oil in each of starter oilers every month.

GENERATOR.—Generator current regulation is by third brush system. Maximum generator output is reached at 20-25 miles per hour.

Generator Data. Models 165A and 165B

Amperes	R. P. M.
0.0	300
7.5	500
14.0-18	1000-1300
12.0	2000

Field current is 2 amperes at 6.3 volts. When generator is operating freely as a motor, current flow is 2.5 amperes at 6.4 volts, armature revolving at 210 R. P. M.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles

RELAY.—Relay closes at 7-10 miles per hour or 300-350 R. P. M. of armature, and opens at 5-7 miles per hour, or 250-300 R. P. M of armature. Charging current is 1-3 amperes at closing and the discharge current is 0-1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are in series. They are each 3-4 volt, 3 cp.

FUSES.—Fuses are 5 ampere.

Reo

Models R, S, M and N (1916)
Remy Generating, Starting and Lighting System
Remy Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The two wire system is used.

Ignition.—Breaker contacts separate .015 to .020 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper.

Timing.—Breaker contacts begin to separate when the mark "UDC 1 and 6" is 1½ inches past indicator on six cylinder cars, or when mark "UDC 1 and 4" is at indicator on four cylinder cars, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order of the four cylinder cars is **1, 3, 4, 2.** The firing order of the six cylinder cars is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—Spark plug gaps are .025. to 030 inch.

Oiling.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Starter.—Starter is connected to the engine through a set of reduction gears and chain. An overrunning ratchet clutch prevents engine driving starter.

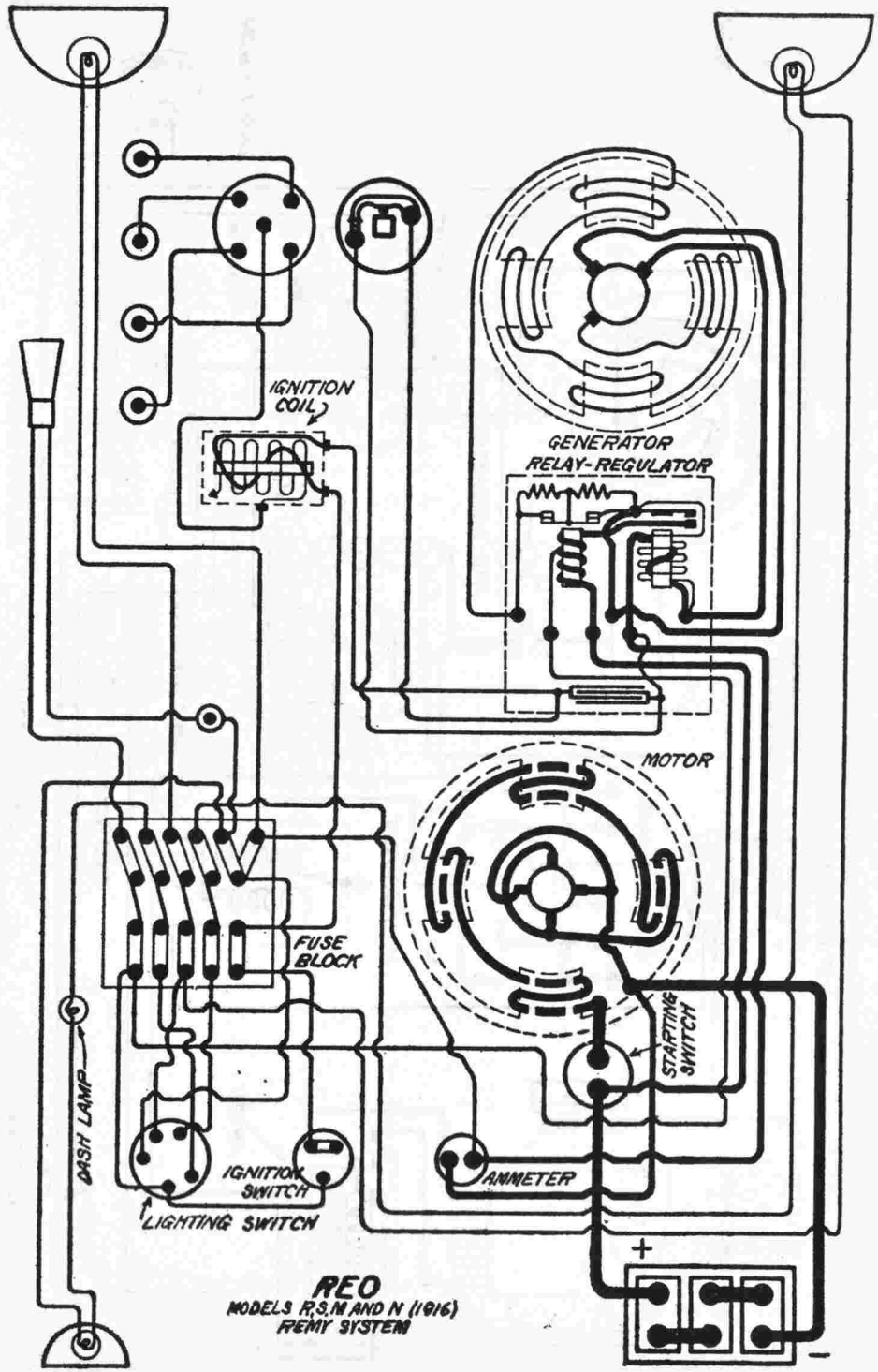
STARTER DATA, MODEL 185
(Used on R and S, Four Cylinder Cars)

Torque		R. P. M.	Amperes	Volts
1	lb ft	800-1000	55- 65	5.9-6.1
2	lb ft	650- 900	65- 80	5.8-5.9
4	lb ft	550- 675	95-115	5.6-5.8
6	lb ft	450- 550	120-150	5.5-5.7
10	lb ft	350- 400	175-200	5.3-5.5
54-65	lb ft	Lock	580-620	4.0-4.2

STARTER DATA, MODEL 188
(Used on M and N, Six Cylinder Cars)

Torque		R. P. M.	Amperes	Volts
1	lb ft	650-570	50- 55	6.0
2	lb ft	550-625	60- 65	5.8-5.9
4	lb ft	450-500	85- 95	5.7-5.8
6	lb ft	400-450	100-120	5.6-5.7
48-54	lb ft	Lock	590-620	3.2

Oiling.—Put several drops of light engine oil in each of starter oilers every month.



Reo

Models R, S, M and N (1916)

Remy Generating, Starting and Lighting System

Remy Ignition

Generator.—Generator current regulation is by a vibrating regulator. Maximum charging rate of 10-12 amperes is reached at 15 miles per hour.

GENERATOR DATA, MODEL 240
(Used on R and S, SixCylinder Cars)

Amperes	R. P. M.	Volts
0	360	6.0-6.4
7.0	500	6.3-6.7
11.0	800	6.5-6.9
12.1	1000	6.5-6.9
12.5	1500	6.5-6.9

When operating freely as a motor, generator takes 3 to 4 amperes at 5.8 volts, armature revolving at 240 R. P. M. Field takes 2 amperes af 5.9 volts.

GENERATOR DATA, MODEL 241
(Used on M and N, Four Cylinder Cars)

Amperes	R. P. M.	Volts
0	550	6.0-6.4
7.0	700	6.3-6.7
11.0	800	6.4-7.0
12.0	1500	6.5-7.9
12.5	2500	6.5-7.9

When operating freely as a motor, generator takes 3 to 4 amperes, armature revolving at 390 R.P.M. Shunt field takes 2 amperes at 5.9 volts.

Oiling.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Relay-Regulator.—Relay closes at 7-9 miles per hour and opens at 5-7 miles per hour. Charging current is .5 to 1.5 amperes at closing, and the discharge current is 0 to 1 ampere at opening of relay. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service. Increasing spring tension on regulator armature will increase the output. Decreasing spring tension will decrease the output.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are in series. They are each 3-4 volt, 2 cp.

Fuses.—Lighting fuses are 5 ampere.

Model Numbers.—The R and S Models use starter No. 185-A and generator No. 241-A. The M and N Models use starter No. 188-A and generator No. 240-A. Relay-regulator is No: 261-A-B. Ignition coil is No. 45-A.

Reo

MODELS R, S, M AND N (1917)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. The two wire system is used.

IGNITION.—Breaker contacts separate .020 to .025 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions should be given every 500 miles.

TIMING.—Breaker points begin to separate when mark "UDCI-4" or "UDCI-6" on flywheel is 1 to 1¾ inches past indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order of the four-cylinder cars is 1, 3, 4, 2. The firing order of the six-cylinder cars is 1, 4, 2, 6, 3, 5.

SPARK PLUGS.—Spark plug gaps are .027 to .030 inch.

STARTER.—Model No. 300-A-B. Starter is connected to engine through a set of reduction gears, chain and rachet clutch.

Starter Data.

Torque	R. P. M.	Amperes	Volts
1 lb. ft	780	65	6.0
3 lb. ft	600	90	5.9
6 lb. ft	460	120	5.7
8 lb. ft	400	140	5.6
10 lb. ft	360	160	5.5
68 ib. ft	Lock	585	3.3

OILING.—Put several drops of light engine oil in each of starter bearing oilers every month. Remove plug and replenish grease in reduction gear case every six months.

GENERATOR.—Models Nos. 254A and 256A. Generator current regulation is by third brush system. A thermostat located in the brush rigging of the generator, cuts in a resistance at a temperature of 175° F.,reducing the maximum charging rate 6 amperes Resistance also acts as a shunt field fuse. The thermostat is intended to change the charging rate as demand of seasons or car operation requires. Never touch the thermostat points.

Generator Data.

High Battery			Low Battery		
Amperes	R. M. P.	Volts-	Ameperes	R. P. M.	Volts
0	350	640	0	330	5.90
7	510	7.13	7	500	6.24
13	690	7.76	13	680	6.58
20	1100-1500	9.0	18	1000-1200	6.84

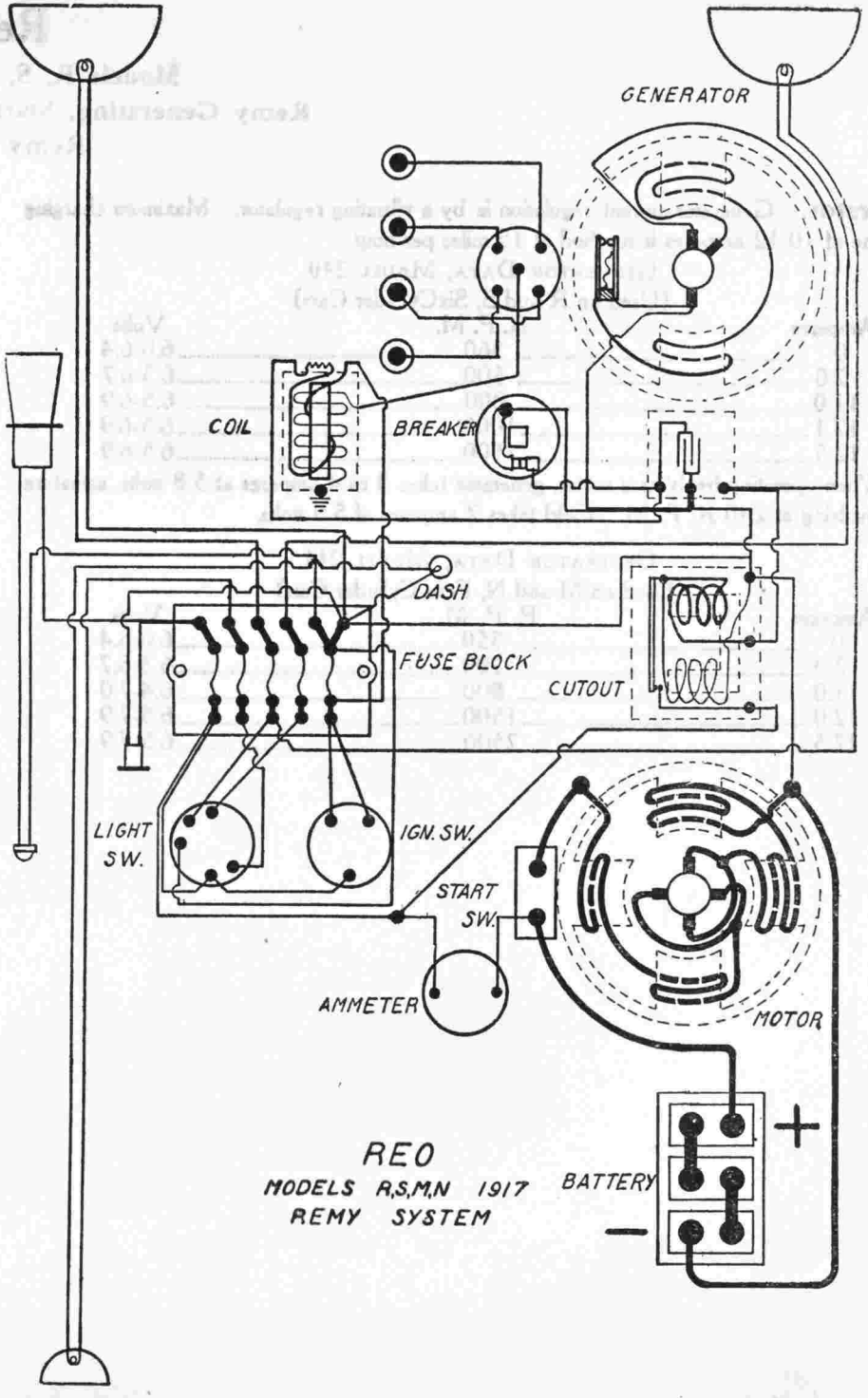
Field current is 5 amperes at 6.4 volts. When generator is operating freely as a motor, the current is 4.75 amperes at 6.4 volts, armature turning at 245 R. P. M.

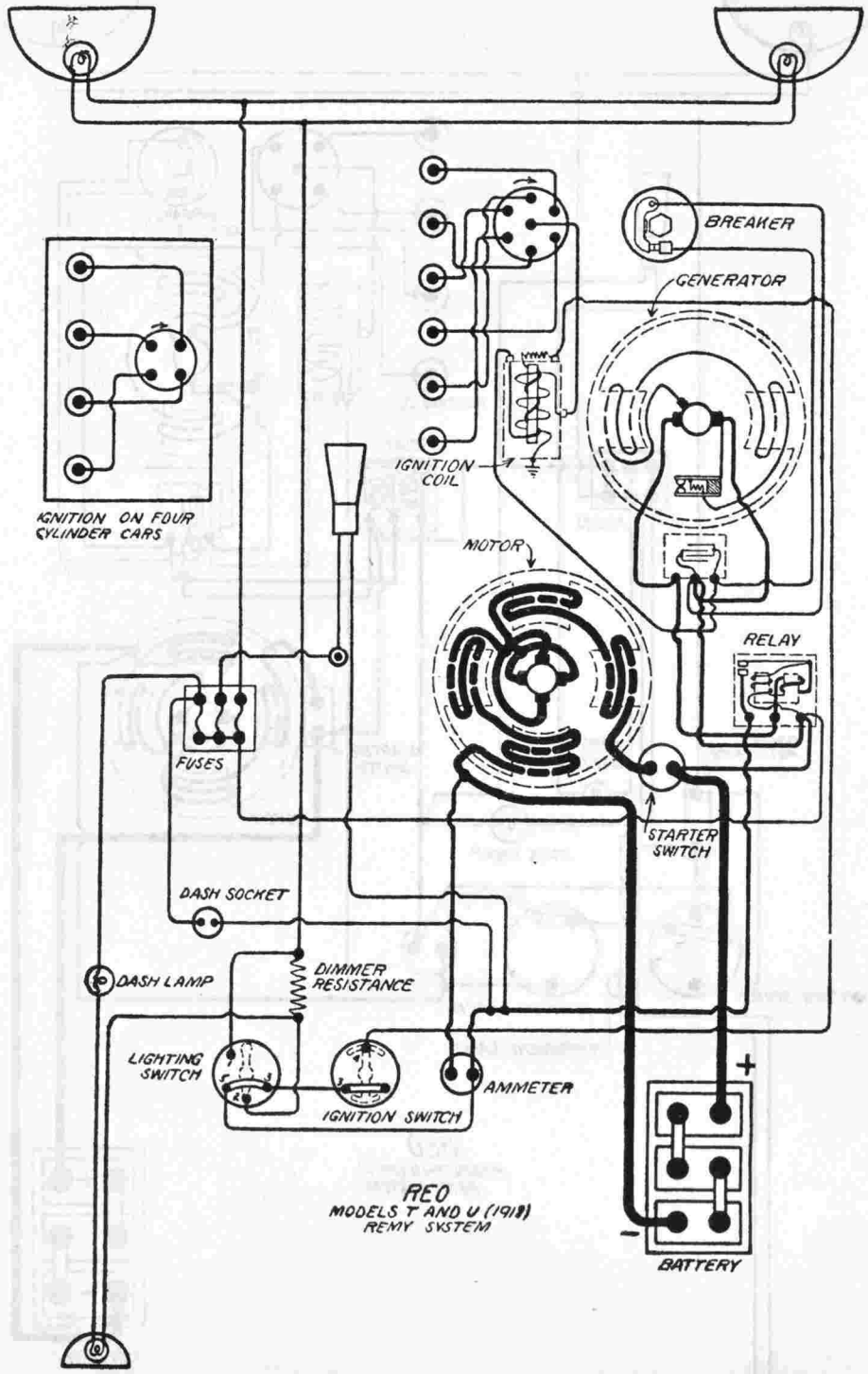
OILING.—Put several drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Relay closes at 7-9 miles per hour or 350 R. P. M., of armature, and opens at 5-7 miles per hour, or 300-350 R. P. M. of armature. Charging current at closing is 1 to 3 amperes and the discharge current 0 to 1 ampere at opening of relay. Contacts separate .012 to .015 inch. Air gap between relay armature and coil core is .012 to .15 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit.. And adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are in series. They are each 3-4 volt, 2 cp. Tail lamp provided with switch to provide a means of control at lamp where ordinances require it.

FUSES.—Fuses are 5 amperes.





REO

MODELS T AND U (1918) R AND SF (1917-18-19) MODELS T AND F (1919-20-21-22) REMY GENERATING, STARTING AND LIGHTING SYSTEM REMY IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. The two-wire system is used.

IGNITION.—Breaker contacts separate .018 to .023 inch. They are made of tungsten. When the condition of the points affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts begin to separate when mark "UDC 1-4" on flywheel of 4 cylinder cars is ½ inch before indicator, or when mark "UDC 1-6" on flywheel of 6 cylinder cars is one inch past indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order of 4 cylinder cars is 1, 3, 4, 2. The firing order of 6 cylinder cars is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .027 to .030 inch.

STARTER.—Model No. 300-A, -B. Starter is connected to engine through a set of reduction gears, driving chain and a ratchet clutch.

Starter Data

Torque	R.P.M.	Amperes	Volts
1 lb. ft.	780	65	6.0
3 lb. ft.	600	90	5.9
6 lb. ft.	460	120	5.7
8 lb. ft.	400	140	5.6
10 lb. ft.	360	160	5.5
68 lb. ft.	Lock	585	3.3

OILING.—Put several drops of light engine oil in each of starter bearing oilers every month. Remove plug and replenish grease in reduction gear case every six months.

GENERATOR.—Models No. 254-A and 256-A. Generator current regulation is by third brush system. A thermostat located in the brush rigging of the generator cuts in a resistance at a temperature of 175°F., reducing the maximum charging rate 6 amperes. Resistance also acts as a shunt field fuse. The thermostat is intended to change the charging rate as demand of seasons or car operation requires. Never touch the thermostat points.

Generator Data

High Battery			Low Battery		
Amperes	R.P.M.	Volts	Amperes	R.P.M.	Volts
0	350	6.40	0	330	5.90
7	510	7.13	7	500	6.24
13	690	7.76	13	680	6.58
20	1100-1500	9.00	18	1000-1200	6.84

Field current is 5 amperes at 6.4 volts. Operating freely as a motor, current is 4.75 amperes at 6.4 volts. armature turning at 245 R.P.M.

OILING.—Put several drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Relay closes at 7-9 miles per hour or 350-400 R.P.M. of armature, and opens at 5-7 miles per hour or 300-350 R.P.M. of armature. Charging current at closing is 1 to 3 amperes and the discharge current 0 to 1 ampere at opening of relay. Contacts separate .012 to .015 inch. Air gap between relay armature and coil core is .012 to .015 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are in series. They are each 3-4 volt, 2 cp.

Reo

Models T and U (1919)

Remy Generating, Starting and Lighting System

Remy Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The two wire system is used.

Ignition.—Breaker contacts separate .020 inch to .025 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or a strip of worn No. 00 sand paper.

Timing—Breaker contacts begin to separate when mark "UDC 1 and 4" on the flywheel is 1 inch to 1¾ inches past indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps are .025 inch to .030 inch.

Oiling.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Starter.—Starter is connected to engine through a chain and an overrunning clutch.

STARTER DATA, MODEL 300-A

Torque	R. P. M.	Amperes	Volts
1 lb. ft.	780	65	6.0
3 lb. ft.	600	90	5.9
6 lb. ft.	460	120	5.7
8 lb. ft.	400	140	5.6
10 lb. ft.	360	160	5.5
68 lb. ft.	Lock	585	3.3

Oiling.—Put 4 or 5 drops of light engine oil in each of starter bearing oilers and lubricate chain well with light engine oil every month. Thoroughly clean out and repack starter reduction gear case with heavy grease once a season.

Generator.—Generator current regulation is by third brush system. A thermostat located in the brush rigging of the generator, cuts in a resistance at a temperature of 175° F., reducing the maximum charging rate 6 amperes. Resistance also acts as a shunt field fuse. The thermostat is intended to change the charging rate as demand of seasons or car operation requires. Never touch the thermostat points. Maximum charging rate is reached at 15 miles per hour.

GENERATOR DATA, MODEL 254-A

High Battery			Low Battery		
Amperes	R. P. M.	Volts	Amperes	R. P. M.	Volts
0	350	6.4	0	330	5.9
7	510	7.1	7	500	6.2
13	690	7.7	13	600	6.6
20	1100-1500	9.0	18	1000-1200	6.8

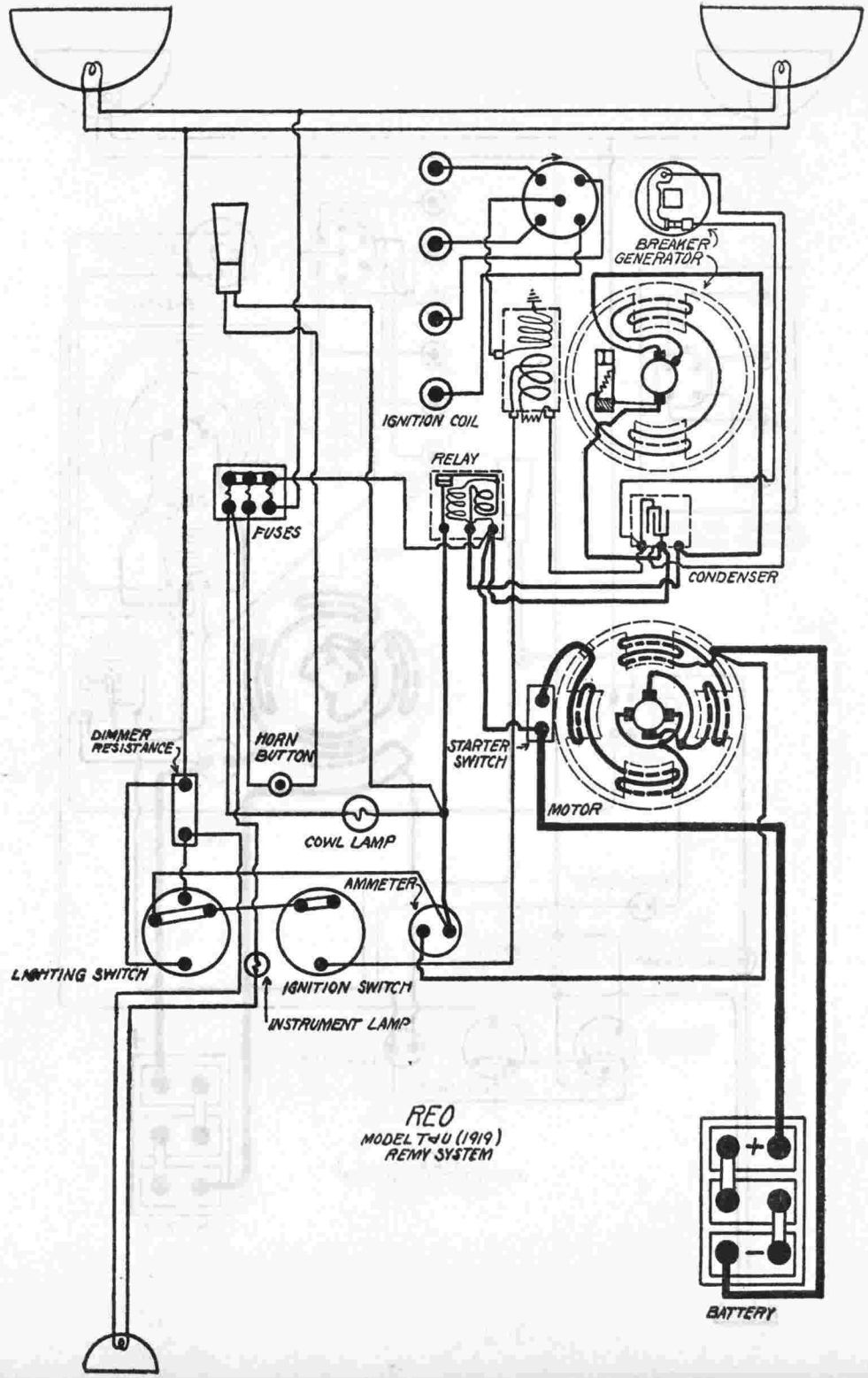
Above tests must be made without ignition and with thermostat closed. When operating freely as a motor, generator takes 4.75 amperes at 6.4 volts, armature revolving at 245 R. P. M. Shunt field takes 5.0 amperes at 6.4 volts.

Oiling.—Put 4 or 5 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Relay.—Relay closes at 7-10 miles per hour or 350-400 R. P. M., of armature. Charging current is 1 to 3 amperes at closing and the discharge current 0 to 1 ampere at opening of relay. Relay contacts separate .012 inch to .015 inch. Air gap between relay armature and coil core is .012 inch to .015 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again puttng into service.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are in series. They are each 3-4 volt, 2 cp.

Fuses.—Fuses are 5 ampere. Use commercial 5 ampere fuse wire when making replace-



REO

MODELS T6 AND U6 (1920 AND EARLY 1921)
NORTH-EAST GENERATING, STARTING AND LIGHTING SYSTEM
NORTH-EAST IGNITION

Note:—This page applies to cars made in late 1921 with the exception of the generator. For generator data see Page 1124.

BATTERY.—Willard, Type SJR-4, 6 volt, 111 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Model T, Type 10442 Distributor. Type 10444 Coil. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put several drops of light engine oil in the oiler under the breaker head every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when the flywheel marking "Spark 1 and 6" is in alignment with the upper edge of the right-hand engine support, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model R, Type 3581. Starter is connected to the engine through a chain and ratchet engagement on the universal shaft. Starter cranks the engine at 100 R. P. M.

OILING.—Put 4 or 5 drops of light engine oil in each of the starter oilers every month. Starter gear housing is packed with soft cup grease, which should be renewed every 2 years.

GENERATOR.—Model L. Type 3711. Generator current regulation is by third brush system. Maximum current output is 16 amperes, reached at 1300 R.P.M. of the armature or 25-28 miles per hour.

Amperes	Generator Data	R.P.M.
0		500
7		700
12		900
14		1000
16		1300
12		2000

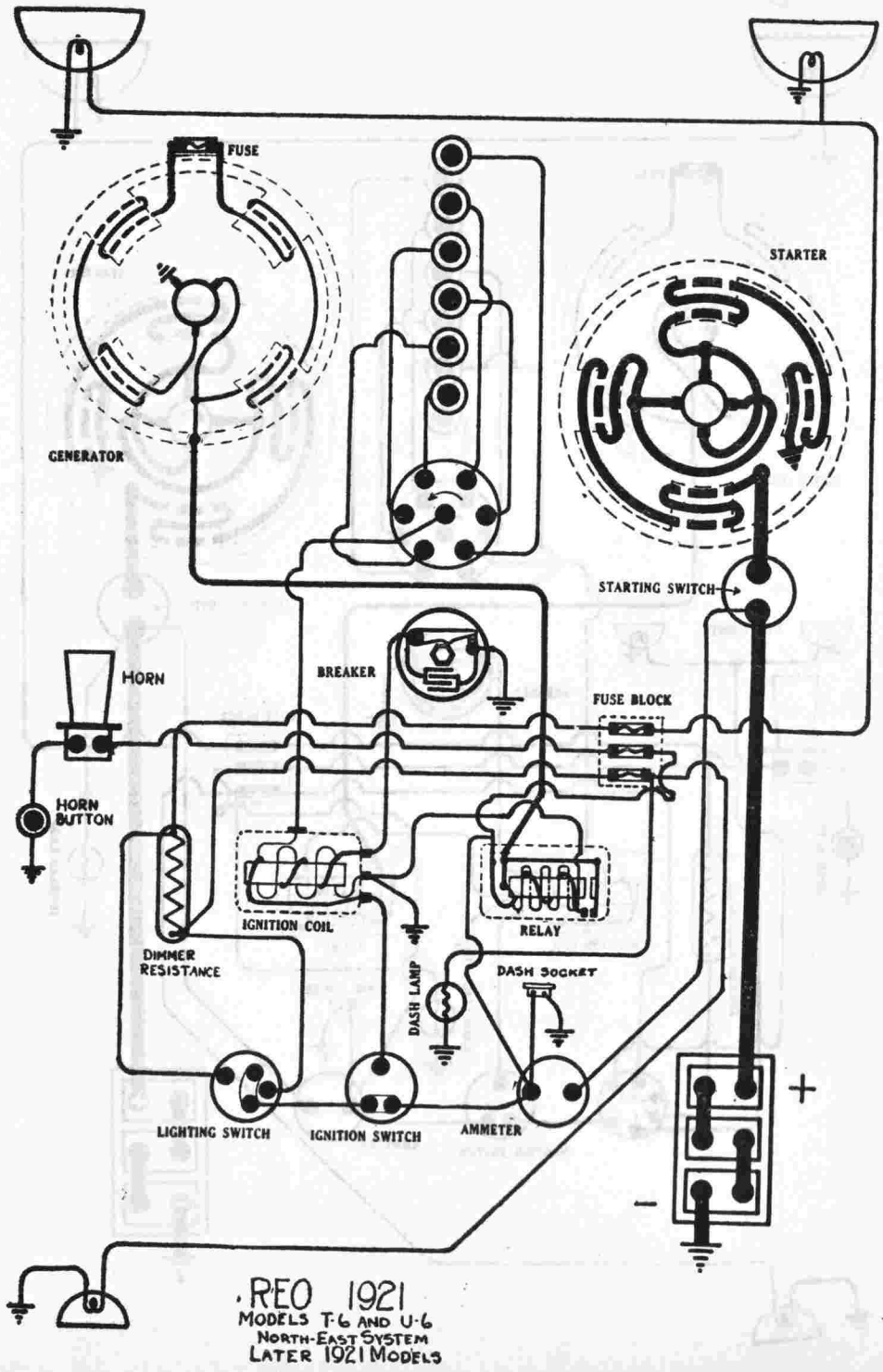
Charging rate is varied by adjustment of the third brush setting. It is first necessary to loosen the two clamp screws located on either side of the bearing cap on the commutator end of generator. Then turn the adjusting stud (directly below the bearing cap) in a counter-clockwise direction (looking at commutator end) to increase the output, or in a clockwise direction to decrease the output. Maximum current output must never be increased above 16 amperes. Lock the third brush assembly by tightening the two clamp screws after the desired adjustment has been made.

OILING.—Put 3 or 4 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Type 8212. Relay closes at 10-12 miles per hour or 500-550 R.P.M. of the armature, and opens at 8-10 miles per hour or 450-500 R.P.M. of the armature. Relay is adjusted to close when the voltage of the generator reaches 7 volts, and open with a discharge current of 1 ampere. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Generator fuse is 6 amperes. Lighting circuit fuses are 5 amperes.



REO

MODEL T-6, SERIES B (1921-22)
NORTH-EAST GENERATING, STARTING AND LIGHTING SYSTEM
NORTH-EAST IGNITION

BATTERY.—Willard, Type SJRN-4, 6 volt, 111 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Type 10,481. Distributor Type No. 10,442. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Put several drops of light engine oil in the oiler under the breaker head every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Timing.—Breaker contacts begin to separate when the flywheel marking "Spark 1 and 6" is in alignment with the upper edge of the right-hand engine support, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—Spark plug gaps are .030 inch.

STARTER.—Model R, Type 3581-A. The direction of rotation is clockwise, viewed from the commutator end. Starter is connected to the engine through a chain and ratchet engagement on the universal shaft. Starter cranks the engine at 100 R.P.M. The lock torque is 55 pound-feet, the current being 500 amperes.

Oiling.—Put 4 or 5 drops of light engine oil in each of the starter oilers every month. Starter gear housing is packed with soft cup grease, which should be renewed every two years.

GENERATOR.—Model LR, Type 3819. The direction of rotation is clockwise, viewed from the commutator end. Generator current regulation is by the third brush system.

Generator Data.—LR

Hot Test		Cold Test	
Amperes	R.P.M.	Amperes	R.P.M.
0.0	400	0.0	375
6	540	6	480
12	740	14	700
14.5	950	16.5	950
12	1300	14	1300

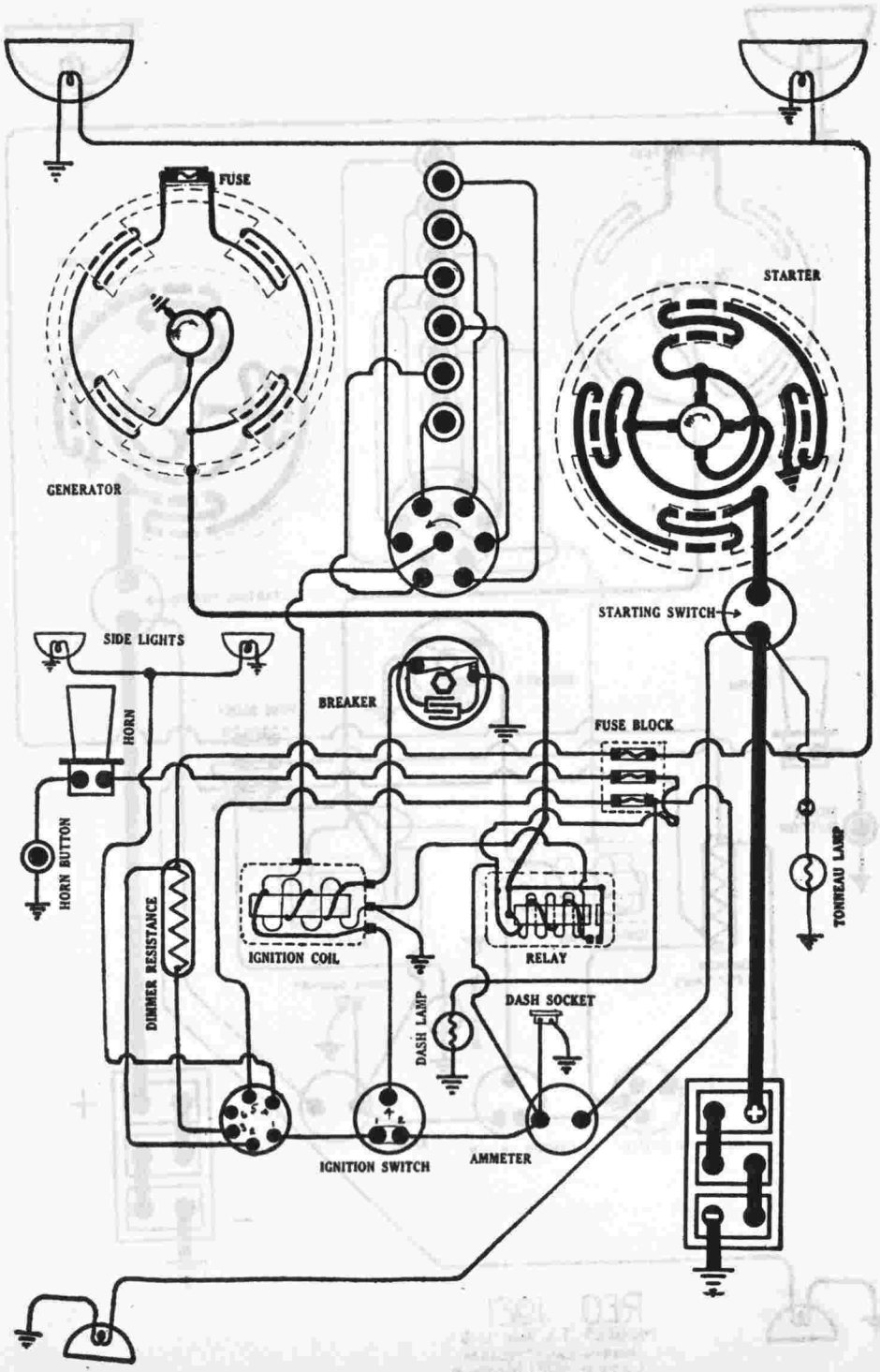
Charging rate is varied by adjustment of the third brush setting. Loosen the clamp screw above the bearing cup and turn adjusting screw in a clockwise direction (looking at the commutator end) to increase the charging rate, and in a counter-clockwise direction to decrease the charging rate. Lock third brush assembly by tightening the clamp screw. The brush tension of all brushes is 1¼ pounds.

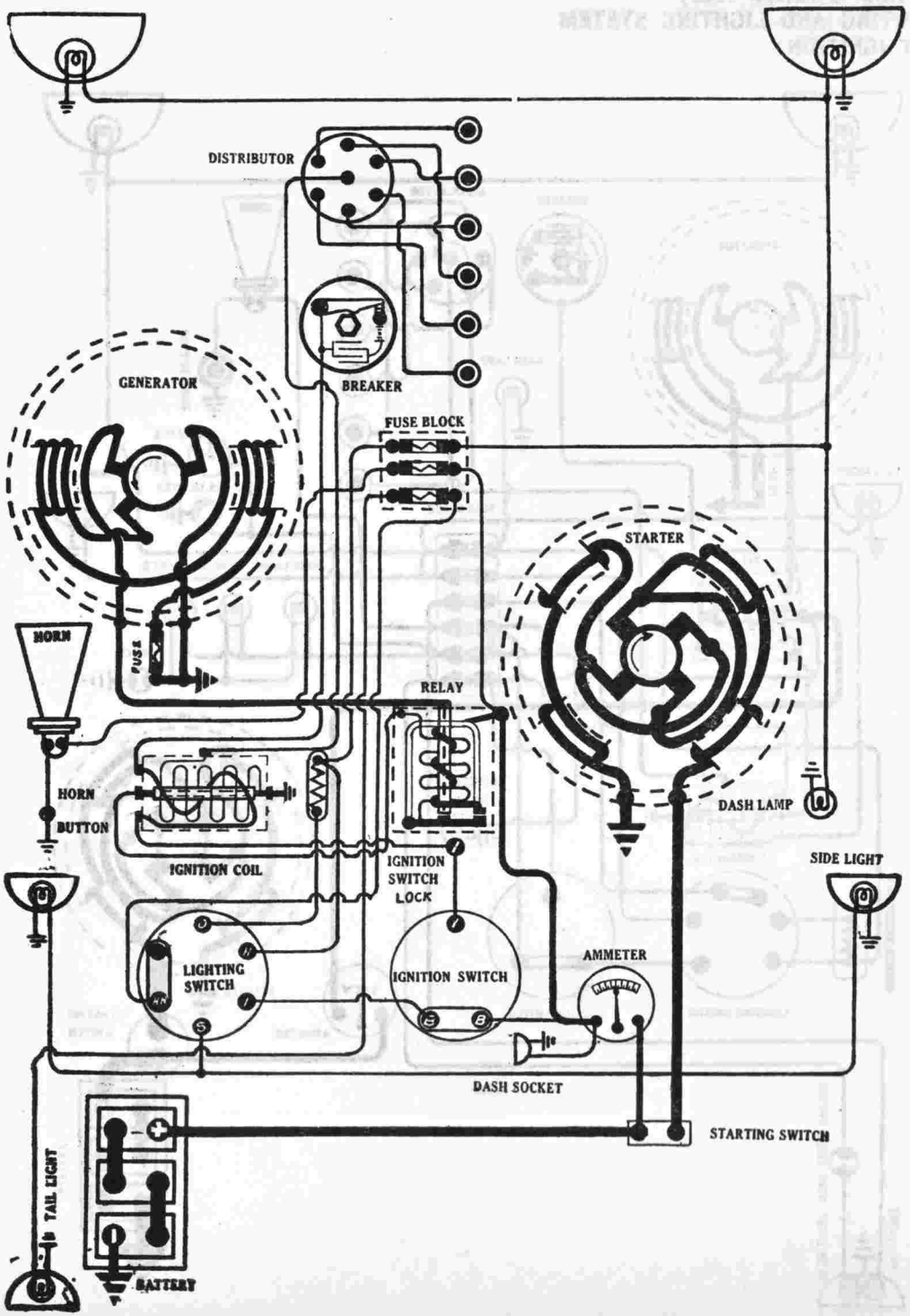
Oiling.—Put 3 or 4 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Type 8212. Relay closes at 10-12 miles per hour or 500-550 R.P.M. of the armature, and opens at 8-10 miles per hour or 450-500 R.P.M. of the armature. Relay is adjusted to close when the voltage of the generator reaches 7 volts, and open with a discharge of 1 ampere. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Tonneau lamp is 6-8 volt, 5 cp. Dash, tail and parking lamps are 6-8 volt, 2 cp.

FUSES.—Generator fuse is 6 ampere. Lighting circuit fuses are 5 ampere.





REO

MODEL T-6, SERIES C (1923-24)
NORTH EAST GENERATING, STARTING AND LIGHTING SYSTEM
NORTH EAST IGNITION

BATTERY:—Willard, Type SJR-4. 6 volt. The starting capacity is 125 amperes for 20 minutes. The lighting capacity is 5 amperes for 22 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model 10481. Distributor Model T Type 10695. Breaker contacts separate .020 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone or with a fine jeweler's file. Never use emery cloth.

Oiling:—The distributor cap and rotor arm should be kept clean and dry. They ordinarily need no lubrication, because the carbon contacts are self-lubricating. Make sure that the carbon brush is free in its socket, also that the flat spring carrying the center contact is bent up sufficiently to make good contact with the distributor cap.

Timing:—Breaker contacts just begin to separate when piston No. 1 is on compression stroke, mark "Spark" on flywheel is even with the top edge of right hand engine support, spark control lever and breaker assembly fully retarded.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plug Gaps:—The spark plug gaps are .025 inch.

STARTER:—Model R. Type 3581-A. Starter is connected to the engine through a rachet and chain on a universal shaft. If the starter mechanism ever fails to engage or takes hold with a thump or pounds when the starter button is depressed, it is an indication that there is not enough tension on the friction cable. On the other hand if the pawl is not brought entirely out of engagement when the starter button is released there is to much friction on the friction cable. To adjust the tension, slack off or draw up on the nut which holds the end of the rod. The starter cranks the engine at 100 R.P.M. with a current of 95-110 amperes. Lock torque is 55 lb. ft., with a current of 500 amperes.

Oiling:—Put 4 or 5 drops of light engine oil into each starter oiler once a month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles. The reduction gear case is filled with No. 4 Keystone grease and requires very infrequent renewal.

GVENERATOR:—Model MAT. Type 3929-L-6. (With Ignition). The direction of rotation is counter-clockwise, looking at driving end. The third brush system is used for current regulation. To adjust the charging rate, loosen lock screws on the commutator end housing. Turning the adjusting screw in the clockwise direction increases the charging rate, and turning to the counter-clockwise direction decreases the charging rate. Be sure to tighten the lock screw in order that the adjustment of generator output is locked in position desired. The maximum charging rate is 18-19 amperes reached at 1350-1500 R.P.M. of the generator armature.

Generator Data

Amperes (Cold)	Volts	R.P.M.	Amperes (Hot)
17	6.5	1250	15.6
18	7.0	1320	16.3
19	7.5	1440	17.0
20	8.0	1600	17.6
21	8.5	——	18.2

Oiling:—Put 4 or 5 drops of light engine oil into each generator oiler and oiler under distributor head every two weeks. If the car is driven more than 500 miles in two weeks, this oiling must be done every 500 miles. The gear case is packed with No. 4 Keystone grease and should be refilled each year.

RELAY:—Type 11690-A. The relay closes at 525 R.P.M. of the armature or 10-12 M.P.H. at 6.5-7.5 volts, and opens at 425-500 R.P.M. of armature or 8-10 M.P.H., with a current discharge of 0-2 amperes. The contact gap is .025-.040 inch, contacts fully separated. The air gap between relay armature and coil core is .010 inch, contacts fully closed.

LIGHTING:—Head lights are each 6-8 volts, 21 cp. Dash, dimmer and tail lights are each 6-8 volt, 2 cp. Trouble light is 6-8 volt, 2 cp. All the above lights are of the single contact type.

FUSES:—Generator fuse is 6 amperes, and the lighting fuses are 5 amperes each.

REO

MODEL T-6 SERIES E AND G (LATE 1925)
NORTH EAST GENERATING, STARTING AND LIGHTING SYSTEM
NORTH EAST IGNITION

BATTERY:—Willard, Type SJR-4. 6 volt. The starting capacity is 125 amperes for 20 minutes. The lighting capacity is 5 amperes for 22 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model 10481. Distributor Model T, Type 10695. Breaker contacts separate .020 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone or with a fine jeweler's file. Never use emery cloth.

Mounting:—Distributor is mounted on rear of generator at left of engine. To remove distributor, disconnect primary lead and remove head with cables intact. Then take out set screw on side of shaft housing and lift distributor from place.

Oiling:—The distributor cap and rotor should be kept clean and dry. They ordinarily need no lubrication, because the carbon contacts are self-lubricating. Make sure that the carbon brush is free in its socket, also that the flat spring carrying the center contact is bent up sufficiently to make good contact with the distributor cap.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 6 inches (on the flywheel) before top dead center with the manual spark lever fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Fully advance spark lever. Continue to crank engine until flywheel mark "Spark/Max. Advance" is opposite the right hand engine support. This mark is 6 inches on the flywheel before the top dead center mark "UDC No. 1." Then loosen lockscrew and rotate cam until contacts are just beginning to separate with the rotor directly under the segment connected to the spark plug in cylinder No. 1. Tighten the lockscrew and check ignition by fully retarding spark lever and cranking engine over until contacts open. The flywheel mark "Spark/Full Retard" should then be opposite the right hand motor support.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plug Gaps:—The spark plug gaps are .025 inch.

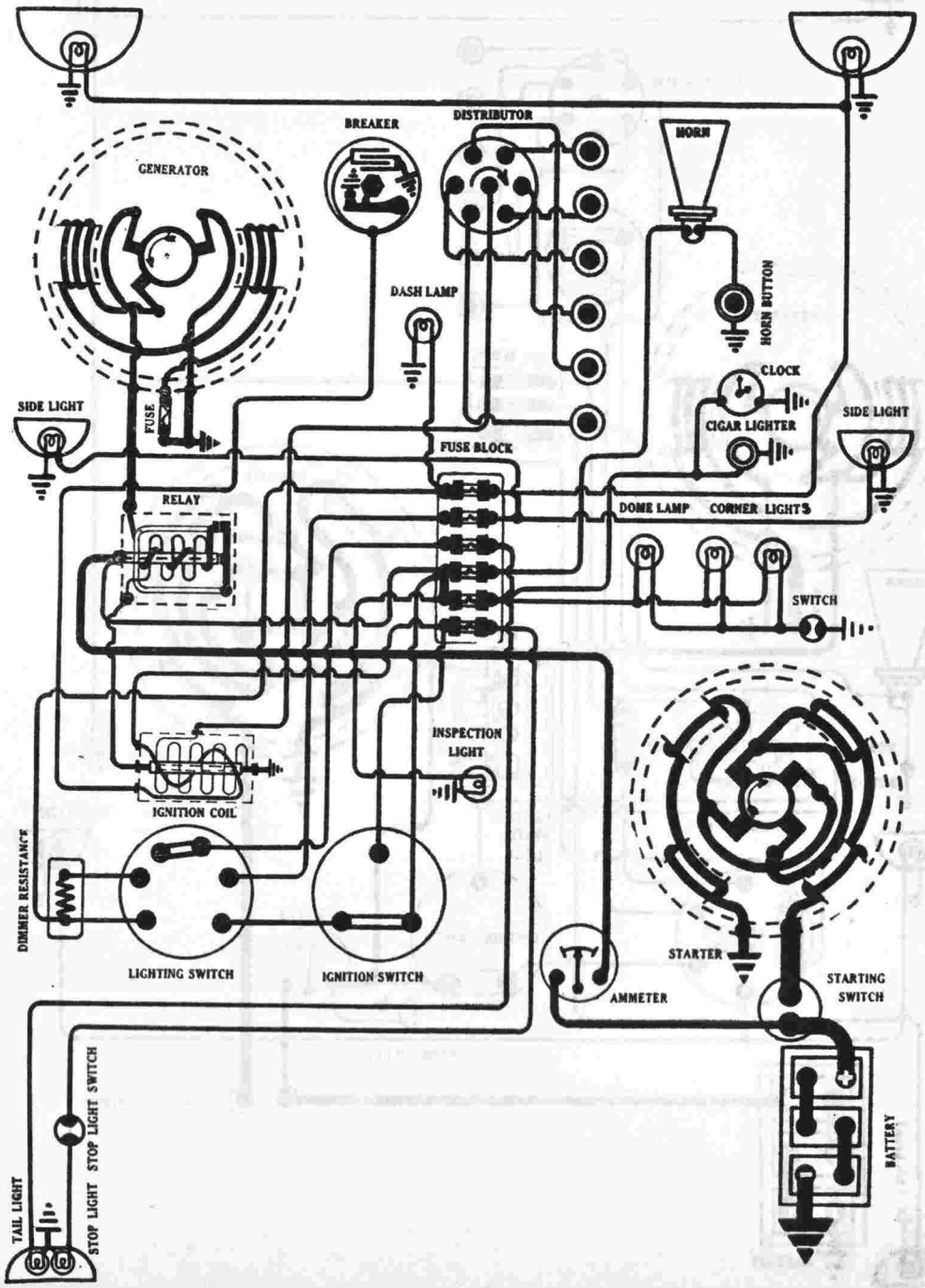
STARTER:—Model R. Type 3581-A. Starter is connected to the engine through a ratchet and chain on a universal shaft. If the starter mechanism ever fails to engage or takes hold with a thump or pound when the starter button is depressed, it is an indication that there is not enough tension on the friction cable. On the other hand if the pawl is not brought entirely out of engagement when the starter button is released, there is too much friction on the friction cable. To adjust the tension slack off or draw up on the nut which holds the end of the rod. The starter cranks the engine at 100 R.P.M. with a current of 95-110 amperes.

Starter Data

Torque	R.P.M.	Amperes	Drive
10 lb. ft.	Lock	490	Armature Shaft
50 "	Lock	490	Sprocket Shaft

Mounting:—Starter is mounted at right of transmission under front floor boards. To remove starter, take up floor boards, disconnect starter cables, starting pedal mechanism and drive chain. Take off nuts on starter mounting studs. Lift starter from place.

Oiling:—Put 4 or 5 drops of light engine oil into each starter oiler once a month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles. The reduction gear case is filled with No. 4 Keystone grease and requires very infrequent renewal.



REO

MODEL T-6 SERIES E AND G (LATE 1925)
NORTH EAST GENERATING, STARTING AND LIGHTING SYSTEM
NORTH EAST IGNITION

GENERATOR:—Model MAT. Type 6089-L-6. (With Ignition). The direction of rotation is counter-clockwise, looking at driving end. The third brush system is used for current regulation. To adjust the charging rate, loosen lock screws on the commutator end housing. Turning the adjusting screw in the clockwise direction increases the charging rate, and turning to the counter-clockwise direction decreases the charging rate. Be sure to tighten the lock screw in order that the adjustment of generator output is locked in position desired. The maximum charging rate is 18-19 amperes reached at 1350-1500 R.P.M. of the generator armature.

Generator Test Data

Amperes (Cold)	Volts	R.P.M.	Amperes (Hot)
17	6.5	1250	15.6
18	7.0	1320	16.3
19	7.5	1440	17.0
20	8.0	1600	17.6
21	8.5		18.2

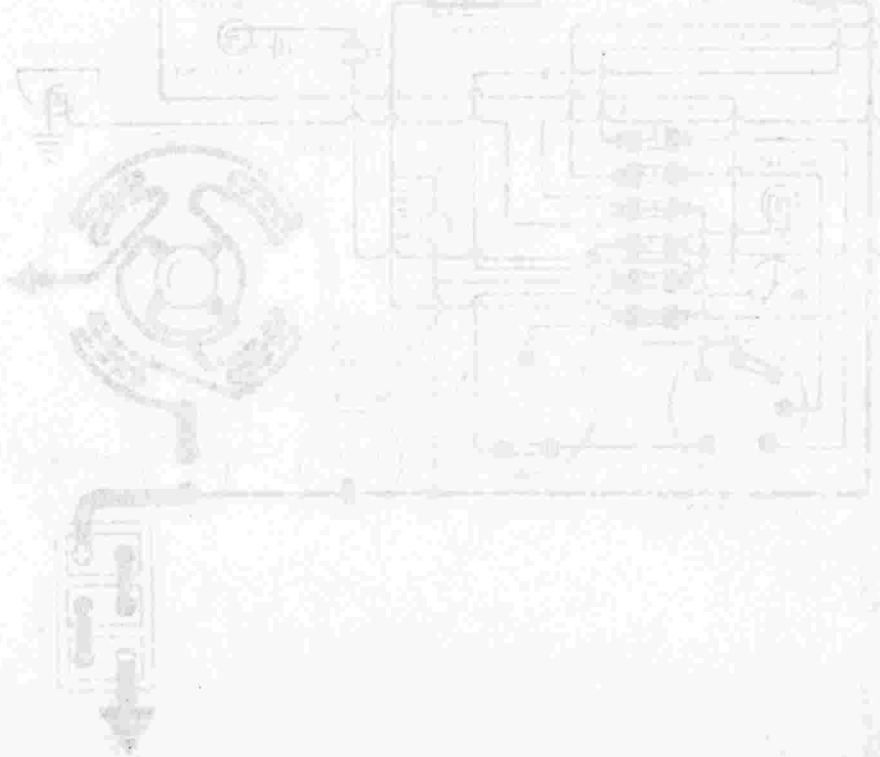
Mounting:—Generator is cradle mounted at left of engine. To remove generator, disconnect generator lead and all ignition wiring or remove distributor. Disconnect manual advance rod and generator drive coupling. Then loosen clamp band and lift generator from place. A dowel pin is located in generator frame to prevent the generator moving in its mounting. Be careful to insert dowel in the hole in the cradle mounting when the generator is installed on the car.

Oiling:—Put 4 or 5 drops of light engine oil into each generator oiler and oiler under distributor head every two weeks. If the car is driven more than 500 miles in two weeks, this oiling must be done every 500 miles. The gear case is packed with No. 4 Keystone grease and should be refilled each year.

RELAY:—Type 11690-A. The relay closes at 525 R.P.M. of the armature or 10-12 M.P.H. at 6.5-7.5 volts, and opens at 425-500 R.P.M. of armature or 8-10 M.P.H., with a current discharge of 0-2 amperes. The contact gap is .025-.040 inch, contacts fully separated. The air gap between relay armature and coil core is .010 inch, contacts fully closed.

LIGHTING:—Head lights are each 6-8 volts, 21 cp. Dash, dimmer and tail lights are each 6-8 volts, 2 cp. Trouble light is 6-8 volts, 2 cp. All the above lights are of the single contact type.

FUSES:—Generator fuse is 6 amperes, and the lighting fuses are 5 amperes each.



REO

MODELS E & G (1926)
NORTH-EAST GENERATING, STARTING AND LIGHTING SYSTEM
NORTH-EAST IGNITION

BATTERY.—Willard, Type SJRR-4. 6 volt. Starting capacity is 125 amperes for 20 minutes. The lighting capacity is 5 amperes for 22 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model 15381. Distributor Model T (On Generator). Breaker contacts separate .020 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone or with a fine jeweler's file. Never use emery cloth.

Oiling.—The distributor cap and rotor arm should be kept clean and dry. They ordinarily need no lubrication, because the carbon contacts are self-lubricating. Make sure that the carbon brush is free in its socket, also that the flat spring carrying the center contact is bent up sufficiently to make good contact with the distributor cap. See generator oiling instructions.

Timing.—Breaker contacts just begin to separate when piston No. 1 is on compression stroke and the flywheel mark "Spark/Max. Advance" is even with the top edge of the right hand engine support, with the spark control lever in the fully advanced position. This point is approximately 6 inches on the flywheel before the top dead center mark and timing can be checked by noting whether dead center mark is even with the engine support when piston No. 1 is on top dead center. To set timing, crank engine until piston No. 1 on compression stroke reaches this position. Then loosen locknut on breaker cam and rotate cam until breaker contacts begin to separate. Then tighten the locknut.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—The spark plug gaps are .025 inch.

STARTER.—Model SBR. Type 6237. Starter is connected to the engine through a ratchet and chain on a universal shaft. If the starter mechanism ever fails to engage or takes hold with a thump or pound when the starter button is depressed, it is an indication that there is not enough tension on the friction cable. On the other hand if the pawl is not brought entirely ont of engagement when the starter button is released, there is too much friction on the friction cable. To adjust the tension slack off or draw up on the nut which holds the end of the rod. The starter cranks the engine at 100 R.P.M. drawing a current of 95-110 amperes at 5.5 volts. The direction of rotation is clockwise, looking at the commutator end (sprocket shaft). The armature rotation is counter-clockwise.

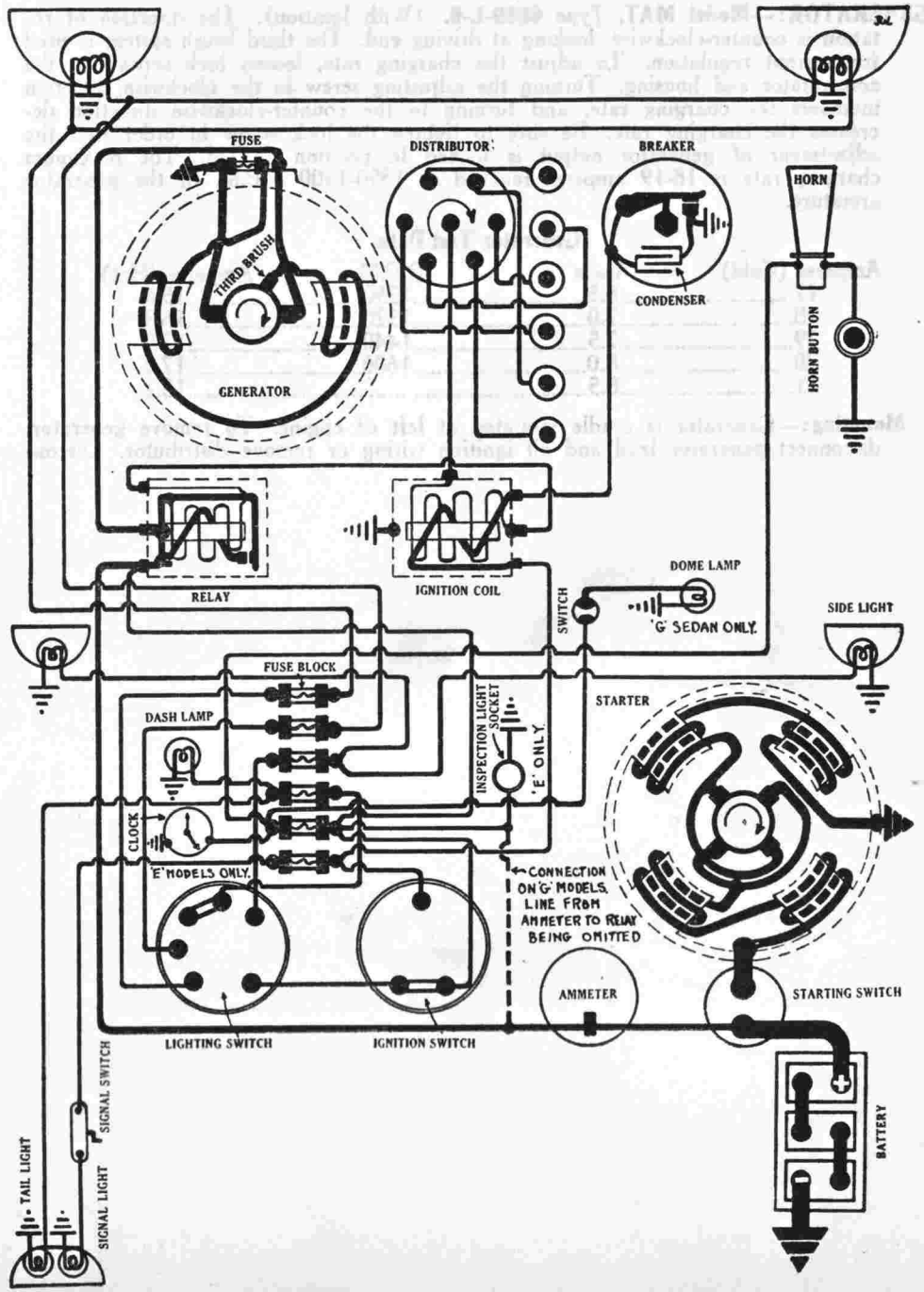
Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	960	6	30
1 "	720	5.75	46
5 "	460	5.5	95
10 "	330	5.1	150
15 "	250	4.6	190
50 "	Lock	3	430

The R.P.M. given in each case is that of the sprocket shaft. The armature rotation is higher.

Oiling.—Put 4 or 5 drops of light engine oil into each starter oiler once a month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles. The reduction gear case is filled with No. 4 Keystone grease and requires very infrequent renewal.

GENERATOR:-Model MAT. Type 6089-L-6. (With Ignition). The direction of rotation is counter-clockwise, looking at driving end. The third brush system is used for current regulation. To adjust the charging rate, loosen lock screws on the commutator



end housing. Then shift third brush by turning the adjustment screw, located below the lock screw. Both have slotted hexagonal heads. To increase the charging rate, the third brush must be shifted in a clockwise direction, looking at commutator end, and in the opposite direction to decrease the charging rate. Tighten the lock screw after making the adjustment. The maximum charging rate is 18 amperes reached at 1500 R.P.M. or 20 M.P.H.

Generator Data

Cold Test (85° F.)			Hot Test (185° F.)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	7.5	525	15	6.5	1250
17	6.5	1250	16.5	7	1330
18	7	1330	17	7.4	1440
19	7.5	1440	17.5	7.8-8.3	1600
20	8-8.5	1600			

Oiling.—Put 4 or 5 drops of light engine oil into each generator oiler and oiler under distributor head every two weeks. If the car is driven more than 500 miles in two weeks, this oiling must be done every 500 miles. The distributor gear case is packed with No. 4 Keystone grease and should be refilled each year.

RELAY: — Type 11,690-A. The relay closes at 525 R. P. M. of the armature or 10-12 M.P.H. at 6.5-7.5 volts, and opens at 425-500 R.P.M. of armature or 8-10 M.P.H., with a current discharge of 0-2 amperes. The contact gap is .025-.040 inch, contacts fully separated. The air gap between relay armature and coil core is .010 inch, contacts fully closed.

LIGHTING.—Head lamps are 6-8 volt, 21 cp. Double filament using second 21 cp. filament for dimming. Stop lamp is 6-8 volt, 21 cp. S. C. Dash, side and tail lamps are each 6-8 volt, 2 cp. S. C. Dome lamp on Model G Sedan is 6-8 volt, 2 cp. S. C.

FUSES.—Generator field fuse is 6 amperes. Lighting fuses are 10 amperes.

REO

WOLVERINE SIX (1927)
NORTH-EAST GENERATING, STARTING AND LIGHTING SYSTEM
NORTH-EAST IGNITION

BATTERY:—Willard, Type RR-13. 6 volt, 90 ampere hour. Battery has 13 plates. The negative (—) terminal is grounded.

IGNITION:—Coil Type 17232. Distributor Type 10820. Breaker contacts separate .020 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 20°. Automatic advance begins at 400 R.P.M. and reaches a maximum of 22½° at 2000 R.P.M. of the engine.

Mounting:—Distributor is mounted on top of the engine block and is driven by spiral gears and extension shaft from the camshaft. To remove distributor, remove manual advance rod and disconnect primary lead and distributor head with high tension cables intact. Then remove set srew in side of distributor mounting bracket and lift distributor from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every month or each 1000 miles. At the same time remove the distributor rotor and saturate the felt oiler in the oil cup in the distributor shaft. Put a small amount of grease on the face of the breaker cam under the fiber bumper of the contact arm.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual control lever in the fully retarded position. To set timing, crank engine until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Then fully retard manual spark advance lever and remove cover from timing inspection hole on the top of the flywheel housing. Continue to crank engine until piston No. 1 reaches top dead center. At this point the flywheel mark "UDC" will be opposite the mark on the flywheel housing. Breaker contacts should begin to separate. If they do not, loosen clamp screw in manual advance arm and rotate distributor in a clockwise direction until contacts begin to separate. Tighten the clamp screw. Check timing by rocking the distributor back and forth. The backlash of the gears should be sufficient to open and close contacts.

Valve Timing:—To check valve timing, set tappet clearance of inlet valve in cylinder No. 6 at .008 inch with pushrod on heel of cam. Then crank engine until piston in cylinder No. 6 is .0125 inch past upper dead center. The intake valve in cylinder No. 6 should open at this point. There is a plug in the sylinder head directly over No. 6 piston to aid in setting this position. After checking valve timing set all tappet clearances at .005 inch.

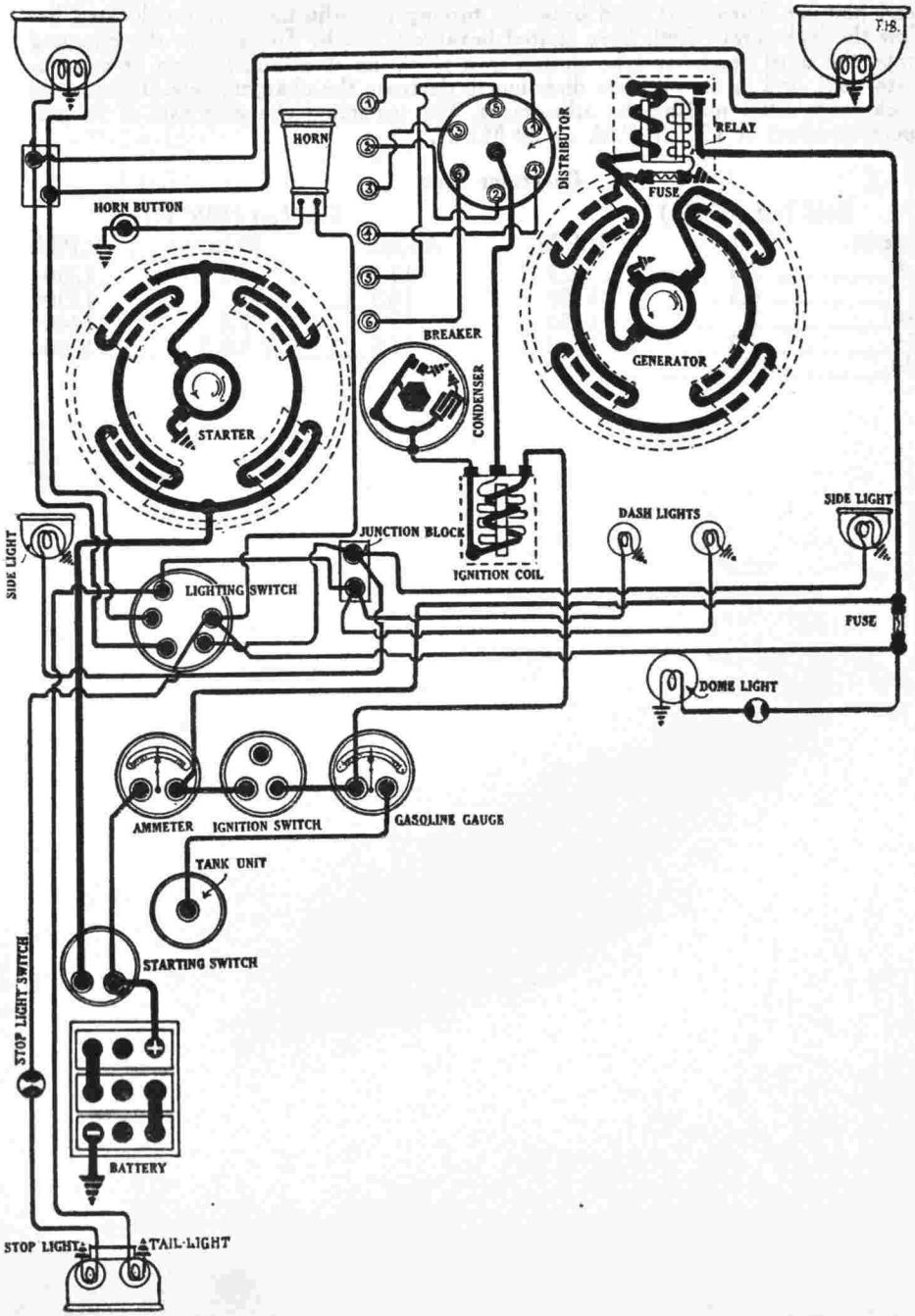
Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Gaps are .025 inch.

STARTER:—Type 6304. Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter switch is Type 15380. Brush spring tension is 3 pounds.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	1600	5.3	160
2.75 "	1500	5.2	164
4 "	1200	4.9	215
5.4 "	900	4.5	280
7 "	600	4.2	356
9 "	300	3.8	420
12 "	Lock	3.4	510



REO

WOLVERINE SIX (1927)
NORTH-EAST GENERATING, STARTING AND LIGHTING SYSTEM
NORTH-EAST IGNITION

Mounting:—Starter is mounted at left of engine on forward side of flywheel housing by No. 1 S.A.E. flange. To remove starter, disconnect starter cable and remove three flange mounting cap screws. Then slide starter forward and lift from place.

Oiling:—Starter bearings are of the oilless type. They require no attention.

GENERATOR:—Type 5394. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, turn the stud extending through to the outside of the generator endplate. First loosen locknut and then turn stud shifting third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the locknut after making the adjustment. Maximum charging rate with standard car setting is 14-15 amperes reached at 1500 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.75	600	5	8	800
8.5	8.0	800	11.5	8	1000
15	8.0	1000	14.8	8	1200
17	8.0	1200	15	8	1400
17	8.0	1400	14.5	8	1600
16	8.0	1600	13.5	8	1800
13.3	8.0	2000	12.5	8	2000
11	8.0	2400	10.5	8	2400

Generator motoring draws 4 amperes at 6 volts. Shunt field current is 3.2 amperes at 6 volts. Brush spring tension is 12-16 ounces.

Mounting:—Generator is flange mounted at right of engine at rear of timing chain case. To remove generator, disconnect generator lead and remove two flange mounting cap screws. Then slide generator to the rear. Generator drive is by slotted tongue from chain sprocket. Adjustment of timing chain tension is made by loosening generator mounting screws and rotating generator outward around lower stud. The chain should be loose enough to insure quiet running.

Oiling:—Put 2 or 3 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles.

RELAY:—Type 15850. Relay is mounted on top of the generator. Relay closes at 600 R.P.M. when the voltage of the generator reaches 6.75 volts and opens with a discharge current of 0-2 amperes. Charging current at closing of contacts is 1-2 amperes. Relay contacts separate .020-.025 inch. Air gap between relay armature and coil core is .030 inch, contacts closed.

LIGHTING:—Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Side lamps are 6-8 volt, 3 cp. S.C. Dome lamp is 6-8 volt, 3 cp. S.C. Stop lamp is 6-8 volt, 15 cp. S.C. Dash and tail lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Generator field fuse is 6 amperes. Lighting fuse on block is 20 amperes.

REO

FLYING CLOUD MODEL (1927-28)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type SJRR-4, 6 volt. Starting capacity is 125 amperes for 20 minutes. Lighting capacity is 5 amperes for 22 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model 525-E. Distributor Model 636-K. Breaker contacts separate .018-.024 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Ignition current is 1-3 amperes with engine running and 3.4-5 amperes with engine stopped. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Manual advance is 25° (engine). Automatic advance begins at 1000 R.P.M. and reaches a maximum of 21° at 2800 R.P.M. of the engine. The ignition switch is Model 440-B.

Mounting:—Ignition coil is mounted on the dash. Distributor is mounted on cylinder head and is driven by spiral gears from the camshaft. To remove distributor, disconnect primary lead and manual advance rod and remove distributor head with high tension cables intact. Then loosen distributor clamp screw and lift distributor from place.

Oiling:—Refill the grease cup under the distributor head with medium cup grease and turn down two turns every month or each 1000 miles. Put a small amount of vaseline on the face of the breaker cam under the fiber bumper of the contact arm.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position one inch after top dead center (on the flywheel) with the spark lever and breaker assembly fully retarded. To set timing, crank engine until piston No. 1 reaches top dead center on compression stroke (the upstroke with both valves closed). Then remove inspection hole cover in top of flywheel case. The flywheel marking 'UDC' will be opposite the indicator line in the edge of the opening. Fully retard spark lever and crank engine over one inch when flywheel mark will be one inch past the indicator. Breaker contacts should separate at this point. If they do not, loosen advance clamp screw and rotate until contacts begin to separate. Tighten the clamp screw.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .030 inch.

VALVE TIMING:—Specifications:—Head diameter, 1 13/16 inches; stem diameter, .3437 inch. Spring pressure, 52½ pounds. Tappet clearance, .004 inch (inlet) and .006 (exhaust).

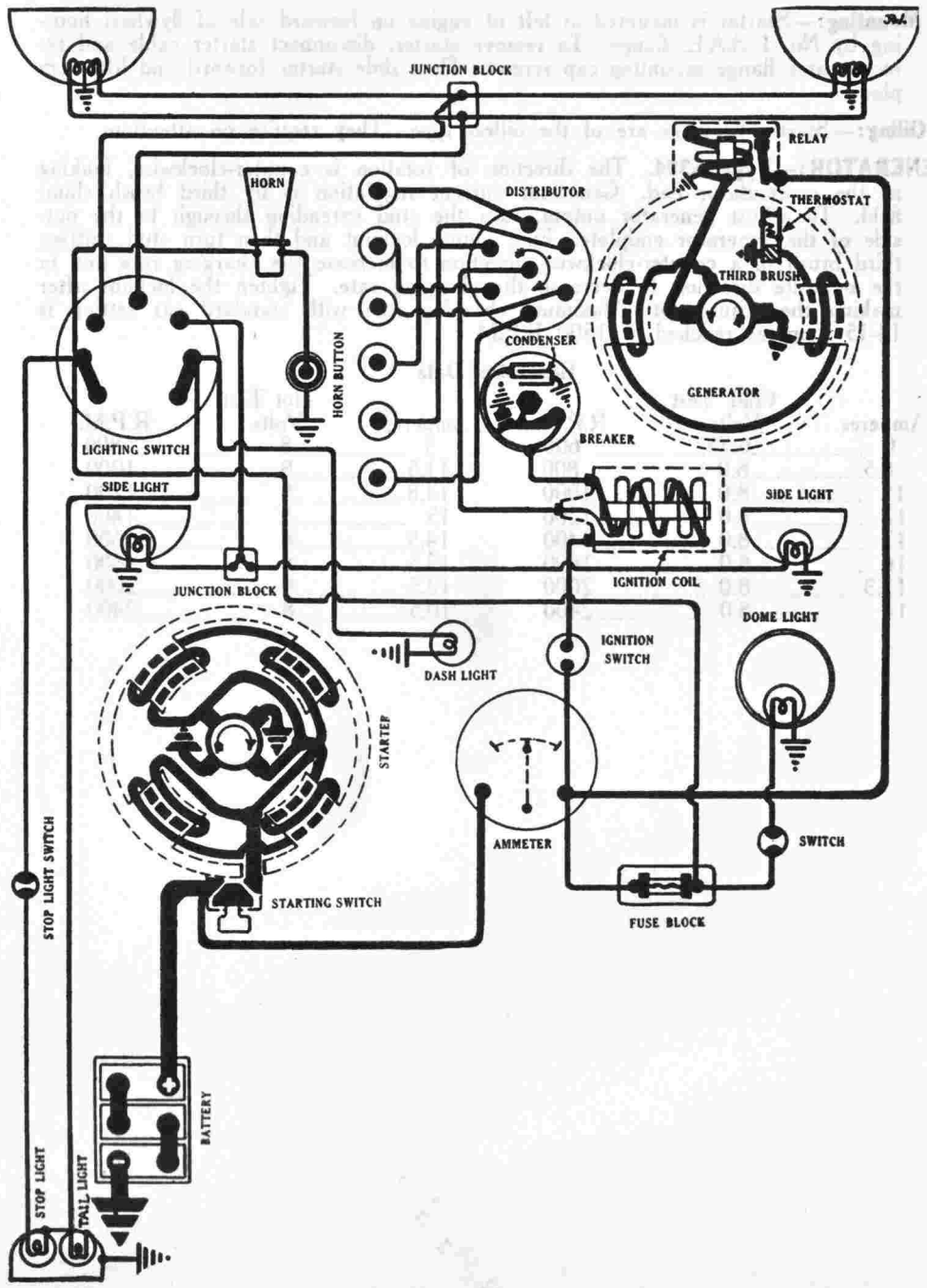
Timing:—Inlet valves open at top dead center and close 40 degrees after lower dead center. Exhaust valves open 48 degrees before lower dead center and close 2 degrees after top dead center. Flywheel is marked 'UDC No. 1 Int. Open' for intake opening of cylinder No. 1.

STARTER:—Model 724-E. Starter is connected to the engine through a mechanical pinion shift and an overrunning clutch. The direction of rotation of the armature shaft is clockwise, looking at the commutator end. Brush spring tension is 24-28 ounces each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3500	5	70
22 "	Lock	3	600

Mounting:—Starter is mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove 3 flange mounting cap screws. Then pull starter forward and lift from place.



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REO

FLYING CLOUD MODEL (1927-28)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

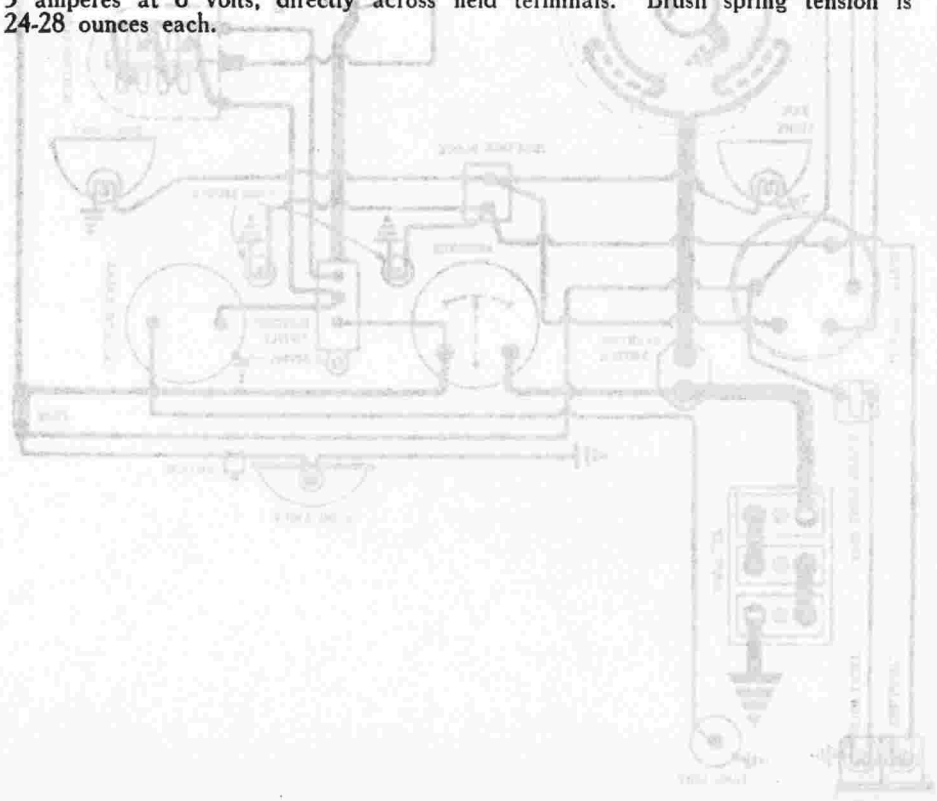
Oiling:—Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles. Every six months or each 5000 miles, remove the grease plug in the gear case and repack the reduction gears with medium cup grease.

GENERATOR:—Model 949-B. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field combined with a thermostat. Thermostat contacts open at 160°F. cutting a resistance in the field circuit and reducing the output approximately 40%. To adjust the generator output, remove the commutator cover band and loosen the small round headed screw on the generator endplate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting the maximum charging rate is 18-19 amperes (cold) reached at 1450 R.P.M. or 25-26 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
21	8.5	1450	9-12	7.5	2000

Motoring freely, generator draws 5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts, directly across field terminals. Brush spring tension is 24-28 ounces each.



Mounting:—Generator is flange mounted at right of engine at rear of timing chain case. To remove generator, disconnect generator lead and remove flange mounting cap screws. Then slide generator to the rear. Generator drive is by slotted tongue from chain sprocket. Adjustment of timing chain is provided by loosening the generator mounting screws and moving the generator sideways. The chain should be loose enough to run noiselessly.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay closes when the voltage of the generator reaches 7-7.5 volts and opens with a discharge current of 0-2.5 omperes. Charging current at closing of contacts is 3 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch, contacts closed.

LIGHTING:—Delco-Remy Switch Model 482-F. Switch is mounted at lower end of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Lighting fuse on block mounted on the dash is 20 amperes.

REO

WOLVERINE MODEL (1928)
NORTH EAST GENERATING, STARTING AND LIGHTING SYSTEM
NORTH EAST IGNITION

BATTERY:—Willard, Type RR-13, 6 volt, 90 ampere hour. Battery has 13 plates. The negative (—) terminal is grounded.

IGNITION:—Coil Type 17232. Ignition coil is mounted on the dash. Current is 1 ampere at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

Distributor Type 10820-A. Breaker contacts separate .020 inch. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Maximum manual advance is 20 degrees. Automatic advance begins at 400 R.P.M. Maximum automatic advance is 22½ degrees at 2000 R.P.M. of the engine. An electrolock is used. It must be removed from the dash with the distributor whenever the distributor is taken off the car for servicing. amperes reached at 1500 R.P.M. or 21 M.P.H.

Mounting:—Distributor is mounted on top of the engine block and is driven by spiral gears and extension shaft from the camshaft. To remove distributor, remove manual advance rod and disconnect primary lead and distributor head with high tension cables intact. Then remove set screw in side of distributor mounting bracket and lift distributor from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every month or each 1000 miles. At the same time remove the distributor rotor and saturate the felt oiler in the oil cup in the distributor shaft. Put a small amount of grease on the face of the breaker cam under the fiber bumper of the contact arm.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual control lever in the fully retarded position. To set timing, crank engine until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Then fully retard manual spark advance lever and remove cover from timing inspection hole on the top of the flywheel housing. Continue to crank engine until piston No. 1 reaches top dead center. At this point the flywheel mark 'UDC' will be opposite the mark on the flywheel housing. Breaker contacts should begin to separate. If they do not, loosen clamp screw in manual advance arm and rotate distributor in a clockwise direction until contacts begin to separate. Tighten the clamp screw. Check timing by rocking the distributor back and forth. The backlash of the gears should be sufficient to open and close contacts.

Firing Order:—The firing order is 1-5-3-6-2-4.

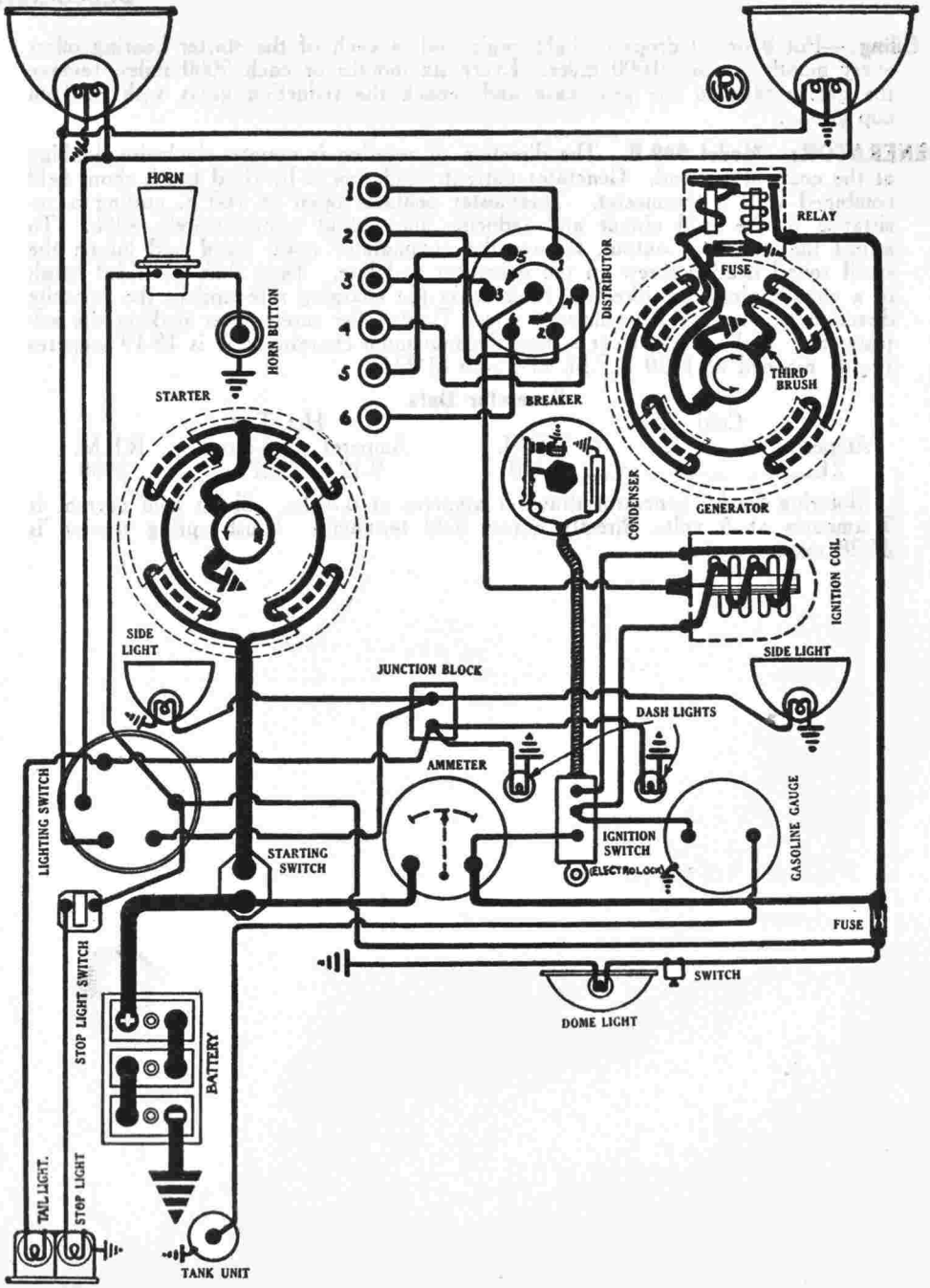
Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Gaps are .025 inch.

Valve Timing:—To check valve timing, set tappet clearance of inlet valve in cylinder No. 6 at .008 inch with pushrod on heel of cam. Then crank engine until piston in cylinder No. 6 is .0125 inch past upper dead center. The intake valve in cylinder No. 6 should open at this point. There is a plug in the cylinder head directly over No. 6 piston to aid in setting this position. After checking valve timing set all tappet clearances at .005 inch.

STARTER:—Type 6304. Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter switch is Type 15380. Brush spring tension is 3 pounds.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	1600	5.3	160
2.75 "	1500	5.2	164
4. "	1200	4.9	215
5.4 "	900	4.5	280
7. "	600	4.2	356
9. "	300	3.8	420
12 "	Lock	3.4	510



REO

WOLVERINE MODEL (1928)
NORTH EAST GENERATING, STARTING AND LIGHTING SYSTEM
NORTH EAST IGNITION



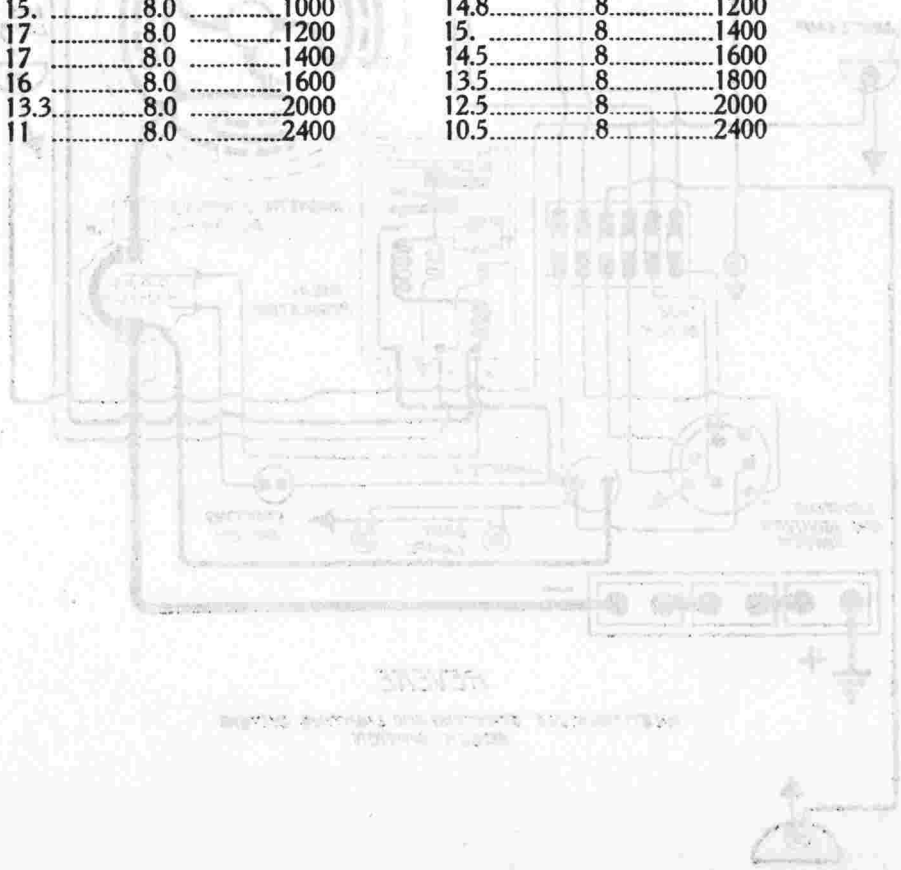
Mounting:—Starter is mounted at left of engine on forward side of flywheel housing by No. 1 S.A.E. flange. To remove starter, disconnect starter cable and remove three flange mounting cap screws. Then slide starter forward and lift from place.

Oiling:—Starter bearings are of the oilless type. They require no attention.

GENERATOR:—Type 5394. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, turn the stud extending through to the outside of the generator endplate. First loosen locknut and then turn stud shifting third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the locknut after making the adjustment. Maximum charging rate with standard car setting is 14-15 amperes reached at 1500 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.75	600	5	8	800
8.5	8.0	800	11.5	8	1000
15.	8.0	1000	14.8	8	1200
17	8.0	1200	15.	8	1400
17	8.0	1400	14.5	8	1600
16	8.0	1600	13.5	8	1800
13.3	8.0	2000	12.5	8	2000
11	8.0	2400	10.5	8	2400



Generator motoring draws 4 amperes at 6 volts. Shunt field current is 3.2 amperes at 6 volts. Brush spring tension is 12-16 ounces.

Mounting:—Generator is flange mounted at right of engine at rear of timing chain case. To remove generator, disconnect generator lead and remove two flange mounting cap screws. Then slide generator to the rear. Generator drive is by slotted tongue from chain sprocket. Adjustment of timing chain tension is made by loosening generator mounting screws and rotating generator outward around lower stud. The chain should be loose enough to insure quiet running.

Oiling:—Put 2 or 3 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles.

RELAY:—Type 15850. Relay is mounted on top of the generator. Relay closes at 600 R.P.M. when the voltage of the generator reaches 6.75 volts and opens with a discharge current of 0-2 amperes. Charging current at closing of contacts is 1-2 amperes. Relay contacts separate .020-.025 inch. Air gap between relay armature and coil core is .030 inch, contacts closed.

LIGHTING:—Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Parking lights (in head lights) are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop light is 6-8 volt, 21 cp. S.C. Mazda No. 1129. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Generator field fuse is 6 amperes. Lighting fuse on block is 20 amperes.

REVERE

MODEL A, B, C, D (1919-20)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH IGNITION

BATTERY:—Willard, Type SJR-6. 6 volt, 120 ampere hour. The positive (+) terminal is grounded.

IGNITION:—Breaker contacts separate .014 to .016 inch. When the condition of the contacts affects the ignition, resurface with a fine flat jeweler's file or worn No. 00 sandpaper.

Oiling:—Put 2 or 3 drops of light engine oil in each of the magneto oilers every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-3-4-2.

Spark Plug Gaps:—Spark plug gaps are .025 inch.

STARTER:—Frame No. 776 (1919), 751 (1920). Starter is connected to the engine through a Bendix drive. The magnetic starting switch is connected to the relay in such a manner that the starting switch can not be operated after the relay closes.

Starter Data

(Frame 776)

Torque		R.P.M.	Volts	Amperes
0	lb. ft.	3500-6000	5.5	35-50
5	"	1000	5.5	210
31	"	Lock	4.0	750

(Frame 751)

Torque		R.P.M.	Volts	Amperes
0	"	3100-3800	5.5	38-52
3.5	"	1200	5.5	185
21	"	Lock	4.0	650

Oiling:—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

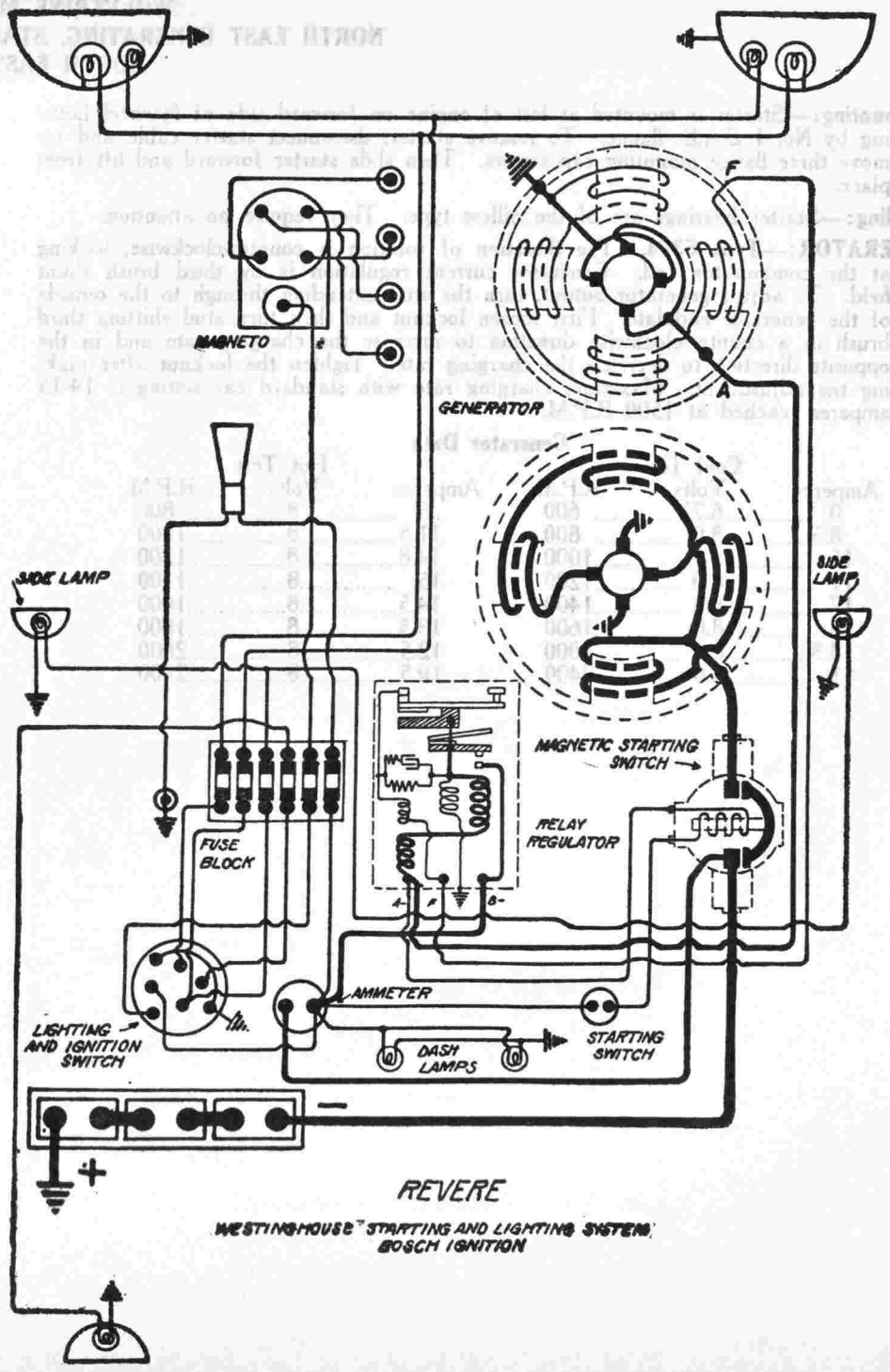
GENERATOR:—Frame 781, Type S-293478 or N-301687. Generator voltage regulation is by vibrating regulator. Maximum generator output is 20 amperes at 6.5 volts, reached at 1200 R.P.M. of the armature or 20 miles per hour. Charging rate reduces to 4 amperes as battery becomes fully charged. Shunt field current is 1.4 to 1.6 amperes at 6 volts. Operating freely as a motor, generator takes 5 amperes at 6 volts.

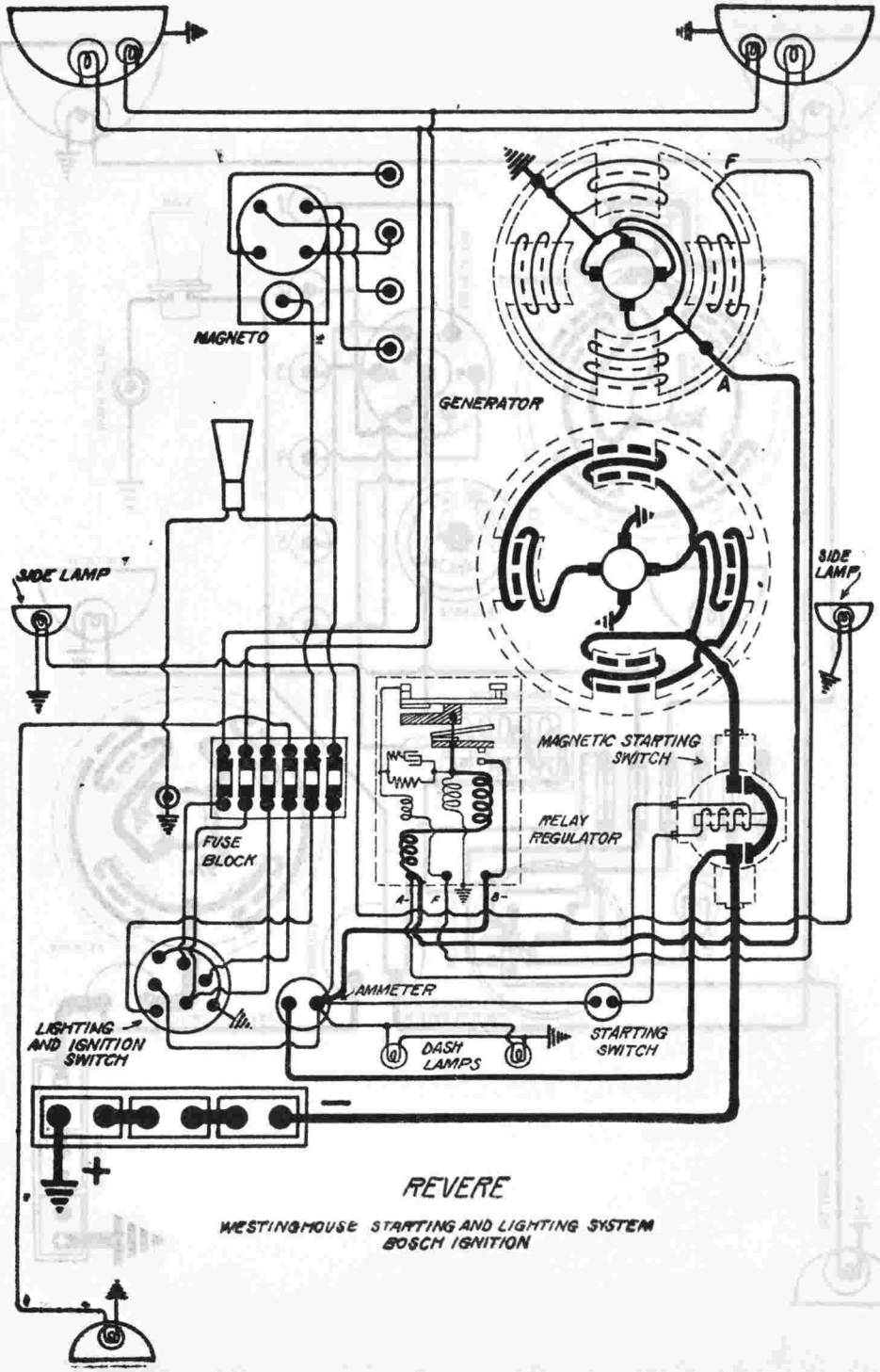
Oiling:—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY REGULATOR:—Relay closes at 550-600 R.P.M. of the armature or 8-10 miles per hour, and opens at 500-550 R.P.M. of the armature or 6-8 miles per hour. To adjust the relay, regulate the spring tension until the contacts open with a discharge current of 1 to 3 amperes. Then disconnect the battery and vary the air gap between relay armature (moving member) and coil core by bending the lower prong until relay contacts just close when a voltmeter connected from the "A" generator terminal to ground indicates 6.5 to 7 volts. This air gap between the relay armature and coil core is .055 inch. To adjust the regulator, disconnect the wire from the terminal "B" and connect a voltmeter between this post and ground. Operate the engine at a speed corresponding to 20 miles per hour, or drive the generator at 1200 R.P.M., and adjust the spring tension on the regulator armature by turning the thumb screw until the voltmeter indicates 8.75 volts. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS:—Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 5 cp. Side lamps are 6-8 volt, 5 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 4 cp.

FUSES:—Fuses are 15 amperes.





REVERE

MODEL M (1921-22-23-24-25)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM

BOSCH IGNITION

BATTERY.—Willard, Type SJR-6, 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .014 to .016 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 2 or 3 drops of light engine oil in each of the magneto oilers every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Frame 776. Starter is connected to the engine through a Bendix drive. Lock torque is 31 pound-feet, current being 750 amperes at 4 volts. The magnetic switch is connected to the relay-regulator in such a manner that it cannot operate after the relay has closed.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Frame 781, Type S-293,478 or N-301,687. Generator voltage regulation is by vibrating regulator. Maximum generator output is 20 amperes at 6.5 volts. reached at 1200 R.P.M. of the armature or 20 miles per hour. Charging rate reduces to 4 amperes as battery becomes fully charged. Shunt field current is 1.4 to 1.6 amperes at 6 volts. Operating freely as a motor, generator takes 5 amperes at 6 volts.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY-REGULATOR.—Relay closes at 550-600 R.P.M. of the armature or 8-10 miles per hour, and opens at 500-550 R.P.M. of the armature or 6-8 miles per hour. To adjust the relay, regulate the spring tension until the contacts open with a discharge current of 1 to 3 amperes. Then disconnect the battery and vary the air gap between relay armature (moving member) and coil core by bending the lower prong until relay contacts just close when a voltmeter connected from the "A" generator terminal to ground indicates 6.5 to 7 volts. This air gap between the relay armature and coil core is .055 to .060 inch. To adjust the regulator, disconnect the wire from the terminal "B" and connect a voltmeter between this post and ground. Operate the engine at a speed corresponding to 20 miles per hour, or drive the generator at 1200 R.P.M., and adjust the spring tension on the regulator armature by turning the thumb screw until the voltmeter indicates 8.75 volts. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 5 cp. Side lamps are 6-8 volt, 5 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 4 cp.

FUSES.—Fuses are 15 ampere.

REVERE

MODEL 25 (1925-26)
AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

BATTERY:—Prest-O-Lite, Type 615-SHK-2. 6 volt. Starting capacity is 150 amperes for 20 minutes. Lighting capacity is 5 amperes for 27 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model TC-30. Distributor Model TM-672. Breaker contacts separate .018-.020 inch. Resurface contacts with a fine flat jeweler's file or on a medium hard oilstone.

Oiling:—Fill the oiler on the side of the distributor housing with light engine oil every month or each 1000 miles. Put one drop of light engine oil on the breaker lever pivot pin and put a small bit of heavy grease on the face of the breaker cam under the fiber bumper of the breaker arm every month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

STARTER:—Model 1118. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension is 1½-1¾ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	6	50
25 "	Lock	3.4	515

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model 1250. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, loosen the hexagonal headed nut on the generator end plate holding the third brush mounting plate and shift the third brush. Shifting the brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. Tighten the nut after making the adjustment.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
3	6.75	600	3	6.5	725
7	7.1	700	8	7.5	900
13	7.6	900	10	7.8	1000
17	8	1300	13	8	1350
13	8	1950	11	7.8	2000

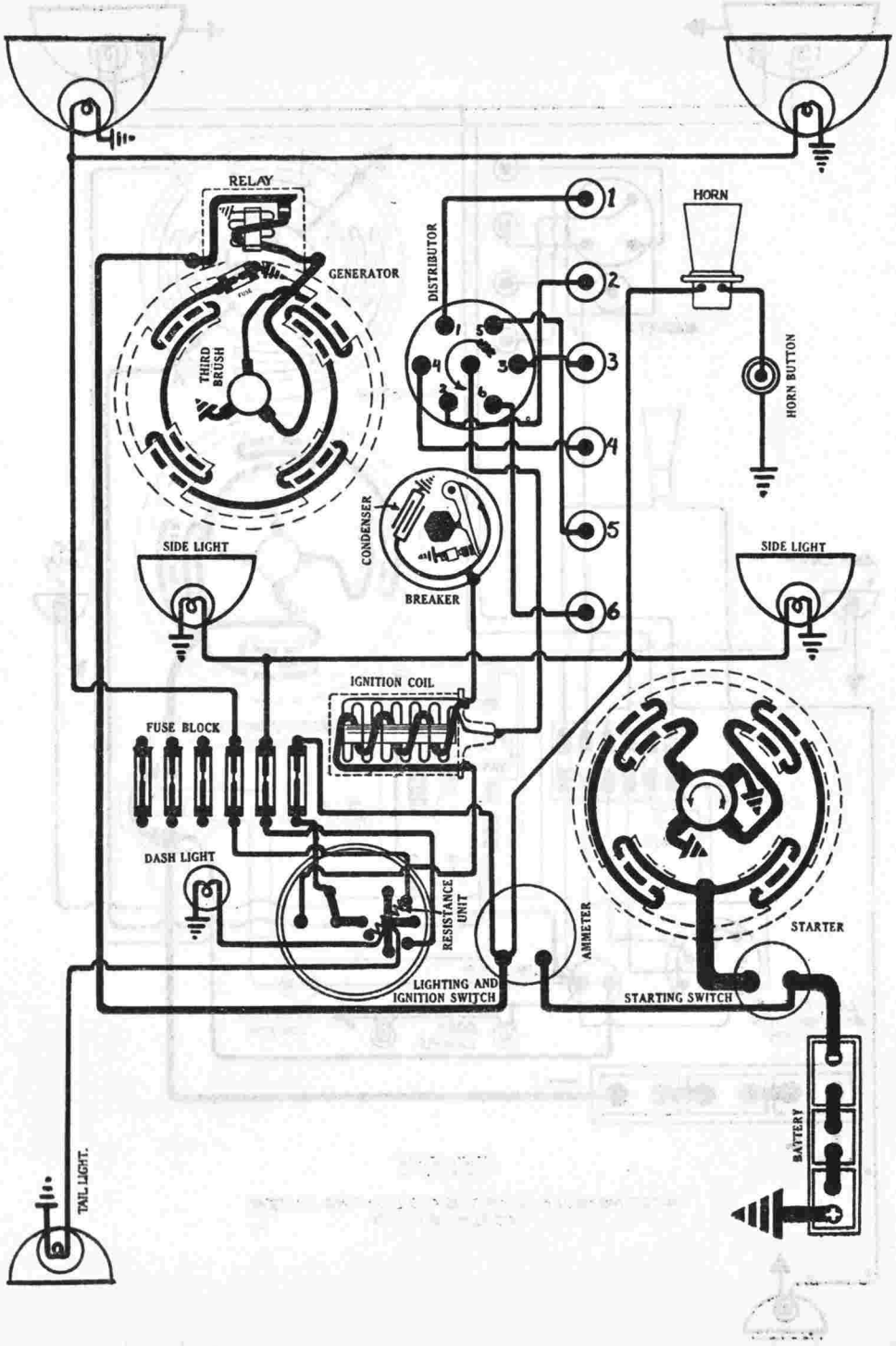
Motoring freely generator draws 6 amperes at 6 volts. Shunt field current is 6.6 amperes at 6 volts. Generator brush tension should be 1½-1¾ pounds each.

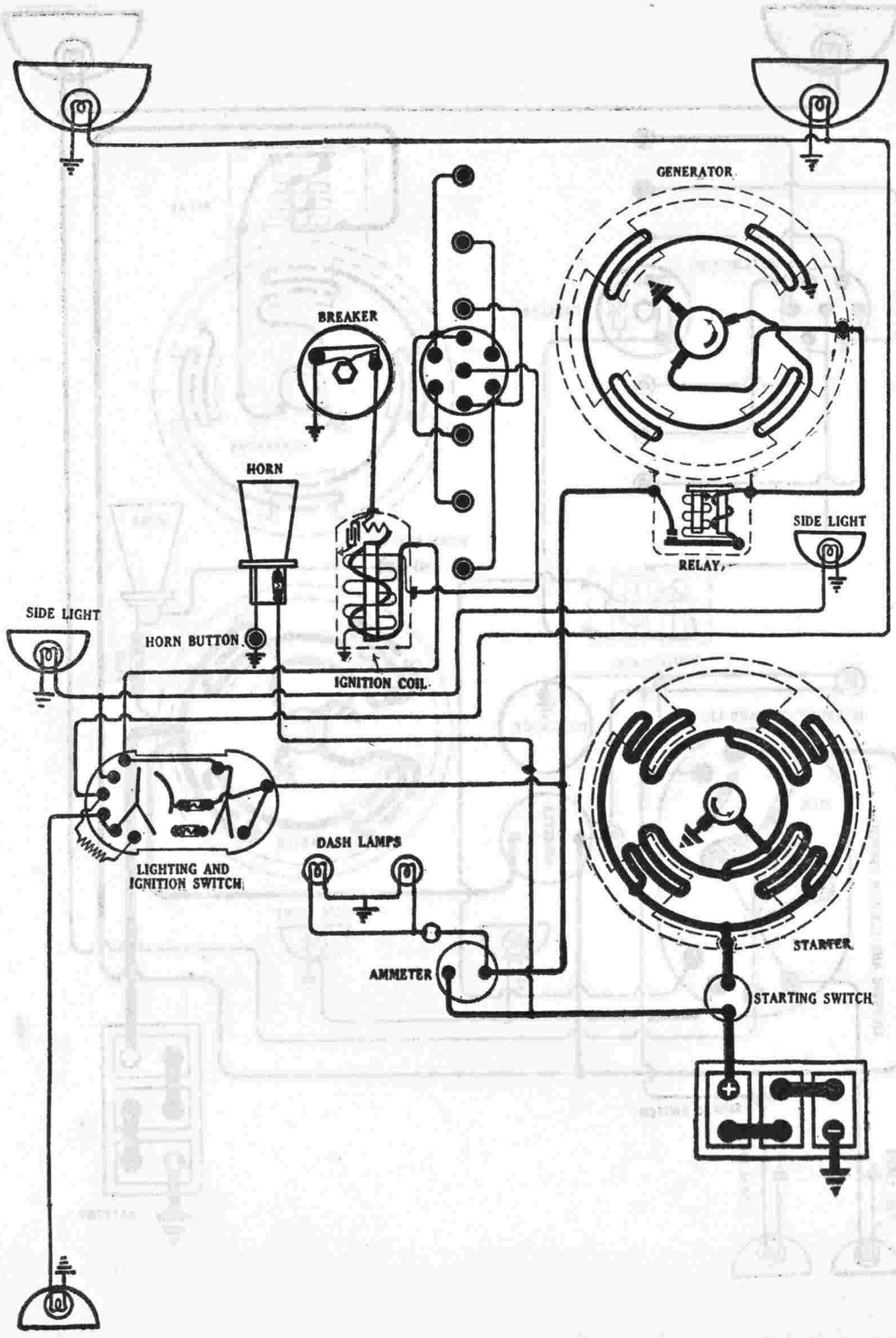
Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 6.5-7 volts and open with a discharge current of 0-2 amperes. Relay contacts separate .030 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING:—Switch Model S-108. Head lamps are 6-8 volt, 21 cp. S.C. Dash lamp is 6-8 volt, 3 cp. S.C. Tail lamp is 6-8 volt, 2 cp. S.C.

FUSES:—Generator field fuse is 7.5 amperes. Lighting fuses are 10 amperes.





RICKENBACKER

MODEL "A" (1922)

SIMM'S GENERATING, STARTING AND LIGHTING SYSTEM

AUTO LITE IGNITION—ATWATER KENT COIL

BATTERY.—Prest-O-Lite, Type 613-RHN, 6 volts, 108 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. N-7. Distributor Model No. IG4019. Breaker contacts separate .016 to .020 inch. When the condition of the contacts affects the ignition resurface them with worn No. 00 sandpaper. Remove all grit.

Oiling.—Fill the oil cup at the side of the distributor with a good grade of light machine oil (peferably 3 in 1) each 1000 miles. Put 1 drop of 3 in 1 oil on the breaker arm bearing each 3000 miles.

Timing.—Breaker contacts begin to separate when the mark "O" on the outer edge of the front flywheel is directly in the center, on top; number 1 piston entering the power stroke.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—The spark plug gaps are .022 to .025 inch.

STARTER.—Model T. The starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 150-175 R.P.M., taking 140 amperes.

Starter Test Data—Model T.

Torque	R.P.M.	Amperes
1.65 lb. ft.	1400	140
11 to 13 lb. ft.	Lock	500

The brush tension is 2½ to 3 pounds.

Oiling.—Put 3 or 4 drops of light engine oil in the commutator end oiler every 1000 miles.

GENERATOR.—Model R. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulaton is by the third brush system. The maximum charging rate is 12 amperes, reached at 1500 R.P.M. of the armature.

Generator Test Data.—Model R.

Hot Test			Cold Test	
Amperes	R.P.M.		Amperes	R.P.M.
0	600	Cuts in	0	560
10	1500		12	1500

The brush tension of all of the brushes is 1 to 2 pounds.

The charging rate is varied by adustment of the third brush setting. To increase the charging rate rotate the small knob which projects through the commutator end plate next to the center bearing in a clockwise direction. Rotating the knob in the opposite direction will decrease the charging rate.

Oiling.—Put 3 or 4 drops of light engine oil in each of the generator oilers every 1000 miles. Do not over oil the generator.

RELAY.—Briggs & Stratton, No. 1441. The relay is mounted on the generator frame. The relay closes when the voltage of the generator reaches 6.5 to 7.5 volts, and opens when there is a discharge current of 0 to 2 amperes. Relay contacts separate .015 to .025 inch. The air gap between the relay armature and coil core is .015 to .040, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into servce.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Fuses are 20 ampere.

SWITCH.—The combination switch is Briggs & Stratton, No. 2276.

RICKENBACKER

MODEL B (1923), C (1924), D (1925)
AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

BATTERY.—Prest-O-Lite, Type 613-RHN, 6 volts, 108 ampere-hour capacity. The starting capacity is 115 amperes for 20 minutes. The lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

BATTERY.—U. S. L., Type 3CVX-6X, 6 volt, 108 ampere-hour. The starting capacity is 115 amperes for 20 minutes. The lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model TC-30. Distributor Model T-6248. Breaker contacts separate .020 inch. If the condition of the contact points affects the ignition remove and resurface on a medium hard oilstone.

Oiling.—Fill oil cup on distributor housing every two weeks. Place a few drops of light engine oil on the interrupter lever every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles. Apply a very small amount of vaseline on breaker cam every 1000 miles.

Timing.—Breaker contacts just begin to separate when mark "0" on the front flywheel is directly in the center on top with piston No. 1 on compression stroke; spark control lever and breaker assembly in the fully retarded position. To set the timing see that the spark lever and breaker assembly are fully retarded, then loosen the screw in the center of the cam and turn cam until the contact points just begin to separate

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plugs.—Spark plug diameters are 7/8 inch, gaps are .022-.025 inch.

STARTER.—Model No. 933 CWDE. The direction of rotation is counter-clockwise looking at commutator end. The starter is connected to the engine by means of a manually operated shift equipped with an overrunning clutch. The starter cranks the engine at 150 R.P.M., taking 125-150 amperes at 6 volts. Brush tension is 2¾-3½ pounds.

Starter Test Data

Torque	R.P.M.	Volts	Amperes
0	2500	6	70
12	(0) Lock	4	500

Oiling.—Fill oil cups with light engine oil every month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles.

GENERATOR.—Model No. 1032. The direction of rotation is counter-clockwise looking at commutator end. The third brush system is employed for current regulation. To increase the out-put, loosen the hexagon nut inside of generator or third brush housing and move brush in counter-clockwise direction; to decrease charging rate, move in clockwise direction. Maximum charging rate is 15 amperes, reached at 1600 R.P.M. or 20 M.P.H., car speed in high gear.

Generator Test Data.

Cold Test. (20°C)			Hot Test. (85°C)		
0	6.5	600	0	6.4	600
5	6.75	700	7	7.	1000
10	7.2	1000	9	7.2	1300
12	7.4	1200	8-10	7.4	1650
14-15	7.5	1600	8.6	7.4	2400
11.5	7.4	2400			

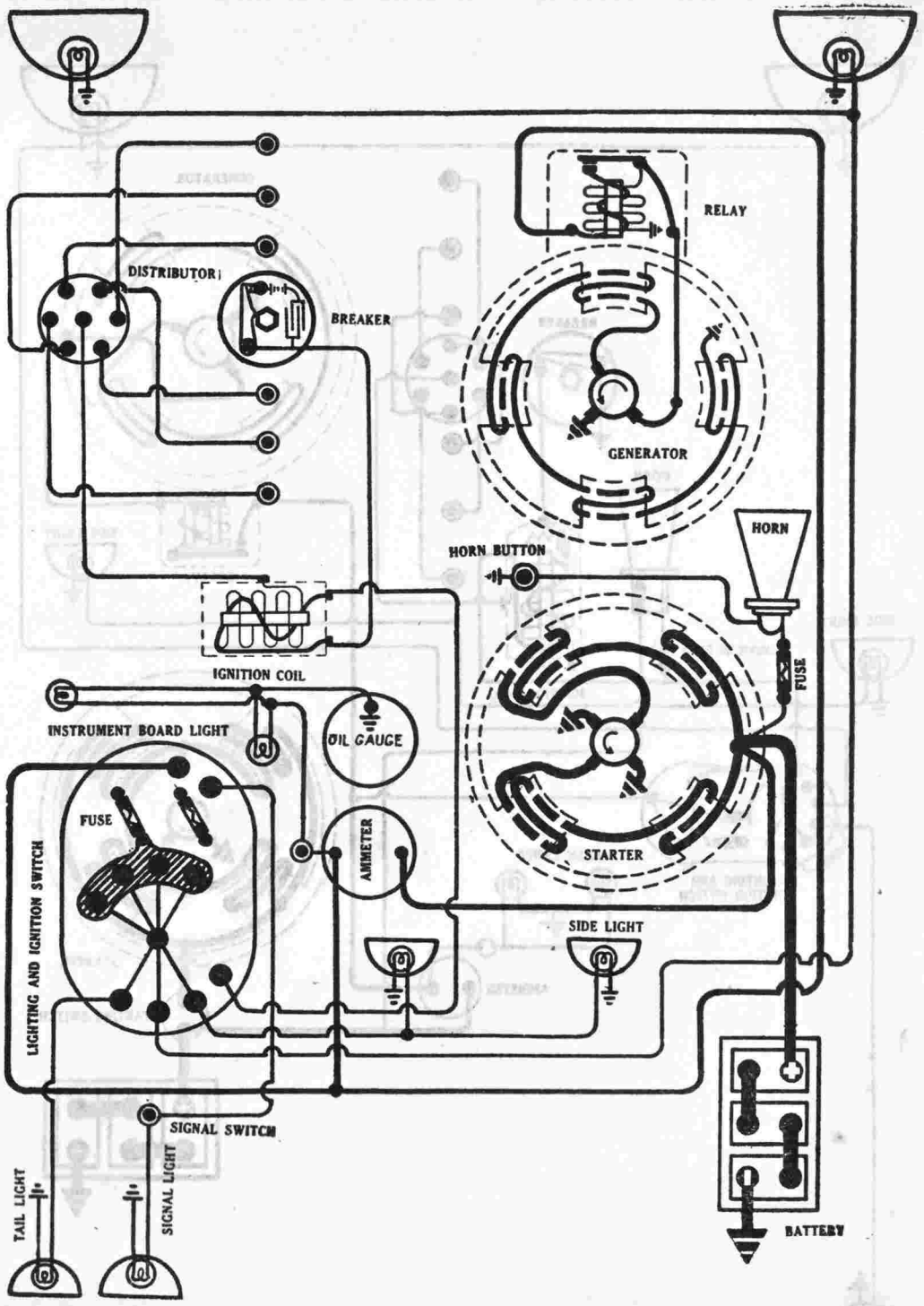
The brush tension should be 2¼ to 2¾ pounds each.

Oiling.—Fill oil cups with light engine oil every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

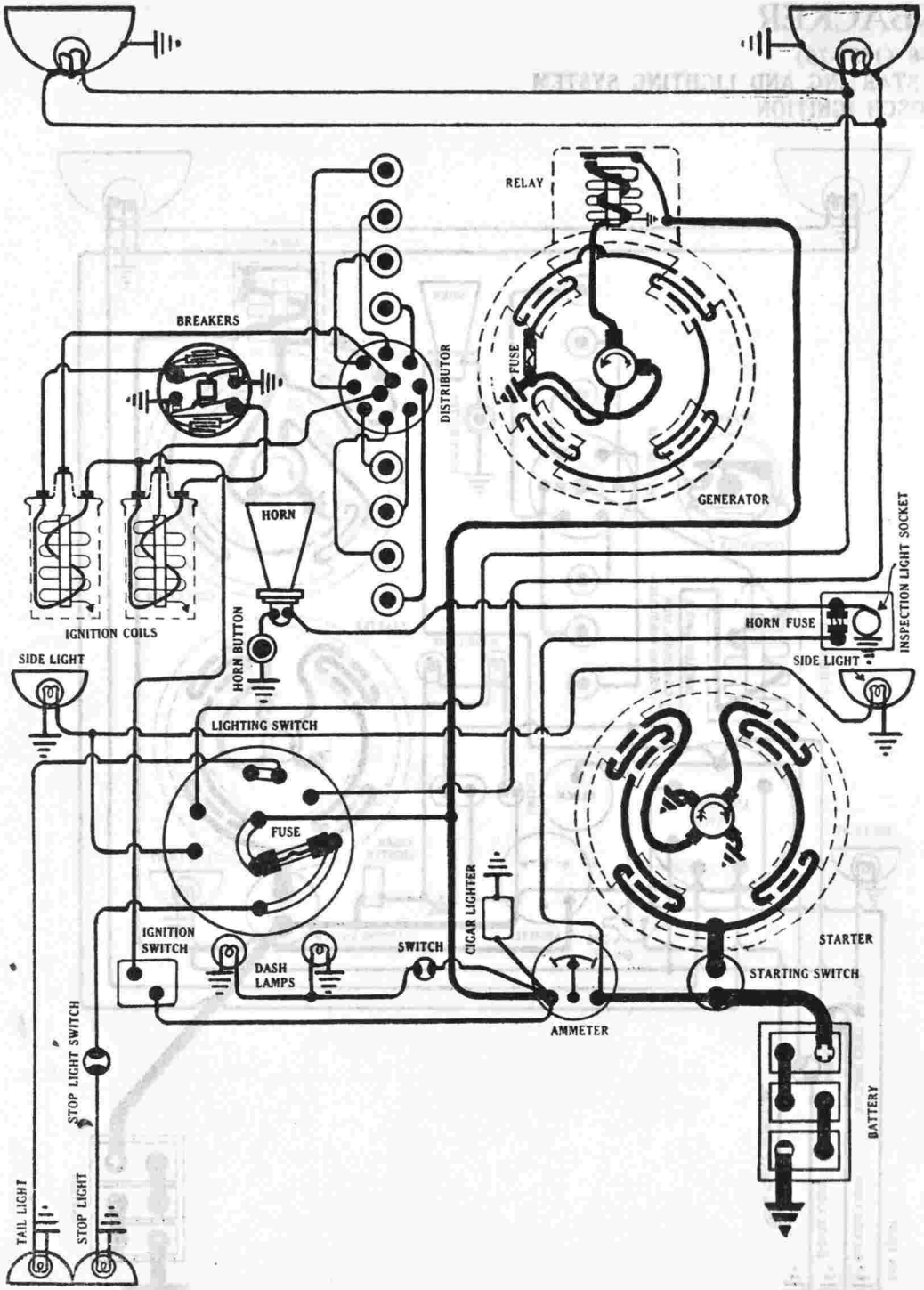
RELAY.—Model No. 1032-CWDE. Relay closes at 7.5 M.P.H. or 600 R.P.M. of armature at 6.5-7.0 volts and opens at 450 R.P.M. or 5-6 M.P.H. or 0-2 amperes discharge. The contact gap is .015-.020 inch .Air gap between relay armature and coil core is .010 inch.

LIGHTING.—Head lamps are 6-8 volt, double filament bulb, 21 and 2 cp. D.C. Dimmer lamps are 6-8 volt, 2 cp. Dash, tail and side lamps are each 6-8 volt, 2 cp. S.C. Stop light is 6-8 volt, 21 cp. S.C. Combination switch—Basco No. 2276.

FUSES.—Two 20 ampere fuses are used. Generator field fuse is 5 ampere.



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RICKENBACKER

MODEL A-8 (1924-25), SERIAL NOS. 25000 UP
AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

BATTERY:—U. S. L. Type 3-HVX-8X. 6 volt, 166 ampere hour. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. 2182. Distributor Model No. 5276. Breaker contacts sepa- Contacts arm spring tension should be 16-20 ounces.
fully retarded position. Manual advance is 25°. Automatic advance starts at 850 R.P.M. and reaches a maximum of 22° at 3600 R.P.M.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks, or each 500 miles if the car is driven more than 500 miles in two weeks. Put a small bit of medium heavy grease or vaseline on the surface of the breaker cam every 1000 miles.

Timing:—Breaker contacts begin to separate when piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position. Manual advance is 25°. Automatic advance starts at 850 R.P.M. and reaches a maximum of 22° at 3600 R.P.M.

Firing Order:—Firing Order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Model No. 947. Starter is connected to the engine through a manually operated pinion shift and overrunning clutch. The direction of rotation is clockwise, looking at the commutator end. Starter cranks the engine at 100 R.P.M. taking 120 amperes at 5.65 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	1800	6	60
—	120	5.4	120
15 "	Lock	4	550

Oiling:—Self-lubricating bearings are used. They require no attention.

GENERATOR:—Model No. 1055. Generator current regulation is by the third brush system. The direction of rotation is counter-clockwise, looking at the commutator end. To adjust the generator output, loosen the screws holding the inner generator end plate upon which the third brush is mounted and shift the third brush. Moving the brush in the direction of generator rotation (counter-clockwise) increases the output and in the opposite direction decreases the output. Tighten the screws after making the adjustement. The maxmimum charging rate is 12-14 amperes reached at 1600 R.P.M. of the generator armature or 30 M.P.H.
Generator shunt field draws 2 to 2.5 amperes at 6 volts.

Generator Data

Cold Test (20°C.)			Hot Test (85°C.)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	600	0	6.4	600
5	6.75	700	7	7	1000
10	7.2	1000	9	7.2	1300
12-14	7.5	1600	8-10	7.4	1650
11.5	7.4	2400	8.6	7.2	2400

Generator shunt field draws 2 to 2.5 amperes at 6 volts.

Oiling:—Put 4 or 5 drops of light engine oil in each generator oiler every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Relay contacts close at approximately 500 R.P.M. of the generator armature with a generator voltage of 6.5 to 7.5 volts and open at 450 R.P.M. or 5

LIGHTING:—Head lamps are 6-8 volt, 21 and 2 cp. D.C. (Double filament). Stop lamp is 6-8 volt, 21 cp. S.C. Dash, dome, side and tail lamps are 6-8 volt, 2 cp. S.C.

FUSES:—Generator field fuse is 5 ampere. Lighting fuse is 20 ampere.

RICKENBACKER

MODEL E-6 (1925-26)

AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM

AMERICAN BOSCH IGNITION

BATTERY.—Willard, Type CW-15. 6 volt, 105 ampere hour. Starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model TC-30. Distributor Model T-6294. Breaker contacts separate .020 inch. They are made of tungsten. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Place a small bit of vaseline on the face of the breaker cam under the fiber bumper and put one drop of oil on the interrupter arm pivot pin every month.

Timing.—Breaker contacts begin to separate when mark "0" on front flywheel is directly in the center on top with piston No. 1 on compression stroke. The spark control lever and breaker assembly should be in the fully retarded position. To set timing, crank engine until piston No. 1 reaches this position. Then loosen screw in center of breaker cam and rotate cam until contacts begin to separate. Then tighten the screw.

Firing Order.—The firing order is 1-4-2-6-3-5.

Spark Plugs.—Spark plugs are S. A. E. Standard 7/8-18. Gaps are .025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter is 1 11/16 inches; stem diameter is .373 inch; stem length is 5 23/64 inches. Tappet clearance is .008 inch. Spring pressure is 61 pounds. Inlet valves open at top dead center and close 50 degrees after lower dead center.

EXHAUST VALVES:—Head diameter is 1 11/16 inches; stem diameter is 3/8 inch; stem length is 5 23/64 inches. Tappet clearance is .008 inch. Spring pressure is 61 pounds. Exhaust valves open at 45 degrees before lower dead center and close 5 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

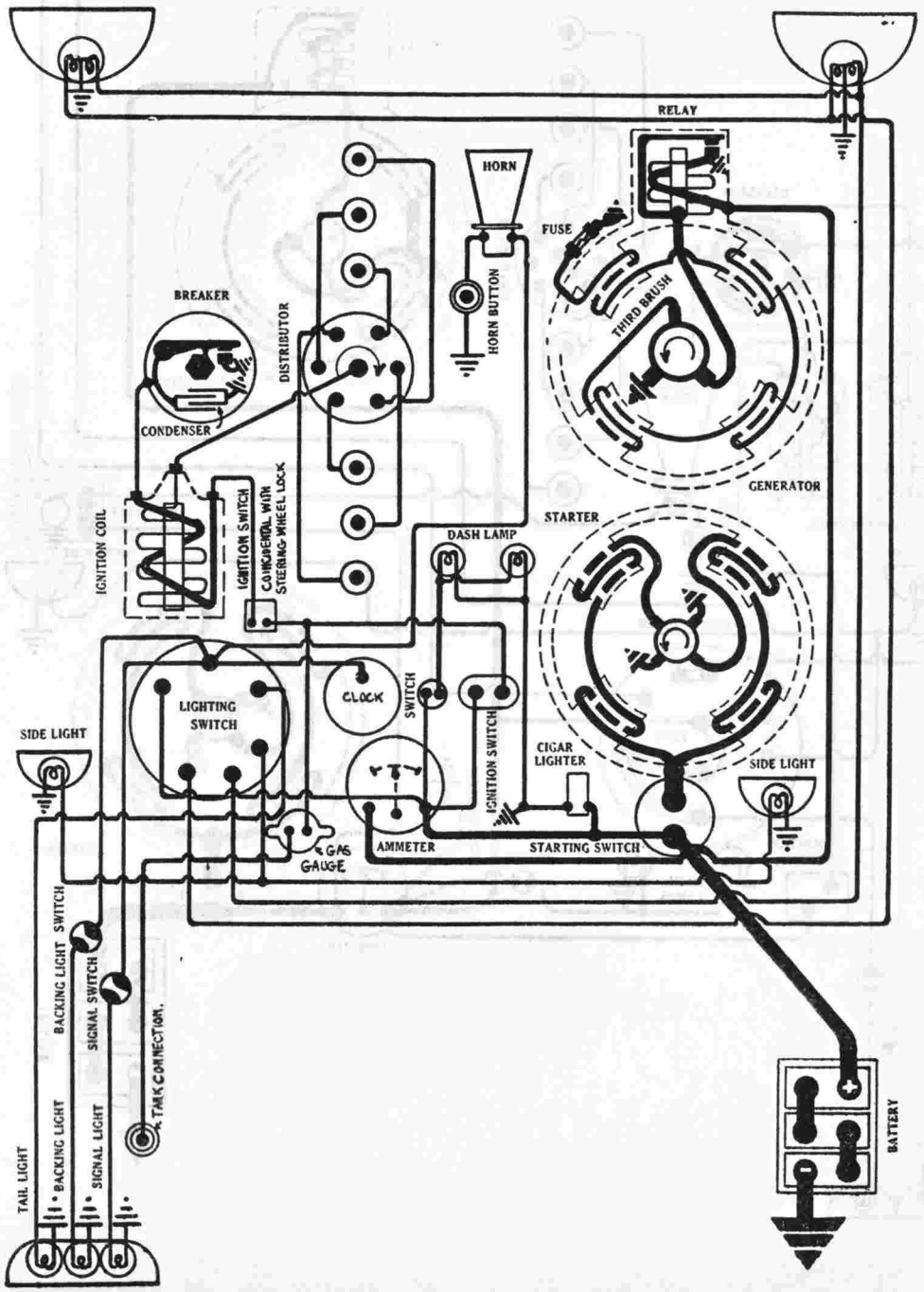
STARTER.—Model No. 966. Starter is connected to the engine through a manually operated pinion shift. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 150 R.P.M., taking 150 amperes at 6 volts. Starter brush tension is 1¾-2 pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	6	50
15 "	Lock	4	500

Oiling.—Starter bearings are oilless. They require no attention.

GENERATOR.—Model No. 1066. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the generator output, insert a special Bosch key in the hole on the generator end plate and shift the third brush by turning the key. The third brush may be shifted by hand by removing the commutator cover band. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The maximum charging rate is 12-14 amperes, reached at 1600-1800 R.P.M. or 20 M.P.H.



RICKENBACKER

MODEL E-6 (1925-26)

AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	600	0	6.4	600
5	6.75	700	7	7	1000
10	7.2	1000	9	7.2	1300
14	7.5	1600	10	7.4	1650
11.5	7.4	2400	8.6	7.2	2400

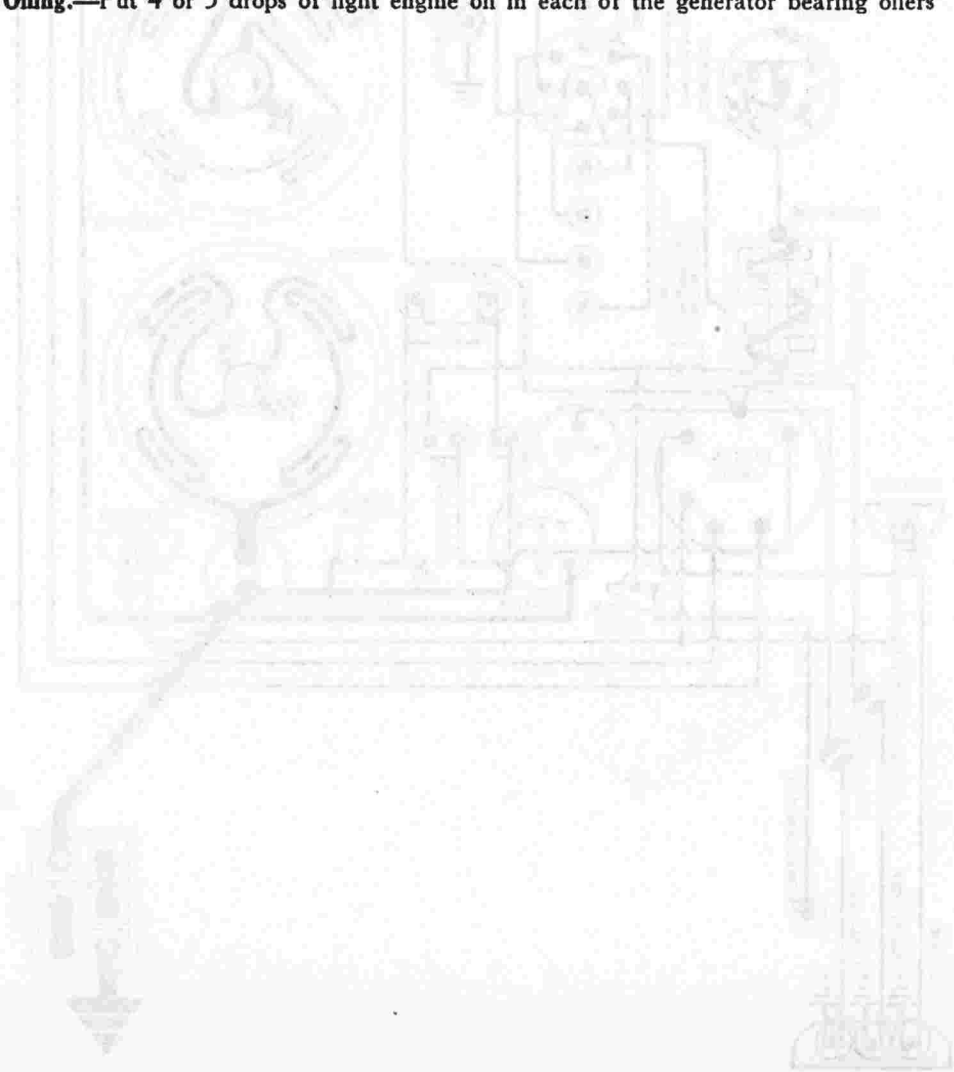
Motoring freely, generator draws 6 amperes at 6 volts. Shunt field current is 3.2 amperes with a terminal voltage of 6 volts.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY.—Relay is mounted on top of the generator. Relay contacts close at approximately 600 R.P.M. of the generator when the voltage reaches 6.5-7.5 volts and open at 450 R.P.M with a discharge current of 1-3 amperes. Relay contacts separate .015 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING.—Briggs and Stratton Switch. Head lamps are 6-8 volt, 21 cp., double filament, using the second 21 cp. filament for dimming. Stop and backing lamps are each 6-8 volt, 15 cp. Dash, tail, side, dome and corner lamps are each 6-8 volt, 2 cp.

FUSES.—Generator field fuse is 5 amperes. Lighting fuse is 20 amperes.



RICKENBACKER

MODEL B-8 (1925-26), SERIAL NOS. 27001 UP
AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type CWR-19. 6 volt, 135 ampere hour. Starting capacity is 145 amperes for 20 minutes. Lighting capacity is 5 amperes for 27 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2190. Distributor Model No. 5292. Breaker contacts separate .020 to .0275 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone. The breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Manual advance is 25°. Automatic advance begins at 850 R.P.M. and reaches a maximum of 25° at 3600 R.P.M. Distributor uses two sets of contacts operating on a single cam. Breaker arms are set at an angle of 45° and open alternately.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks, or each 500 miles if the car is driven more than 500 miles in two weeks. Put a small bit of medium heavy grease or vaseline on the surface of the breaker cam every 1000 miles.

Timing:—Breaker contacts begin to separate when piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position. Set timing when piston No. 1 reaches this position. Then check position of rotor to make certain that short segment of rotor button is under segment in distributor head connected to spark plug in cylinder No. 1. Loosen the screw in the center of the breaker cam and rotate cam until breaker contacts begin to separate. Then tighten the screw. Check opening of other set of contacts by rotating distributor shaft exactly 45° using a scale to check rotation and shifting breaker mounting plate until contacts open at the proper instant. They may also be checked by cranking engine over 90° from firing position of No. 1 cylinder when piston No. 6 will reach top dead center entering power stroke. The second set of contacts should open at this point.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:— Spark plug diameters are 7/8 inch. Gaps are .025 inch

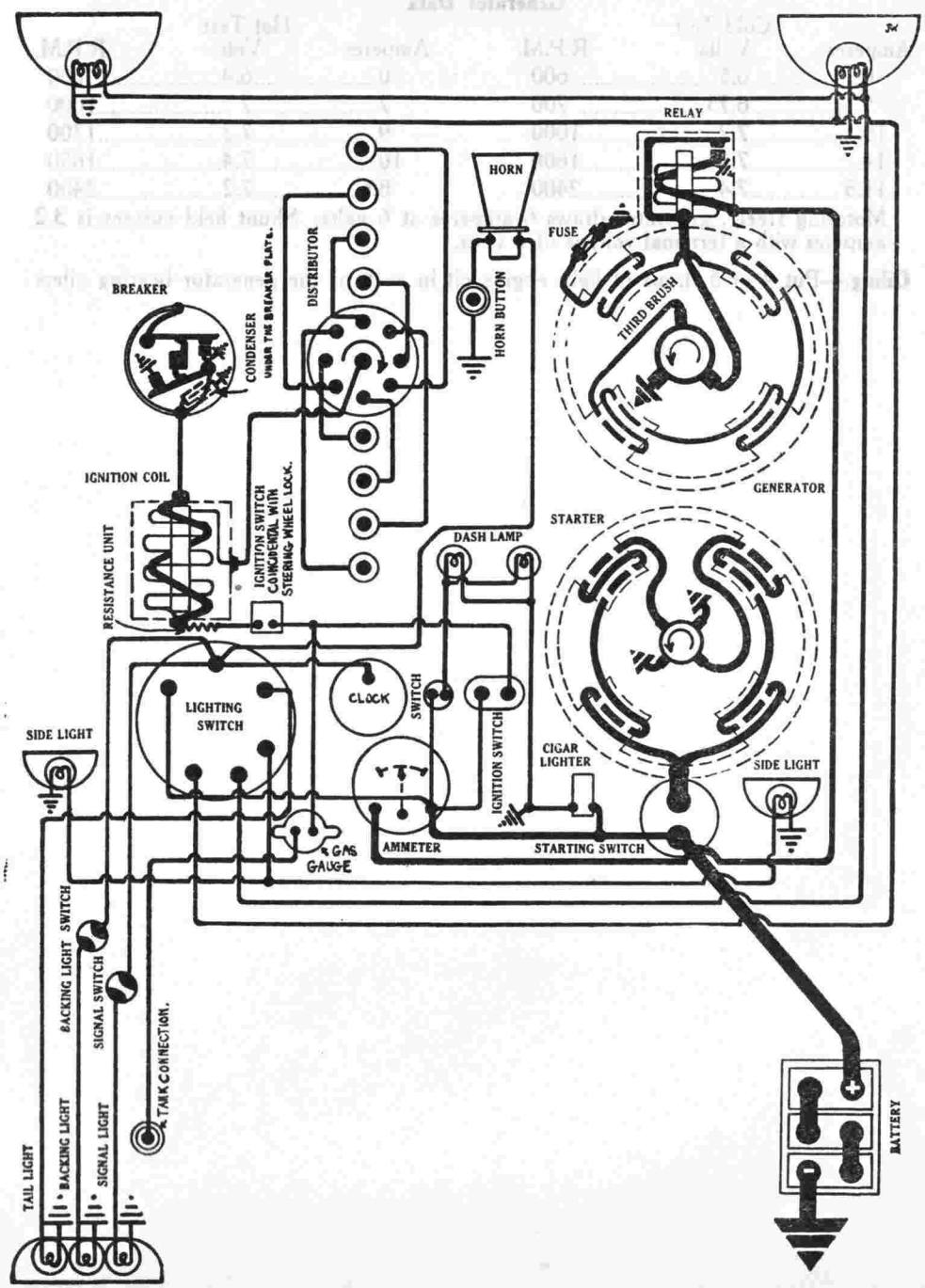
STARTER.—Model No. 957. Starter is connected to the engine through a manually operated pinion shift and overrunning clutch. The direction of rotation is clockwise, looking at the commutator end. Starter cranks the engine at 100 R.P.M. taking 120 amperes at 5.65 volts.

Starter Data

Torque	R.P.M.	Volts.	Amperes.
0 lb. ft.	1800	6	60
.....	120	5.4	120
Lock.	0	5	550

Oiling:—Self-lubricating bearings are used. They require no attention.

GENERATOR.—Model 1066. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, insert the special Bosch key in the hole on the generator end plate and shift the third brush by turning the key. The third brush may be moved by hand by removing the commutator cover band. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The maximum charging rate is 12-14 amperes reached at 1600-1800 R.P.M. of the generator or approximately 30 M.P.H.



RICKENBACKER

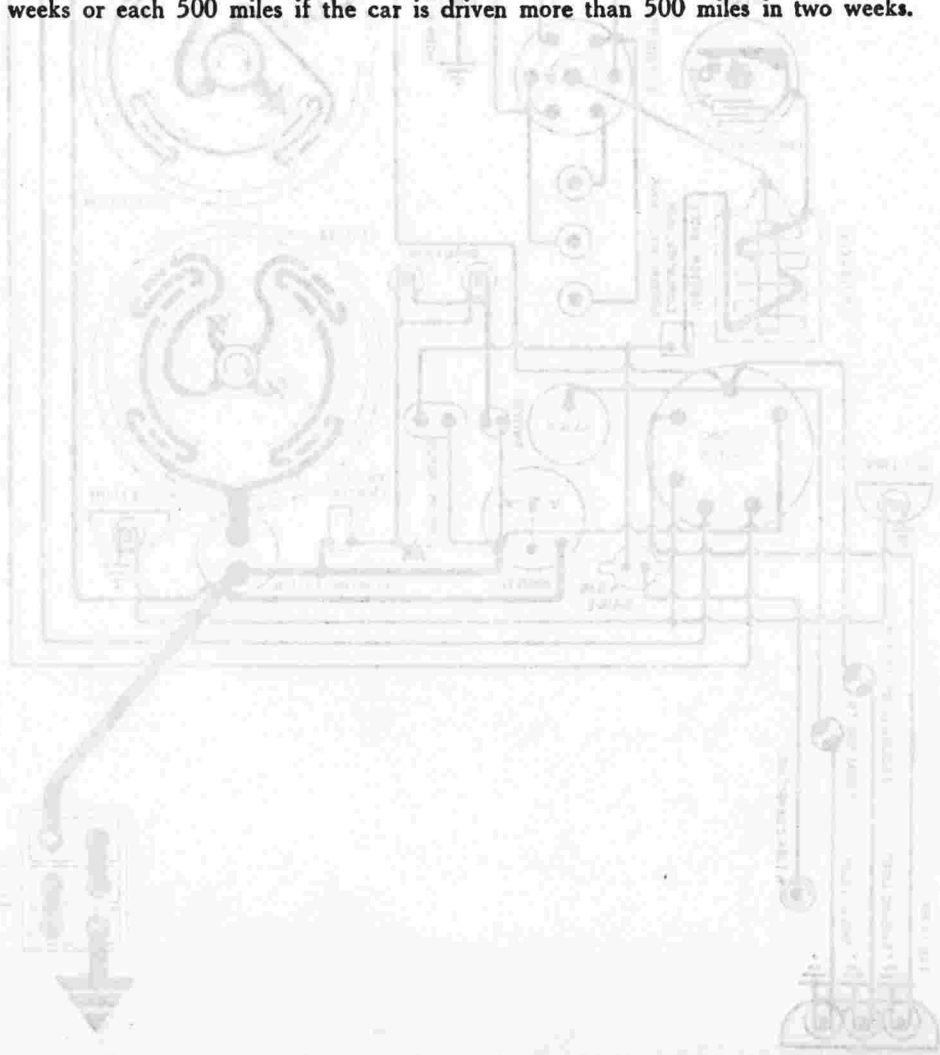
MODEL B-8 (1925-26) SERIAL NOS. 27,001 UP
AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

Generator Data.

Cold Test. (20°C)			Hot Test (85°C)		
Amperes.	Volts.	R.P.M.	Amperes.	Volts.	R.P.M.
0	6.5	600	0	6.4	600
5	6.75	700	7	7.	1000
10	7.2	1000	9	7.2	1300
12-14	7.5	1600	8-10	7.4	1650
11.5	7.4	2400	8.6	7.2	2400

Motoring freely, the generator draws 6 amperes at 6 volts. Shunt field current is 3.2 amperes with a terminal voltage of 6 volts.

Oiling:—Put 4 or 5 drops of light engine oil in each generator oiler every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.



RELAY.—Relay contacts close at approximately 600 R.P.M. of the generator armature with a generator voltage of 6.5-7.5 volts and open at 550 R.P.M. or 5 to 6 M.P.H. with a discharge current of 0 to 2 amperes. Relay contacts separate .015 to .020 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING.—Briggs and Stratton Switch. Head lamps are 6-8 volt, 21 cp. Double filament using second 21 cp. filament for dimming. Stop and backing lamps are each 6-8 volt, 15 cp. Side lamps are 6-8 volt, 3 cp. Dash, tail, dome and tonneau lamps are each 6-8 volt, 2 cp.

FUSES:—Generator field is 5 ampere. Lighting fuse is 20 ampere.

RICKENBACKER

MODEL 6-70 (1927)

AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH IGNITION

BATTERY:—Willard, Type CW-15, 6 volt, 105 ampere hour. Starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model TC-30. Distributor Model T-6294. Breaker contacts separate .020 inch. They are made of tungsten. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Place a small bit of vaseline on the face of the breaker cam under the fiber bumper and put one drop of oil on the interrupter arm pivot pin every month.

Timing:—Breaker contacts begin to separate when mark "O" on front flywheel is directly in the center on top with piston No. 1 on compression stroke. The spark control lever and breaker assembly should be in the fully retarded position. To set timing, crank engine until piston No. 1 reaches this position. Then loosen screw in center of breaker cam and rotate cam until contacts begin to separate. Then tighten the screw.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plugs are S.A.E. Standard 7/8-18. Gaps are .025 inch.

Valve Timing:—INLET VALVES:—Head diameter, 1 5/8 inches; stem diameter, .373-.372 inch; stem length, 5 5/16 inches; tappet clearance, .008 inch; spring pressure, 61 pounds; valve lift, 5/16 inch; intake opens at top dead center and closes at 50° past lower dead center.

EXHAUST VAVLES:—Head diameter, 1 5/8 inches; stem diameter, .3725-.3715 inch; stem length, 5 5/16 inches; tappet clearance, .008 inch; spring pressure, 61 pounds; valve lift, 5/16 inch; exhaust opens at 45° before lower dead center and closes at 5° past top dead center. The guide stems are removable. No oversize valve stems are made. A variance of .020 inch is allowed in stem length.

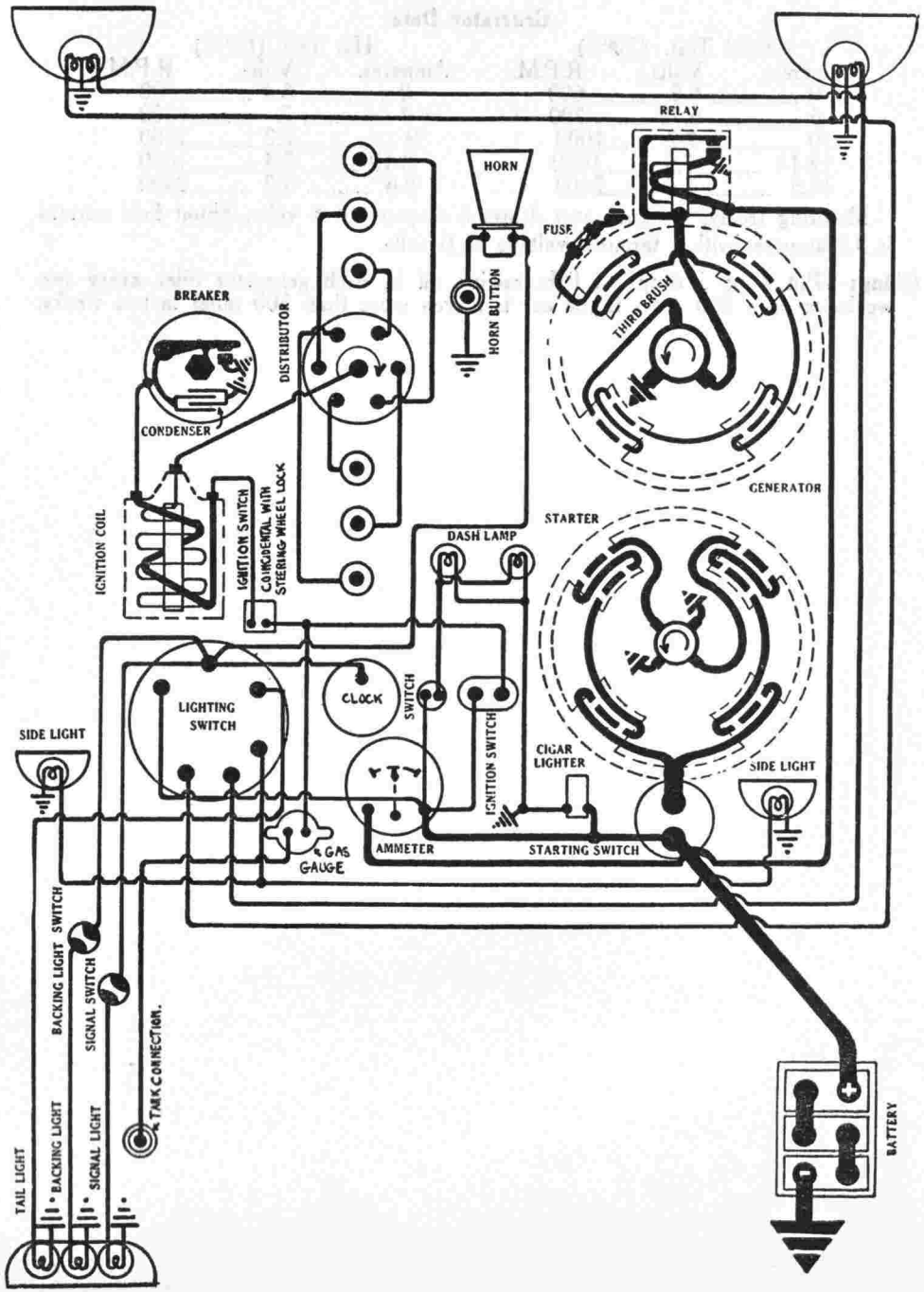
STARTER:—Model No. 966. Starter is connected to the engine through a manually operated pinion shift. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 150 R.P.M., taking 150 amperes at 6 volts. Starter brush tension is 1 3/4-2 pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	6	50
15 "	Lock	4	500

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model No. 1066. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the generator output, insert a special Bosch key in the hole on the generator end plate and shift the third brush by turning the key. The third brush may be shifted by hand by removing the commutator cover band. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The maximum charging rate is 12-14 amperes, reached at 1600-1800 R.P.M. or 20 M.P.H.



RICKENBACKER

MODEL 6-70 (1927)

AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM

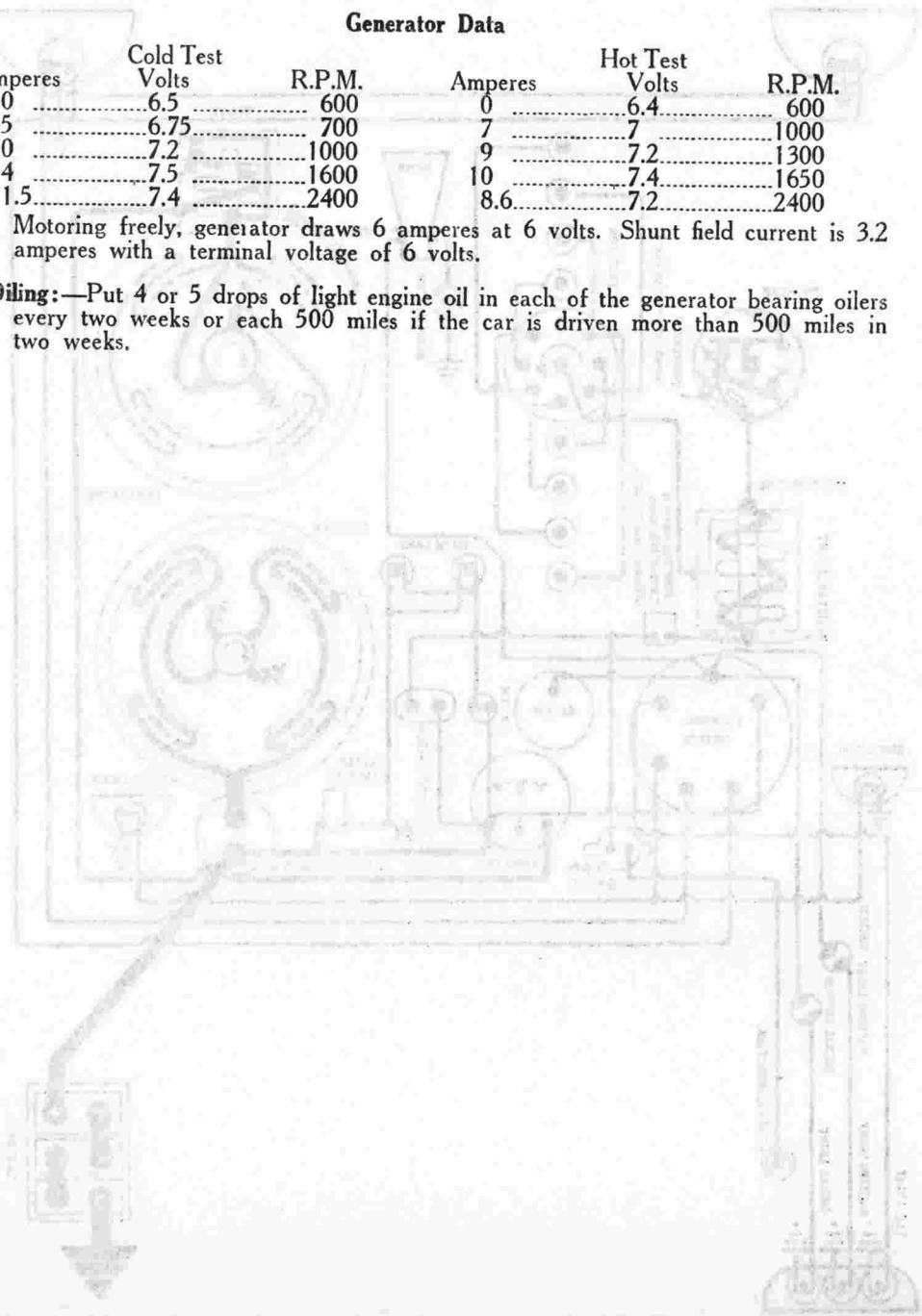
AMERICAN BOSCH IGNITION

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	600	0	6.4	600
5	6.75	700	7	7	1000
10	7.2	1000	9	7.2	1300
14	7.5	1600	10	7.4	1650
11.5	7.4	2400	8.6	7.2	2400

Motoring freely, generator draws 6 amperes at 6 volts. Shunt field current is 3.2 amperes with a terminal voltage of 6 volts.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.



RELAY:—Relay is mounted on top of the generator. Relay contacts close at approximately 600 R.P.M. of the generator when the voltage reaches 6.5-7.5 volts and open at 450 R.P.M. with a discharge current of 1-3 amperes. Relay contacts separate .015 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING:—Briggs and Stratton Switch. Head lamps are 6-8 volt, 21 cp. double filament, using the second 21 cp. filament for dimming. Stop and backing lamps are each 6-8 volt, 15 cp. Dash, tail, side, dome and corner lamps are each 6-8 volt, 2 cp.

Instrument Panel:—National Gauge and Equipment Co. instrument unit panel is used which is arranged to carry the ammeter, oil pressure gauge, electric gasoline gauge, dash lamps and speedometer.

FUSES:—Generator field fuse is 5 amperes. Lighting fuse is 20 amperes.

RICKENBACKER

MODEL 8-80 (1927)

AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—Willard, Type CW-15, 6 volt, 105 ampere hour. Starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. 2190. Distributor Model No. 5292. Breaker contacts separate .020 to .0275 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone. The breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Manual advance is 25°. Automatic advance begins at 850 R.P.M. and reaches a maximum of 25° at 3600 R.P.M. Distributor uses two sets of contacts operating on a single cam. Breaker arms are set at an angle of 45° and open alternately.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks, or each 500 miles if the car is driven more than 500 miles in two weeks. Put a small bit of medium heavy grease or vaseline on the surface of the breaker cam every 1000 miles.

Timing:—Breaker contacts begin to separate when piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position. Set timing when piston No. 1 reaches this position. Then check position of rotor to make certain that short segment of rotor button is under segment in distributor head connected to spark plug in cylinder No. 1. Loosen the screw in the center of the breaker cam and rotate cam until breaker contacts begin to separate. Then tighten the screw. Check opening of other set of contacts by rotating distributor shaft exactly 45°, using a scale to check rotation and shifting breaker mounting plate until contacts open at the proper instant. They may also be checked by cranking engine over 90° from firing position of No. 1 cylinder when piston No. 6 will reach top dead center entering power stroke. The second set of contacts should open at this point.

Valve Timing:—INLET VALVES:—Head diameter, 1⅝ inches; stem diameter, .373-.372 inch; stem length, 5 5/16 inches; tappet clearance, .008 inch; spring pressure, 61 pounds; valve lift, 5/16 inch; intake opens at top dead center and closes at 50° past lower dead center.
EXHAUST VALVES:—Head diameter, 1⅝ inches; stem diameter, .3725-.3715 inch; stem length, 5 5/16 inches; tappet clearance, .008 inch; spring pressure, 61 pounds; valve lift, 5/16 inch; exhaust opens at 45° before lower dead center and closes at 5° past top dead center. The guide stems are removable. No oversize valve stems are made. A variance of .020 inch is allowed in stem length.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

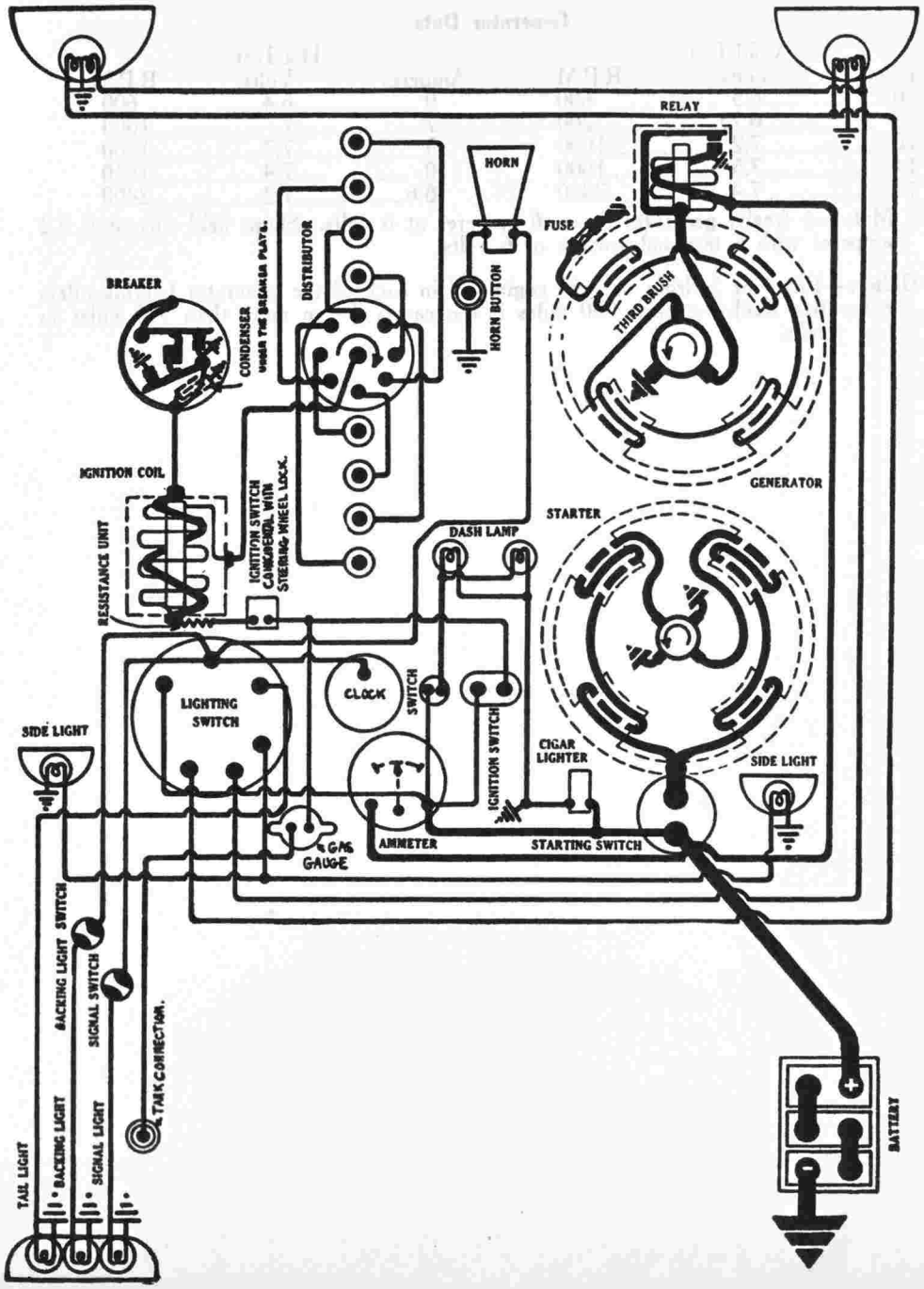
STARTER:—Model No. 966. Starter is connected to the engine through a manually operated pinion shift. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 150 R.P.M., taking 150 amperes at 6 volts. Starter brush tension is 1¾-2 pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	6	50
15 "	Lock	4	500

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model 1066. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, insert the special Bosch key in the hole on the



RICKENBACKER

MODEL 8-80 (1927)

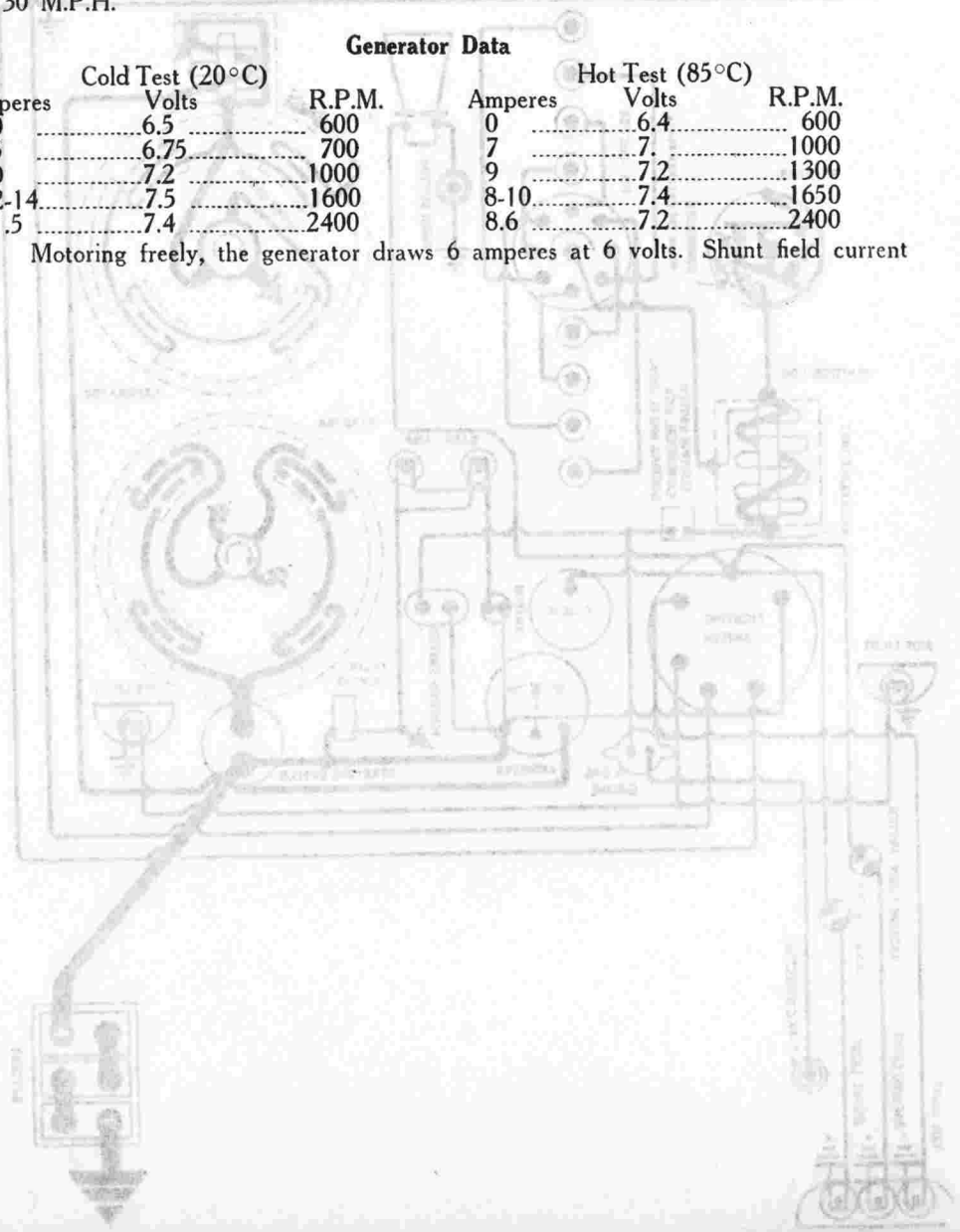
AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

generator end plate and shift the third brush by turning the key. The third brush may be moved by hand by removing the commutator cover band. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The maximum charging rate is 12-14 amperes reached at 1600-1800 R.P.M. of the generator or approximately 30 M.P.H.

Generator Data

Cold Test (20°C)			Hot Test (85°C)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	600	0	6.4	600
5	6.75	700	7	7.	1000
10	7.2	1000	9	7.2	1300
12-14	7.5	1600	8-10	7.4	1650
11.5	7.4	2400	8.6	7.2	2400

Motoring freely, the generator draws 6 amperes at 6 volts. Shunt field current is 3.2 amperes with a terminal voltage of 6 volts.



Oiling:—Put 4 or 5 drops of light engine oil in each generator oiler every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Relay contacts close at approximately 600 R.P.M. of the generator armature with a generator voltage of 6.5-7.5 volts and open at 550 R.P.M. or 5 to 6 M.P.H. with a discharge current of 0 to 2 amperes. Relay contacts separate .015 to .020 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING:—Briggs and Stratton Switch. Head lamps are 6-8 volt, 21 cp. Double filament using second 21 cp. filament for dimming. Stop and backing lamps are each 6-8 volt, 15 cp. Side lamps are 6-8 volt, 3 cp. Dash, tail, dome and tonneau lamps are each 6-8 volt, 2 cp.

FUSES:—Generator field fuse is 5 ampere. Lighting fuse is 20 ampere.

RICKENBACKER

MODEL 8-90 (1927)

AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type CWR-19, 6 volt, 135 ampere hour. Starting capacity is 145 amperes for 20 minutes. Lighting capacity is 5 amperes for 27 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. 2190. Distributor Model No. 5292. Breaker contacts separate .020 to .0275 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone. The breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Manual advance is 25°. Automatic advance begins at 850 R.P.M. and reaches a maximum of 25° at 3600 R.P.M. Distributor uses two sets of contacts operating on a single cam. Breaker arms are set at an angle of 45° and open alternately.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every two weeks, or each 500 miles if the car is driven more than 500 miles in two weeks. Put a small bit of medium heavy grease or vaseline on the surface of the breaker cam every 1000 miles.

Timing:—Breaker contacts begin to separate when piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position. Set timing when piston No. 1 reaches this position. Then check position of rotor to make certain that short segment of rotor button is under segment in distributor head connected to spark plug in cylinder No. 1. Loosen the screw in the center of the breaker cam and rotate cam until breaker contacts begin to separate. Then tighten the screw. Check opening of other set of contacts by rotating distributor shaft exactly 45°, using a scale to check rotation and shifting breaker mounting plate until contacts open at the proper instant. They may also be checked by cranking engine over 90° from firing position of No. 1 cylinder when piston No. 6 will reach top dead center entering power stroke. The second set of contacts should open at this point.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

Valve Timing:—INLET VALVES:—Head diameter, 1 5/8 inches; stem diameter, .373-.372 inch; stem length, 5 5/16 inches; tappet clearance, .008 inch; spring pressure, 61 pounds; valve lift, 5/16 inch; intake opens at top dead center and closes at 50° past lower dead center.

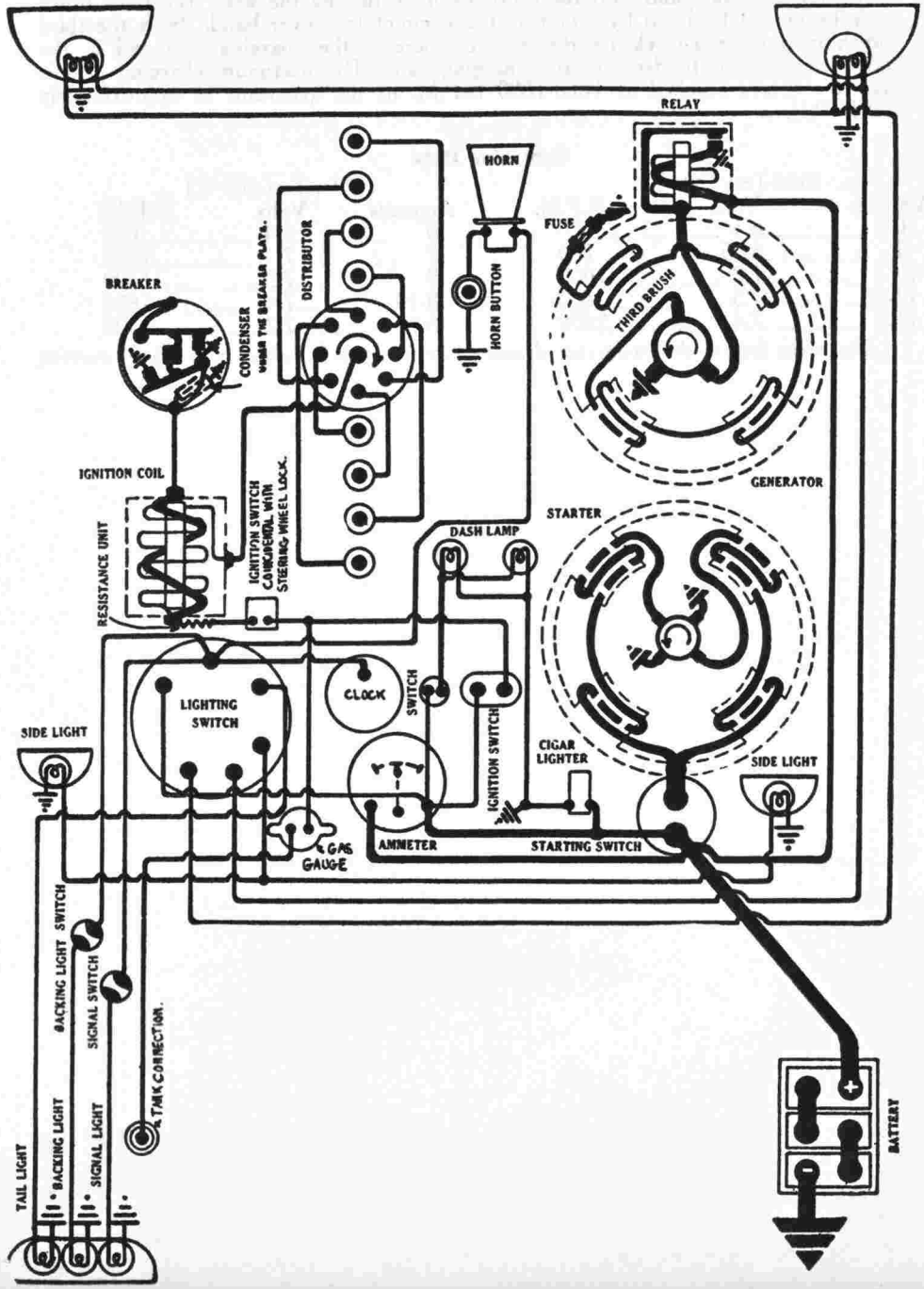
EXHAUST VALVES:—Head diameter, 1 5/8 inches; stem diameter, .3725-.3715 inch; stem length, 5 5/16 inches; tappet clearance, .008 inch; spring pressure, 61 pounds; valve lift, 5/16 inch; exhaust opens at 45° before lower dead center and closes at 5° past top dead center. The guide stems are removable. No oversize valve stems are made. A variance of .020 inch is allowed in stem length.

STARTER:—Model No. 957. Starter is connected to the engine through a manually operated pinion shift and overrunning clutch. The direction of rotation is clockwise, looking at the commutator end. Starter cranks the engine at 100 R.P.M. taking 120 amperes at 5.65 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	1800	6	60
.....	120	5.4	120
Lock	0	5	550

Oiling:—Self-lubricating bearings are used. The require no attention.



RICKENBACKER

MODEL 8-90 (1927)

AMERICAN BOSCH GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

GENERATOR:—Model 1066. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, insert the special Bosch key in the hole on the generator end plate and shift the third brush by turning the key. The third brush may be moved by hand by removing the commutator cover band. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The maximum charging rate is 12-14 amperes reached at 1600-1800 R.P.M. of the generator or approximately 30 M.P.H.

Generator Data

Cold Test (20°C)			Hot Test (85°C)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	600	0	6.4	600
5	6.75	700	7	7.	1000
10	7.2	1000	9	7.2	1300
12-14	7.5	1600	8-10	7.4	1650
11.5	7.4	2400	8.6	7.2	2400

Motoring freely, the generator draws 6 amperes at 6 volts. Shunt field current is 3.2 amperes with a terminal voltage of 6 volts.

Oiling:—Put 4 or 5 drops of light engine oil in each generator oiler every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Relay contacts close at approximately 600 R.P.M. of the generator armature with a generator voltage of 6.5-7.5 volts and open at 550 R.P.M. or 5 to 6 M.P.H. with a discharge current of 0 to 2 amperes. Relay contacts separate .015 to .020 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING:—Briggs and Stratton Switch. Head lamps are 6-8 volt, 21 cp. Double filament using second 21 cp. filament for dimming. Stop and backing lamps are each 6-8 volt, 15 cp. Side lamps are 6-8 volt, 3 cp. Dash, tail, dome and tonneau lamps are each 6-8 volt, 2 cp.

FUSES:—Generator field fuse is 5 ampere. Lighting fuse is 20 ampere.

ROAMER

1916-1917 (SERIAL NOS. 1 TO 14004)
BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour. The two-wire system is used on cars No. 1 to 13,125, inclusive. The negative (—) terminal is grounded at the starting switch on all cars after No. 13126.

IGNITION.—D U-6. Breaker contacts separate .014 to .016 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 3 or 4 drops of light machine oil in each of magneto oilers every month. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .018 to .022 inch.

STARTER.—Starter is connected to the engine through a pinion shifted by the operator on the 1916, Model 25, cars with Rutenber engine, and through a Bendix drive on all other models.

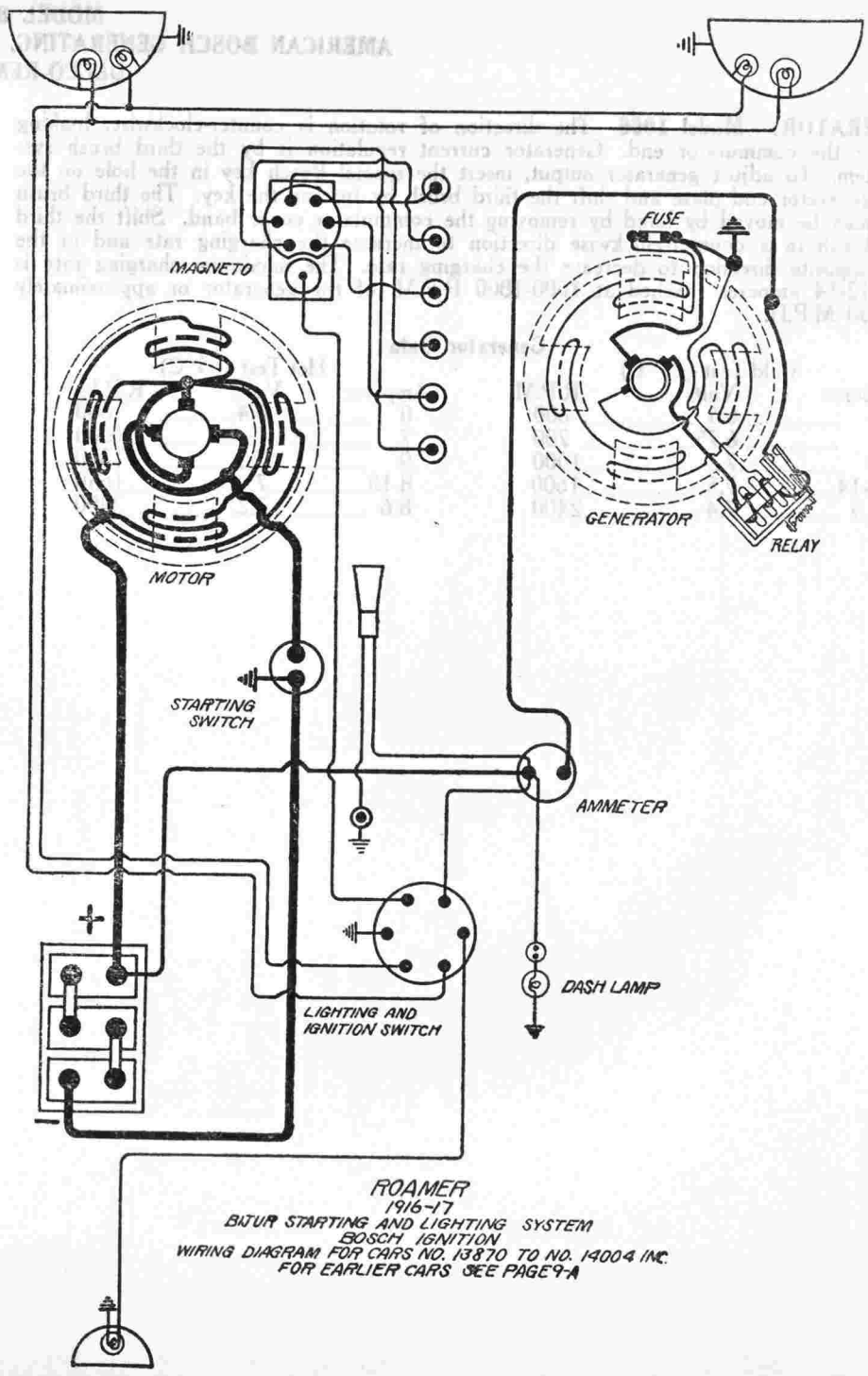
OILING.—Put 4 or 5 drops of light engine oil in each of the starter oilers every month. On cars using manual shift, lubricate the sliding surfaces at the same time.

GENERATOR.—Type L-61. Generator current regulation is by third brush system. Maximum generator output is 12-16 amperes, reached at 20-25 miles per hour, or 1400-1600 R.P.M. of armature. Output is varied by shifting third brush. Third brush is secured to generator by two stud bolts, the nuts of which appear in a recess in the front head of generator. Loosen these nuts with a socket wrench and shift the brush by gently tapping the shank of the wrench. Shifting brush in the direction of armature rotation will increase the output. Shifting brush in the opposite direction will decrease the output. Shifting the brush 1/16 inch will vary the output 2 or 3 amperes. Tighten nuts after adjusting brush. Brush adjustment is made to give the desired rate with generator hot and carrying a 3 cell battery with solution of 1.250 or higher. There is a 20 ampere fuse in the small aluminum cap on generator housing to protect generator windings, should excessively high resistance occur in the charging circuit.

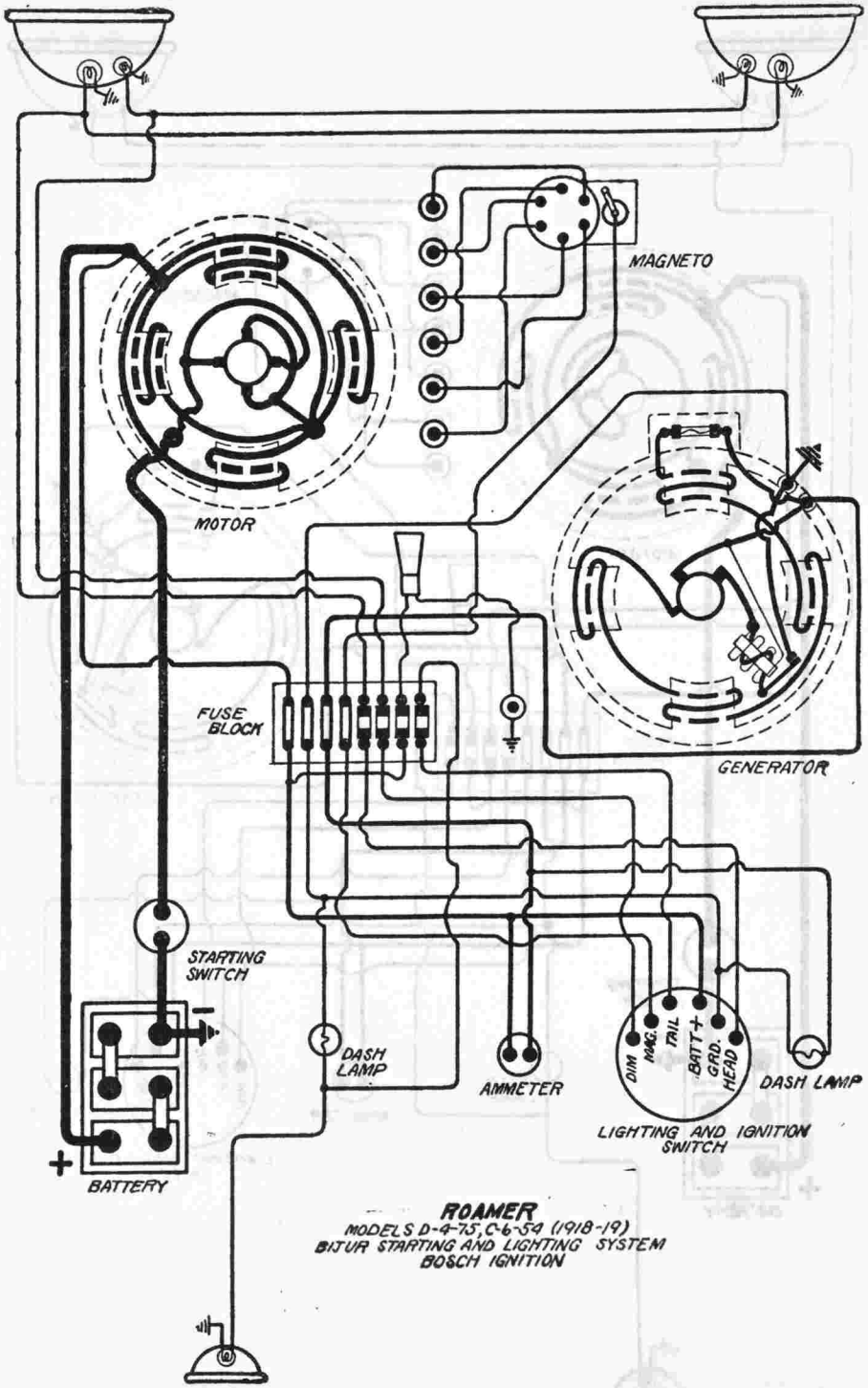
OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Relay closes at 10-12 miles per hour, or 500-600 R.P.M. of armature, and opens at 8-10 miles per hour, or 450-500 R.P.M. of armature. The charging current is 1 to 3 amperes at closing, and the discharge current 0 to 1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.



ROAMER
1916-17
BIJUR STARTING AND LIGHTING SYSTEM
BOSCH IGNITION
WIRING DIAGRAM FOR CARS NO. 13870 TO NO. 14004 INC.
FOR EARLIER CARS SEE PAGE 9-A



ROAMER

MODELS D-4-74 AND C-6-54 (1918-19) (SERIAL NOS. 15737 UP)
BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH IGNITION

BATTERY.—Battery is 6 volt, 85 or 130 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .014 to .016 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 2 or 3 drops of light machine oil in each of the magneto oilers every month. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4, or 1, 2, 4, 3.

SPARK PLUG GAPS.—Spark plug gaps are .018 to .022 inch.

STARTER.—E.D.-160, M-979, or C-8, M-1055. Rotation is counter-clockwise, looking at commutator end. Starter is connected to the engine through a Bendix drive.

OILING.—Put several drops of light engine oil in each of the starter bearings every month.

GENERATOR.—Type L-61, M-768, or M-1087. Rotation is counter-clockwise, looking at commutator end. Generator current regulation is by third brush system. Maximum current output is 15 amperes, reached at 20 miles per hour or 1400 R.P.M. of the armature. Charging rate is varied by inserting a special toothed wrench in the adjusting hole in the commutator end plate and shifting the third brush assembly through a ratchet engagement. Turn the adjusting wrench to the right (facing commutator end) to increase the charging rate. Maximum current output must not exceed 15 amperes at 1400-1600 R.P.M. Pressure of brushes on commutator is 14 ounces. There is a 10 ampere fuse mounted on the generator frame to protect the field winding should excessively high resistance occur in the charging circuit.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-9 miles per hour or 550-600 R.P.M. of the armature and opens at 7-8 miles per hour or 500-550 R.P.M. of the armature. Relay contacts separate .045 inch. Air gap between relay armature (moving member) and coil core is .035 inch, contacts closed. To adjust relay, connect a voltmeter across the main brushes of the generator. Then insert a special wrench in the small adjusting hole in the commutator end plate and adjust relay spring tension until the contacts close when the voltage reaches 6.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted ,resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

ROAMER

MODEL C-6-54 (1920), 6-54-E (1921-22)
BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH IGNITION

BATTERY.—Columbia, Type S-313-A, 6 volt, 117 ampere-hour. The negative (—) terminal is grounded.

IGNITION:—Breaker contacts separate .014 to .016 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 2 or 3 drops of light machine oil in each of the magneto oilers every month. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS:—Spark plug gaps are .025 inch.

STARTER.—E.D.-160, M-979. Rotation is counter-clockwise, looking at commutator end. Starter is connected to the engine through a Bendix drive. Lock torque is 16.5 pound-feet, current being 665 amperes at 3.6 volts. Running freely, armature revolves at 6800 R.P.M., taking 30 amperes. Pressure of brushes on commutator is 25 ounces.

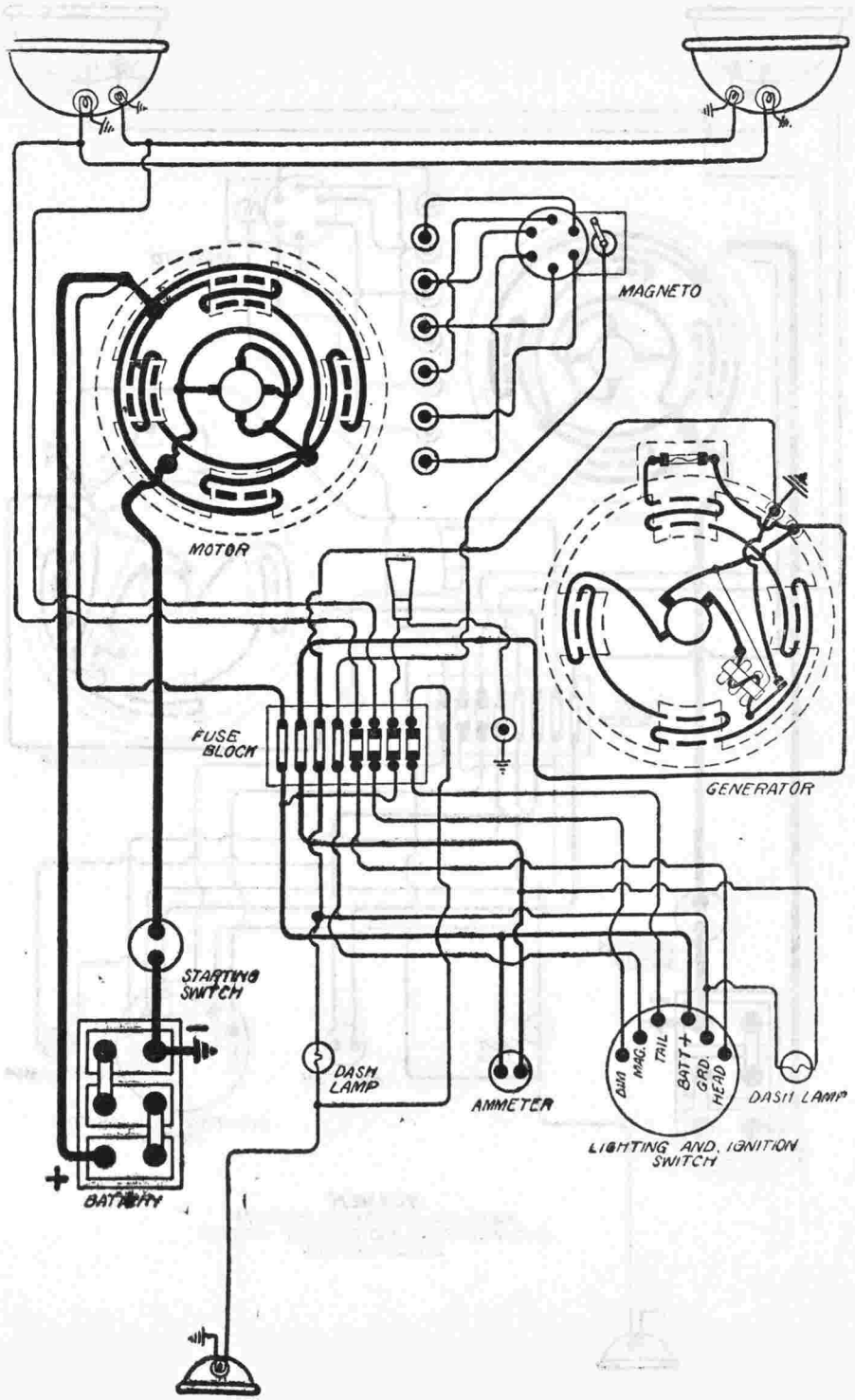
OILING.—Put several drops of light engine oil in each of the starter bearings every month.

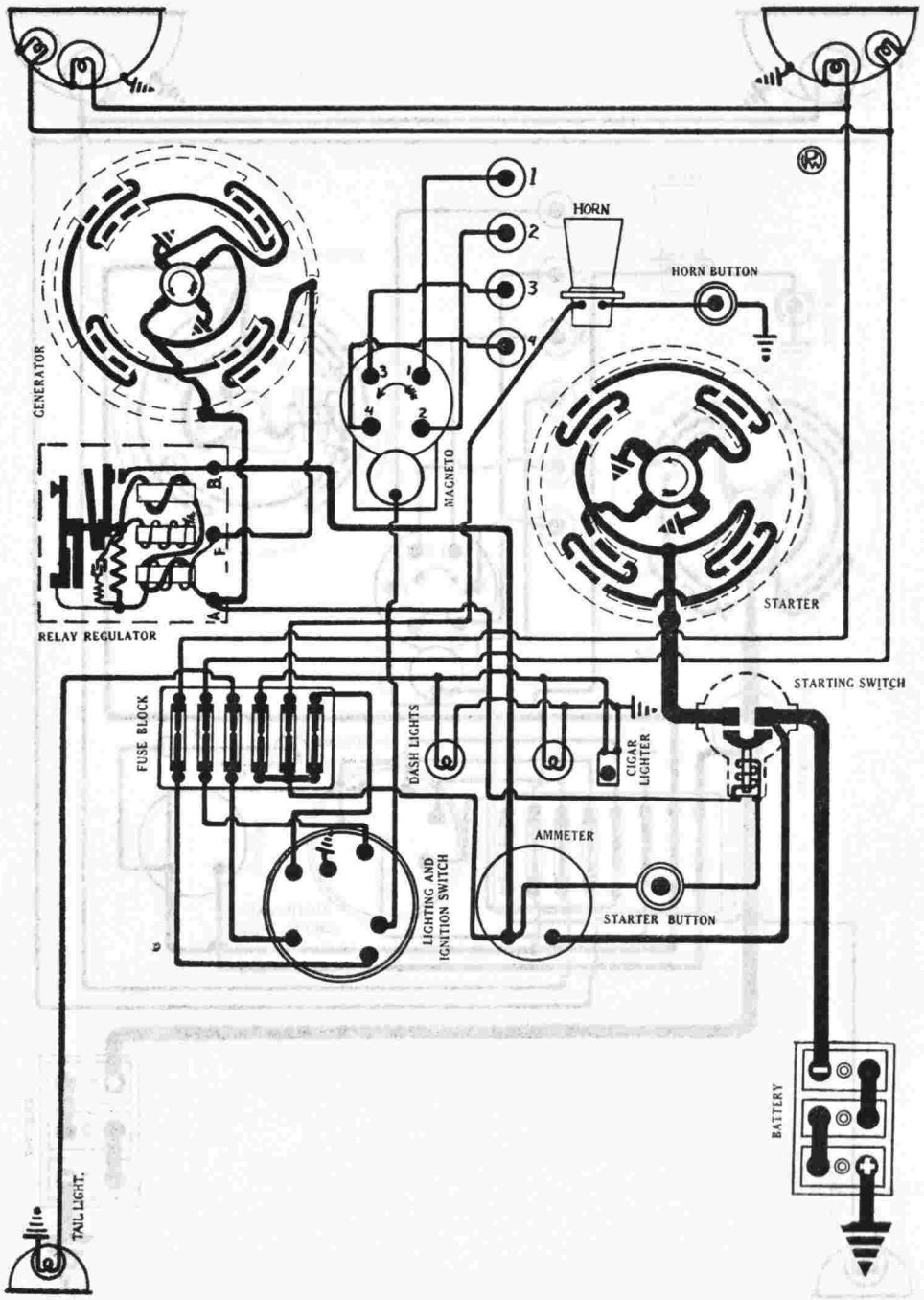
GENERATOR.—Type L-61, M-1204. Rotation is counter-clockwise, looking at commutator end. Generator current regulation is by third brush system. Maximum current output is 15 amperes, reached at 20 miles per hour or 1400 R.P.M. of the armature. Charging rate is varied by inserting a special toothed wrench in the adjusting hole in the commutator end plate and shifting the third brush assembly through a ratchet engagement. Turn the adjusting wrench to the right (facing commutator end) to increase the charging rate. Maximum current output must not exceed 15 amperes at 1400-1600 R.P.M. Pressure of brushes on commutator is 14 ounces. There is a 10 ampere fuse mounted on the generator frame to protect the field winding should excessively high resistance occur in the charging circuit.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-9 miles per hour or 550-600 R.P.M. of the armature and opens at 7-8 miles per hour or 500-550 R.P.M. of the armature. Relay contacts separate .045 inch. Air gap between relay armature (moving member) and coil core is .035 inch, contacts closed. To adjust relay, connect a voltmeter across the main brushes of the generator. Then insert a special wrench in the small adjusting hole in the commutator end plate and adjust relay spring tension until the contacts close when the voltage reaches 6.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6 volt, 21 cp. Dimmer and dome lamps are 6 volt, 4 cp. Dash, tail and tonneau lamps are 6 volt, 4 cp.





MODEL 4-75-E (1920-21-22-23-24)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH OR SPLITDORF MAGNETO IGNITION

BATTERY:—Columbia, Type S-313-A. Prest-O-Lite, Type 613-SHC. 6 volt. Starting capacity is 130 amperes for 20 minutes. Lighting capacity is 5 amperes for 22.6 hours. The positive (+) terminal is grounded.

IGNITION:—Breaker contacts separate .014-.016 inch. Contacts are made of platinum. When the condition of the contacts affects the ignition, resurface with a fine flat jeweler's file or with worn No. 00 sandpaper.

Oiling:—Put 2 or 3 drops of light engine oil in each of the magneto oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month. Put a small bit of vaseline on the fiber bumper of the contact arm applying with a toothpick.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-3-4-2.

Spark Plugs:—Spark plug gaps are .022-.025 inch.

STARTER:—Model 776 (1920), Model 778 (1921-22-23), Model 751 (1924). Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 2½-3 pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
Model 776 778			
0 lb. ft.	3500-5000	5.5	35-50
5 "	1000	5.5	210
31 "	Lock	4	750
Model 751			
0 lb. ft.	3100-3800	5.5	38-65
3.5 "	1200	5.5	185
21 "	Lock	4	650

Oiling:—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR:—Model 781-R. The direction of rotation is counter-clockwise, looking at the commutator end. Generator regulation is by a vibrating regulator. To adjust generator output adjust regulator action by changing spring tension on regulator contact arm. Increase the spring tension to increase the charging rate and decrease charging rate by lessening spring tension. Spring tension is controlled by turning a small screw bearing on the contact arm.

Generator Data

Amperes	Volts	R.P.M.
0	6.5	425
20	6.5	1200

Operating as a motor generator draws 5 amperes at 6-6.3 volts. Shunt field current is 1.25-1.75 amperes at 6-6.3 volts. The brush spring tension should be 1¼-1½ pounds each.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY-REGULATOR:—Relay is combined with a vibrating regulator. Relay contacts close when the voltage of the generator reaches 6.5 volts at a generator speed not above 500 R.P.M. and open with a discharge current of 1-2 amperes. Adjust spring stop so contacts open with discharge current within these limits. To adjust regulator action connect voltmeter between main generator terminal and ground. Slowly speed up generator and adjust armature stop so that contacts close with a voltage of 6.5 volts at normal armature speed of 425 R.P.M. or maximum speed of 500 R.P.M. Maximum generator voltage must not exceed 8.5 volts at 1200 R.P.M. when disconnected from battery. Relay contacts separate .055-.060 inch. Regulator contacts separate .045-.055 inch. Center gap is .015-.019 inch, contacts closed.

LIGHTING:—Head lamps are each 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are each 6-8 volt, 2 cp.

FUSES:—Lighting fuses are 10 amperes.

ROAMER

MODEL 6-54-E (1920-21-22-23-24-25), MODEL 4-75-E (1925)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH AND SPLITDORF IGNITION

BATTERY:—Prest-O-Lite, Type 613-SHC. 6 volt. Starting capacity is 130 amperes for 20 minutes. Lighting capacity is 5 amperes for 22.5 hours. The negative (—) terminal is grounded.

IGNITION:—Breaker contacts separate .014-.016 inch. When the condition of the contacts affects the ignition resurface contacts with a fine flat jeweler's file or with worn No. 00 sandpaper.

Oiling:—Put 2 or 3 drops of light engine oil in each of the magneto oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month. Put a small bit of vaseline on the fiber bumper of the contact arm applying with a toothpick.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4 and 1-3-4-2.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .020-.025 inch.

STARTER:—Model 711. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 2½-3 pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3500-6000	5.5	35-45
2.5 "	1300	5.5	150
17 "	Lock	4	525

Oiling:—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR:—Model 760. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the charging rate remove the commutator cover band and loosen the nut on the generator end plate holding the third brush in position. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the nut after making the adjustment.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	500	12-14	7.5	1250
8	6.5	750	7-11	7	2500
14-17	7.5	1100-1500			
7-11	6.5-7.5	2500			

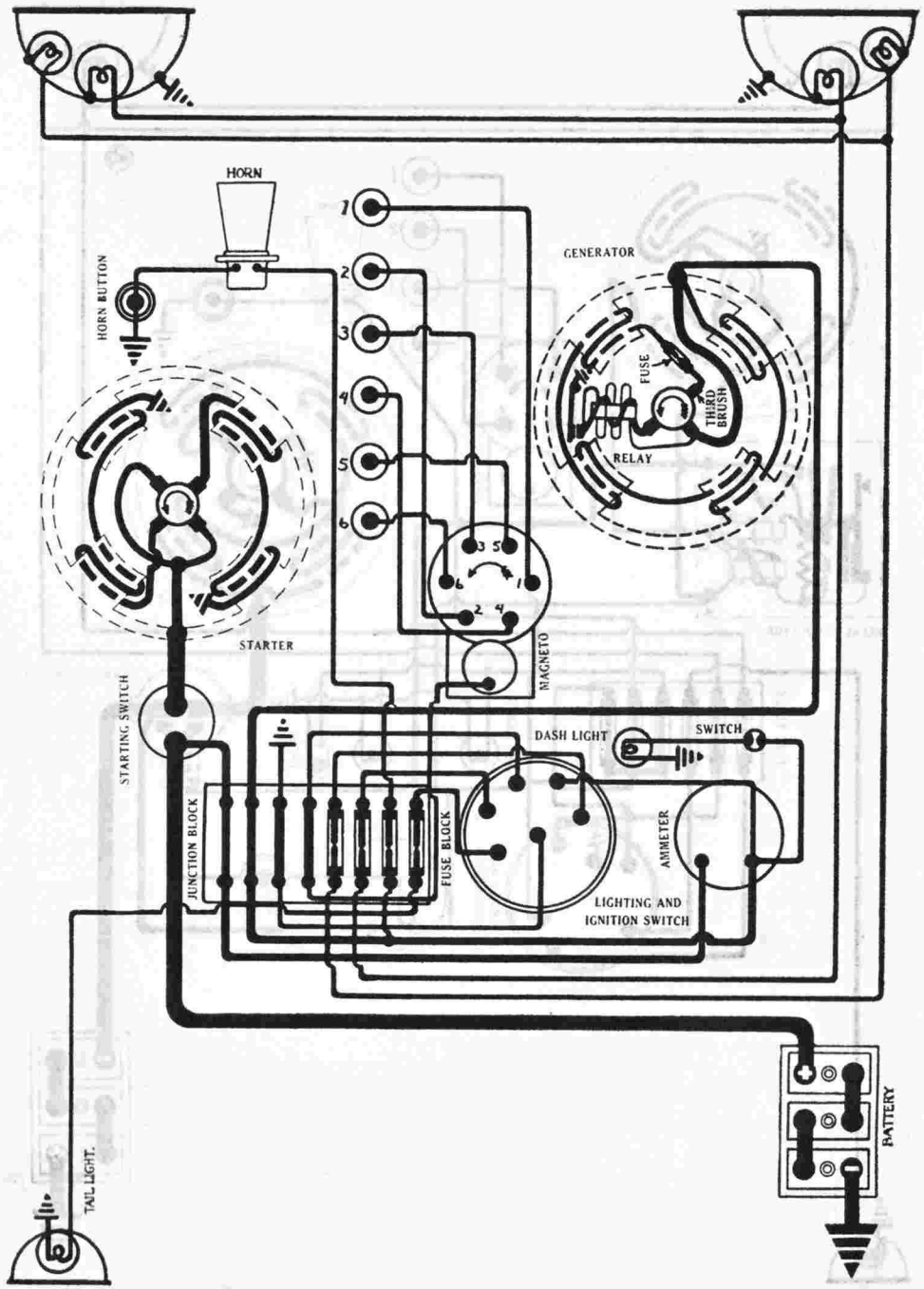
Motoring freely generator draws 3.5-5 amperes at 6-6.3 volts. Shunt field current is 2.5 amperes at 6-6.3 volts. Generator brush tension is 1¼-1½ pounds each.

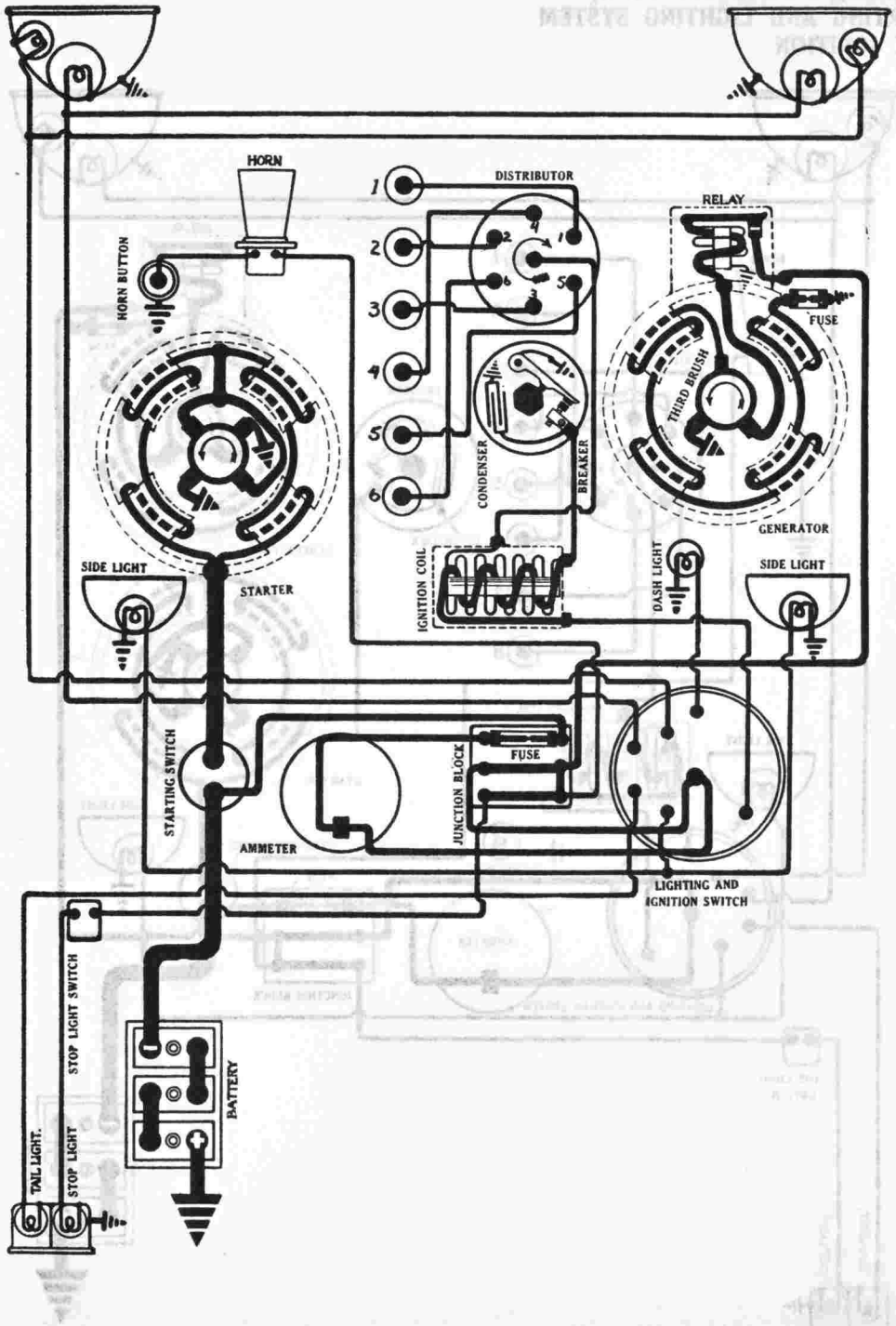
Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Relay contacts close when the voltage of the generator reaches 6.2-6.5 volts and open with a discharge current of 0-3 amperes. Contacts separate .030-.035 inch. Air gap between relay armature and coil core is .005 inch, contacts closed.

LIGHTING:—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are each 6-8 volt, 2 cp.

FUSES:—Lighting fuses are each 10 amperes. Generator field fuse is 5 amperes.





ROAMER

MODEL 6-50-55 (1925-26)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

BATTERY:—Prest-O-Lite, Type 611-SHK. 6 volt. Starting capacity is 110 amperes for 20 minutes. Lighting capacity is 5 amperes for 18.5 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model IG-4062. Distributor Model IG-4034-A. Breaker contacts separate .020-.024 inch. Resurface contacts on a medium hard oilstone. Ignition current is 3.4-5 amperes with engine stopped and 1-3 amperes running. Distributor is of the manual type. Manual advance is 50°.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every week or each 250 miles. Put a small bit of vaseline on the face of the breaker cam every month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

STARTER:—Model MG-4102. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 160 R.P.M. taking 130 amperes at 4.8 volts. Brush tension should be 1¼-1½ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	5.5	45
	(Without Bendix)		
0 "	Free	5.5	50
	(With Bendix)		
1 "	2200	5.5	100
3.4 "	1180	5	200
6 "	500	4.5	300
7.6 "	350	4.25	350
9.6 "	Lock	3.45	400

Oiling:—Put 5 to 10 drops of light engine oil in the oiler at the drive end of the starter every month or each 1000 miles.

GENERATOR:—Model GJ-4103. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust output, remove commutator cover band and shift third brush mounting bracket by tapping with a screwdriver. Shifting the third brush in the direction of the armature rotation increases the charging rate. Maximum charging rate is 16.5 amperes at 7.5 volts and 17.5 amperes at 8 volts. Performance on car should be as follows:

Generator Data

Cold Test				Hot Test			
Amperes	Volts	R.P.M.	M.P.H.	Amperes	Volts	R.P.M.	M.P.H.
2	6.6	675	9.7	2	7.2	750	10.8
5	7	780	11.3	5	7.4	900	12.8
10	7.3	940	13.6	10	7.7	1200	17.3
14	7.7	1300	18.8				

Motoring freely generator draws 5 amperes at 6 volts. Shunt field current is 2.2 amperes at 6.2 volts. Brush spring tension should be 1¼-1½ pounds each.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at the commutator end of the generator every two weeks or each 500 miles.

RELAY:—Model CB-4008. Relay is mounted on the dash. Relay contacts close when the voltage of the generator reaches 7-7.5 volts and open with a current discharge of .5-2.5 amperes. Contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING:—Head and stop lamps are each 6-8 volt, 21 cp. S.C. Dash and tail lamps are each 6-8 volt, 2 cp. S.C.

ROAMER

MODELS 8-80, 8-88 (1925-26-27), MODEL 8-78 (1927)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—Prest-O-Lite, Type 613-SHK. 6 volt. Starting capacity is 130 amperes for 20 minutes. Lighting capacity is 5 amperes for 22.5 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model IG-4062. Distributor Model IG-4105. Breaker contacts separate .020-.024 inch. Resurface contacts on a medium hard oilstone. The distributor is of the manual advance type. Manual advance is 50°. Ignition current is 3.4-5 amperes with the engine stopped and 1-3 amperes running.

Mounting:—Distributor is mounted on the top of the engine block. To remove the distributor, disconnect primary lead and manual advance rod and remove head with high tension cables intact. Then loosen advance arm clamp screw and lift distributor from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every week or each 250 miles. Put a small bit of vaseline on the face of the breaker cam every month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position. To set timing, crank engine until piston No. 1 enters compression stroke. This is the up stroke with both valves closed. Fully retard spark control lever. Continue to crank engine until piston reaches top dead center. Loosen the advance arm clamp screw and rotate the distributor until the contacts begin to separate. Then tighten the clamp screw and make certain the rotor is under the segment connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4..

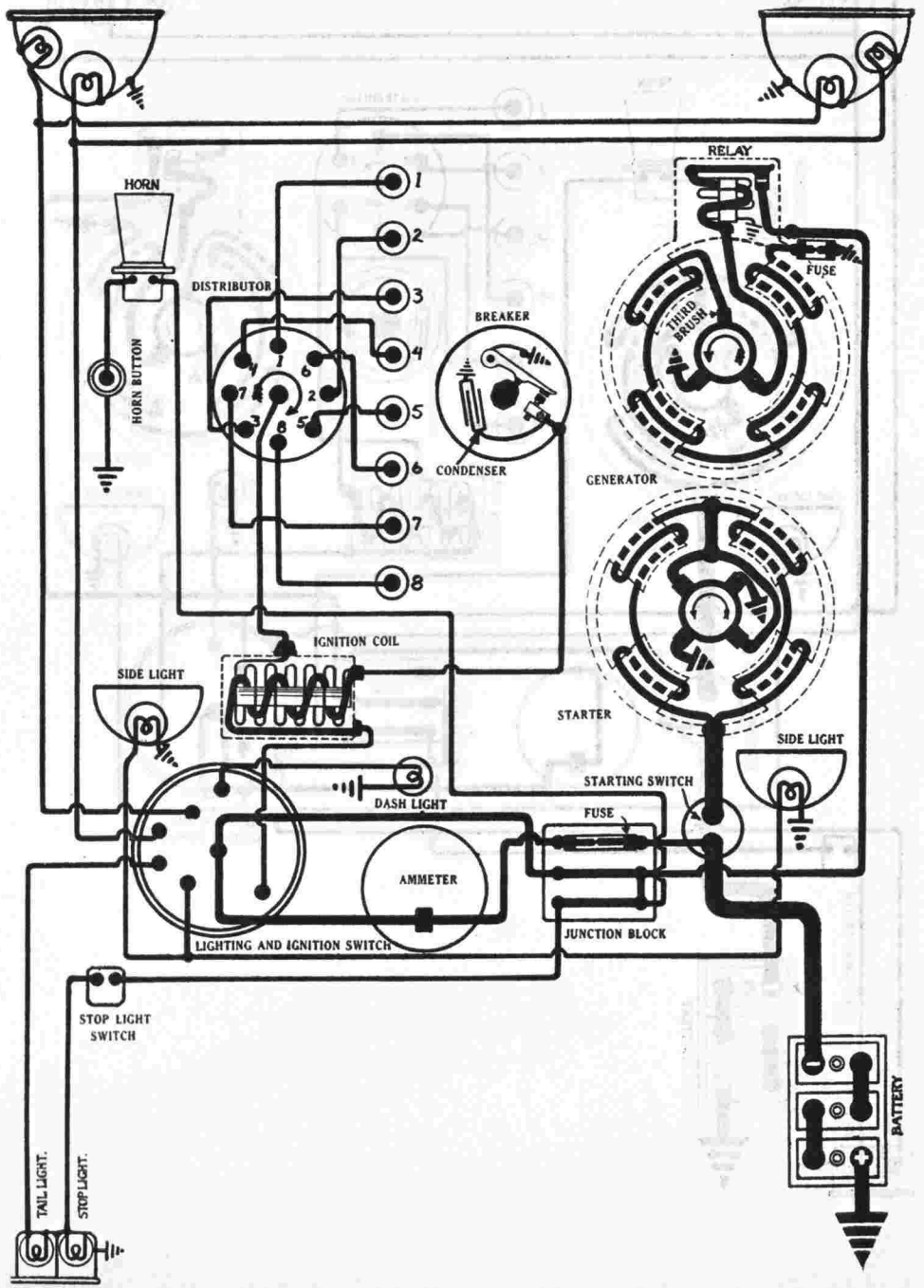
Spark Plugs:—Spark plug diameters are ⅞ inch. Gaps are .025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1 15/32 inches; stem diameter, 11/32 inch; stem length, 5½ inches. Spring pressure is 36 pounds. Tappet clearance is .006 inch (hot). Inlet valves open at top dead center and close 35 degrees after lower dead center.
EXHAUST VALVES:—Head diameter, 1 15/32 inches; stem diameter, 11/32 inch; stem length, 5½ inches. Spring pressure is 36 pounds. Tappet clearance is .008 inch (hot). Exhaust valves open 42 degrees before lower dead center and close 5 degrees after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

STARTER:—Model MN-4102. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 155 R.P.M. taking 140 amperes at 4.75 volts. Starter brush tension should be 1¼-1½ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	5.5	45
	(Without Bendix)		
0 "	Free	5.5	50
	(With Bendix)		
.5 "	2800	5.5	100
2.4 "	1450	5	200
4.8 "	950	4.5	300
7.2 "	650	4	400
13.6 "	Lock	3	620



ROAMER

MODELS 8-80, 8-88 (1925-26-27), MODEL 8-78 (1927)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

Mounting:—Starter is flange mounted at the right of the engine on the forward side of the flywheel housing. To remove starter, disconnect cable and remove 3 flange mounting capscrews. Then pull starter forward and lift from place.

Oiling:—Put 5 or 10 drops of light engine oil in the oiler on the drive end of the starter every month or each 1000 miles. The commutator end of the starter requires no oil.

GENERATOR:—Model GJ-4116. The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the charging rate, remove the commutator cover band and shift the third brush stud by prying with a screwdriver. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. The maximum charging rate is 16.5 amperes at 7.5 volts and 17.5 amperes at 8.0 volts. Generator performance on the car is as follows:

Generator Data

	Cold Test				Hot Test		
Amperes	Volts	R.P.M.	M.P.H.	Amperes	Volts	R.P.M.	M.P.H.
2	6.6	675	9.6	2	7.2	750	10.7
5	7	780	11.1	5	7.4	900	13
10	7.3	940	13.4	10	7.7	1200	17.2
14	7.7	1300	18.6				

Shunt field current is 2.2 amperes at 6.2 volts. Motoring freely generator draws 5 amperes at 6 volts. Brush spring tension is 1¼-1½ pounds each.

Mounting:—Generator is flange mounted at the right of the engine on rear of timing chain case. To remove generator, disconnect lead and remove 3 flange mounting capscrews. Then pull generator straight back and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks or each 500 miles.

RELAY:—Model CB-4009. Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of .5-2.5 amperes. Contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING:—Head lamps are 6-8 volt, 21 cp. S.C. Dash and tail lamps are each 6-8 volt, 2 cp. S.C.

FUSES:—Generator field fuse is 5 amperes.



ROLLIN

MODEL G (1924), G-2 (1925-26)
OWEN-DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION.

BATTERY: — U. S. L. Type 3-CVX-6X, 6 volt, 106 ampere hour. The starting capacity is 115 amperes for 20 minutes. The lighting capacity is 5 amperes for 21.2 hours. The positive (+) terminal is grounded.

Willard, Type CWR-15 (1925-26), 6 volt, 105 ampere hour. Starting capacity is 114 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The positive (+) terminal is grounded.

IGNITION: — Coil Model No. 600Y. Distributor Model No. 373-2Y. The breaker points separate .020 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with a fine flat jeweler's file. The surface of the points should be kept clean and unpitted.

OILING: — Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every month or each 1000 miles.

TIMING: — Automatic advance is used. A button on the dash connected with the distributor provides a slight retard to prevent the engine laboring on hills. The breaker contacts begin to separate when piston No. 1 on compression stroke is on top dead center (when the flywheel marking is opposite the indicator on the clutch housing) with the spark control button in the fully advanced position i. e. pushed all the way in.

FIRING ORDER: — The firing order is 1-3-4-2.

SPARK PLUGS: — The spark plug diameters are 7/8 inch. The gaps are .020-.025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1½ inches; stem diameter, .341 inch; stem length, 6 inches. Spring pressure is 45 pounds. Tappet clearance is .005 inch (hot). Inlet valves open 2 degrees after top dead center and close 46 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1½ inches; stem diameter, .341 inch; stem length, 6 inches. Spring pressure is 45 pounds. Tappet clearance is .005 inch (hot). Exhaust valves open 45 degrees before lower dead center and close 3 degrees after top dead center.

STARTER: — Model No. DE-607. The starter is a six pole, two brush machine using a special type of field winding. The field coil for all six poles is so wound that each pole is surrounded by a U shaped section of the coil. The starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

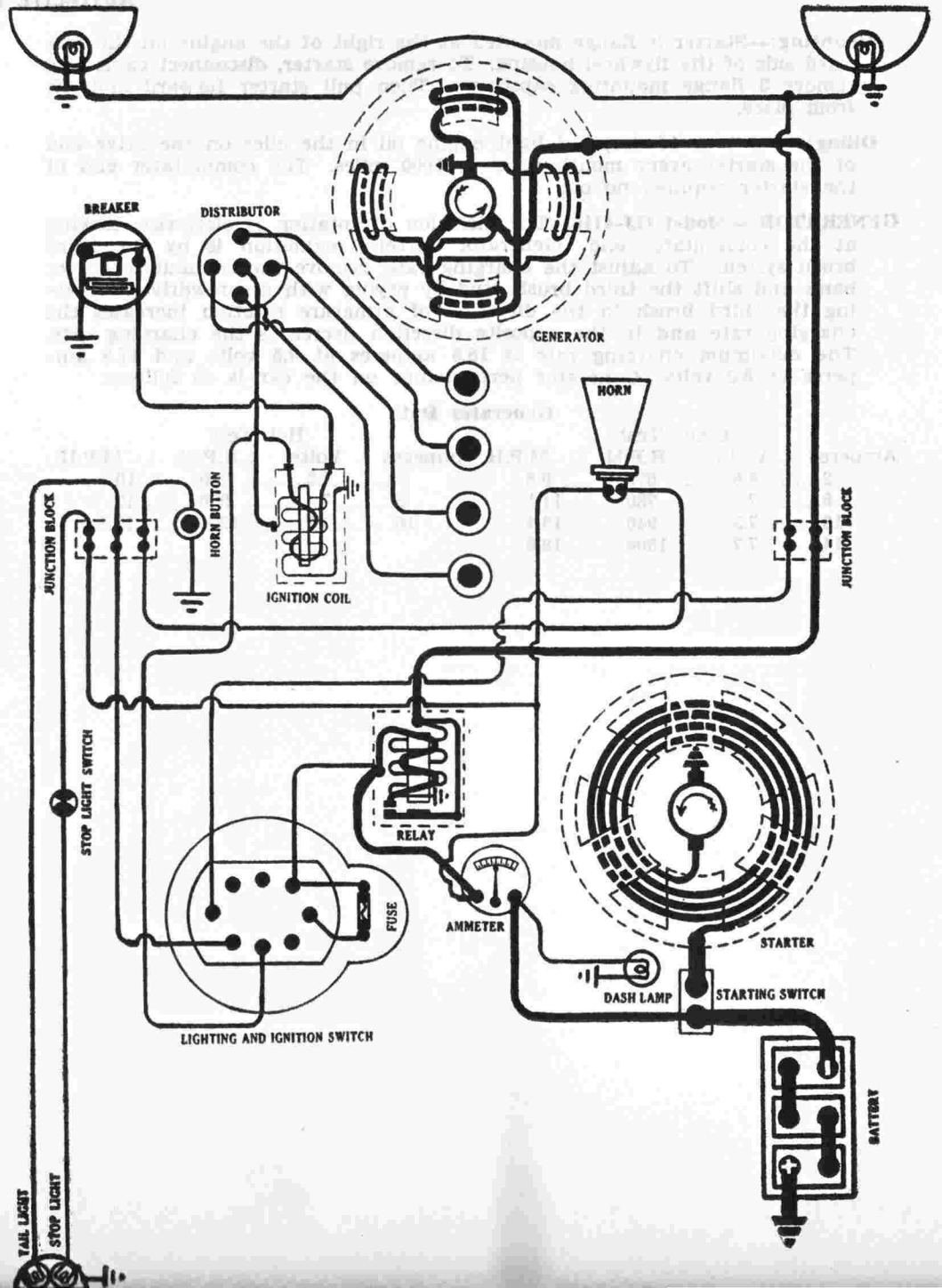
Starter Data.

Torque.	R. P. M.	Volts.	Amperes.
0 lb. ft.	.. 6000	6.0	60.
3 „	1500	5.5	200.
18 „	Lock.	3.5	650.

Mounting:—Starter is sleeve mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove the large pilot mounting screw. Then slide starter forward and lift from place.

OILING: — The starter bearing are fitted with oilless bronze bushings. They require no attention.

GENERATOR:—Model CE-614 or 680. Generator current regulation is by third brush system. The generator is equipped with two shunt fields, each being wound on two field coils. The light shunt field is connected between one main brush and the third brush and regulates the output. The heavy shunt field is connected between the third brush and the other main brush. The battery is connected to the same brushes as the light shunt field. The direction of rotation is counter-clock-



ROLLIN

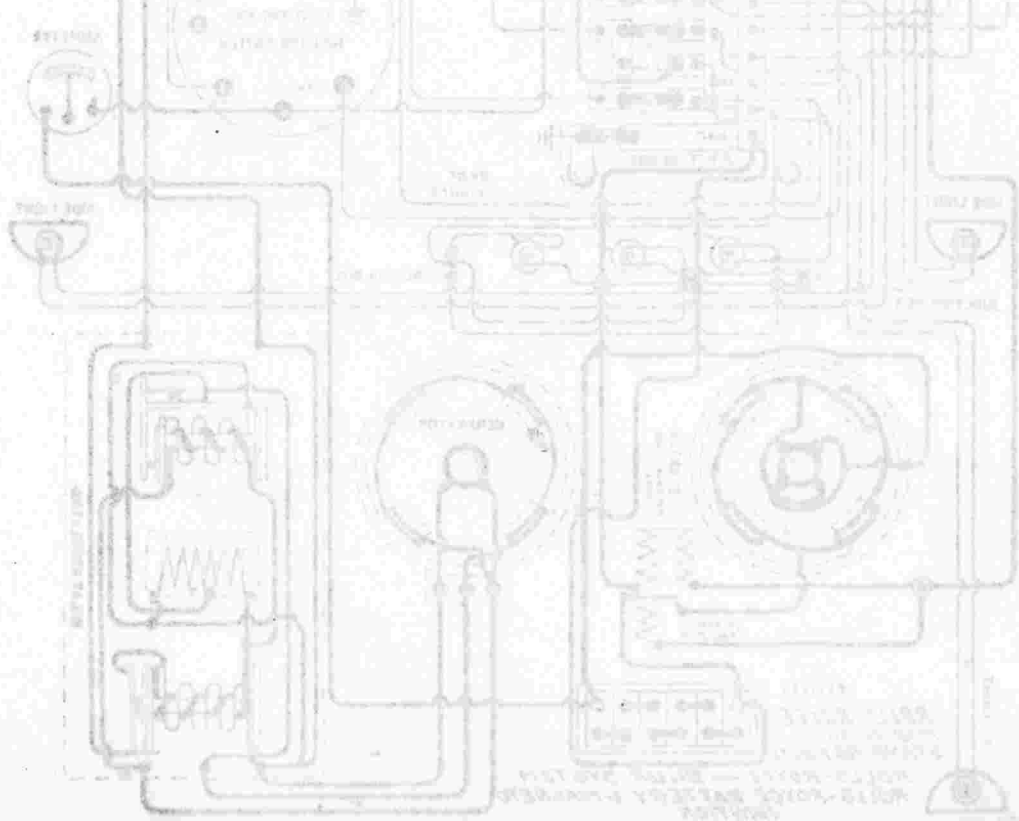
MODEL G (1924), G-2 (1925-26)
OWEN-DYNETO GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

wise looking at the commutator end. The light shunt field draws 2 amperes at 6 volts. The heavy shunt field draws 75 amperes at 6 volts.

Generator Data.

Amperes.	Volts.	R. P. M.
0	6.5	475
8	7.0	650
13-15	7.4	1000
8.5	7.0	3600

To adjust the generator output, loosen the hexagon head screw on the generator end plate between the generator and the cylinder block, and move the screw downward to increase the charging rate and upward to decrease the charging rate. Tighten the screw after making the adjustment. Raising the third brush does not render the generator inoperative. The generator should never be run in this condition; two brushes must be raised, any two will serve. If the car is to be run without a battery, the generator must be short-circuited by connecting a wire between the generator terminal and the frame or ground.



Mounting:—Generator is cradle mounted at the front of the engine and is driven by the fan belt. To remove generator, disconnect lead, loosen mounting band and take off drive belt. Then lift generator from place.

OILING: — Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles.

RELAY:—No. 22253. Relay is mounted on the generator. Relay contacts close at 475-500 R.P.M. when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2 amperes. Relay contacts separate .015 inch. Air gap between relay armature and coil core is .010 inch with contacts closed.

LIGHTING: — Connecticut Switch Model No. 187-1-Y. Head and stop lamps are each 6-8 volt, 21 cp. S. C. Dome lamp is 6-8 volt, 4 cp. S. C. Dash and tail lamps are each 6-8 volt, 2 cp. S. C.

FUSES: — The main lighting fuse on the back of the switch is 15 ampere. Closed cars have a fuse mounted on a block under the front seat frame at the side of the body above the battery.

ROLLS ROYCE

MODEL 40-50 (1923-24)

BIJUR-ROLLS-ROYCE GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH BATTERY AND MAGNETO IGNITION

BATTERY.—Exide, Type 6-XXC-13-1, 12 volts, 90 ampere-hour capacity. There is no ground. It is a two-wire system.

IGNITION.—American Bosch Special. The breaker contacts separate .014 inch. They are made of tungsten. If the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone. It is not necessary to grind the points when the same are burned or pitted. Just brighten up the point and remove the raised portion of the opposite point. Magneto and American-Bosch breaker adjust to .014 inch.

Oiling.—Put 4 or 5 drops of light engine oil into each oiler of the distributor and magneto once a week. Remove battery ignition distributor rotor and contact breaker cup, and oil joints and sliding sleeves of advance mechanism with a few drops of light engine oil every month.

Timing.—Breaker contacts just begin to separate when piston No. 1 is on compression stroke, mark on flywheel is 10° late, breaker assembly and spark control lever is fully retarded for the BATTERY IGNITION; and for the MAGNETO IGNITION magneto breaker contacts separate 6° early, with spark control lever fully retarded.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—The spark plug gaps are .030 inch.

STARTER.—Bijur Model E. X. 21. The starter is geared to the engine by two sets of epicyclic or planetary gears and chain 23.6 to 1 gear ratio. The direction of rotation is clockwise, looking at the commutator end. The starter cranks the engine at 70 R.P.M., taking a current of 100 amperes.

Starter Test Data

Torque	R.P.M.	Amperes
5 ft. lbs.	1400	130
10 ft. lbs.	1000	220
15 ft. lbs.	600	310

Brush tension is 32 ounces.

Oiling.—Put 8 or 10 drops of light engine oil into oilers at rear end of starter and top of epicycloid gear housings at front end. This oiling should be done every month. If the car is driven more than 2000 miles in a month, this care must be given every 2000 miles.

GENERATOR.—Model E. X. 11. The direction of rotation is clockwise, looking at commutator end or the pulley end. The charging rate is controlled by a relay regulator of the constant voltage type, of which the charging rate depends on the condition of the battery. The output of the generator is variable to the strength of the battery and the lights. The maximum charging rate is 14 amperes, reached at 820 R.P.M. of armature, or 15 M.P.H., car speed in high gear.

Amperes	R.P.M.	Volts
0	600	10
14 Low Battery	800	15
13 Low Battery	900 or Over	17
7 High Battery	750	14
6 High Battery	800 or Over	15

The brush tension is 22 ounces.

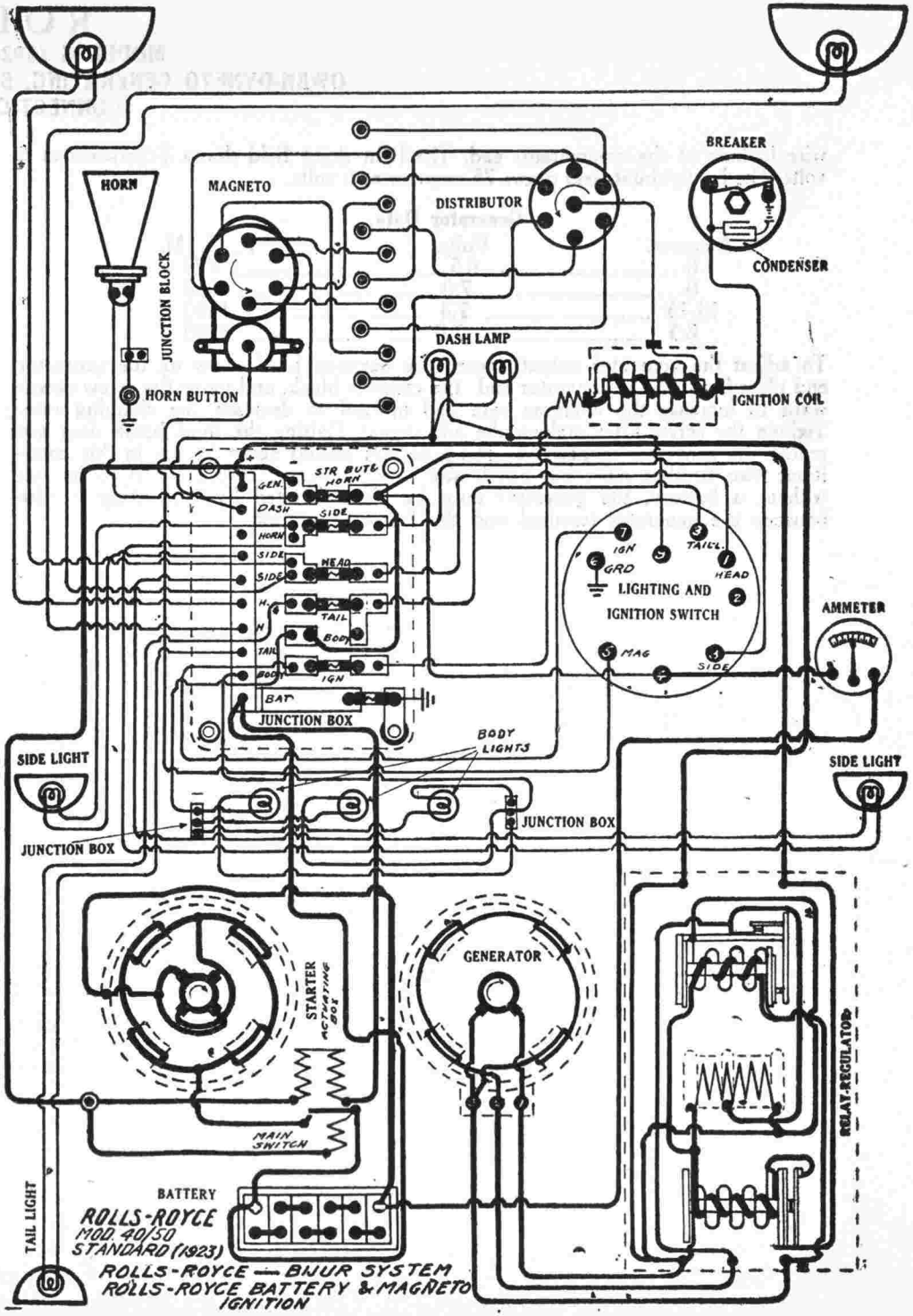
Oiling.—Fill oil cups on the both ends of the generator once a month with light engine oil. If the car is driven more than 2000 miles in a month, this care must be given every 2000 miles.

RELAY.—Bijur, Model KXL.R125-K12V. Relay closes at 10-11 M.P.H. or 600 R.P.M. of armature, at 13-14 volts, and opens at 9 M.P.H. or 500 R.P.M., with a current discharge of 0.5-1.5 amperes. The contact gap is .056 inch, relay contacts fully separated. The air gap between relay armature and coil core is .050 inch, contacts fully closed. The air gap of the voltage regulator is .060 inch, contacts fully closed.

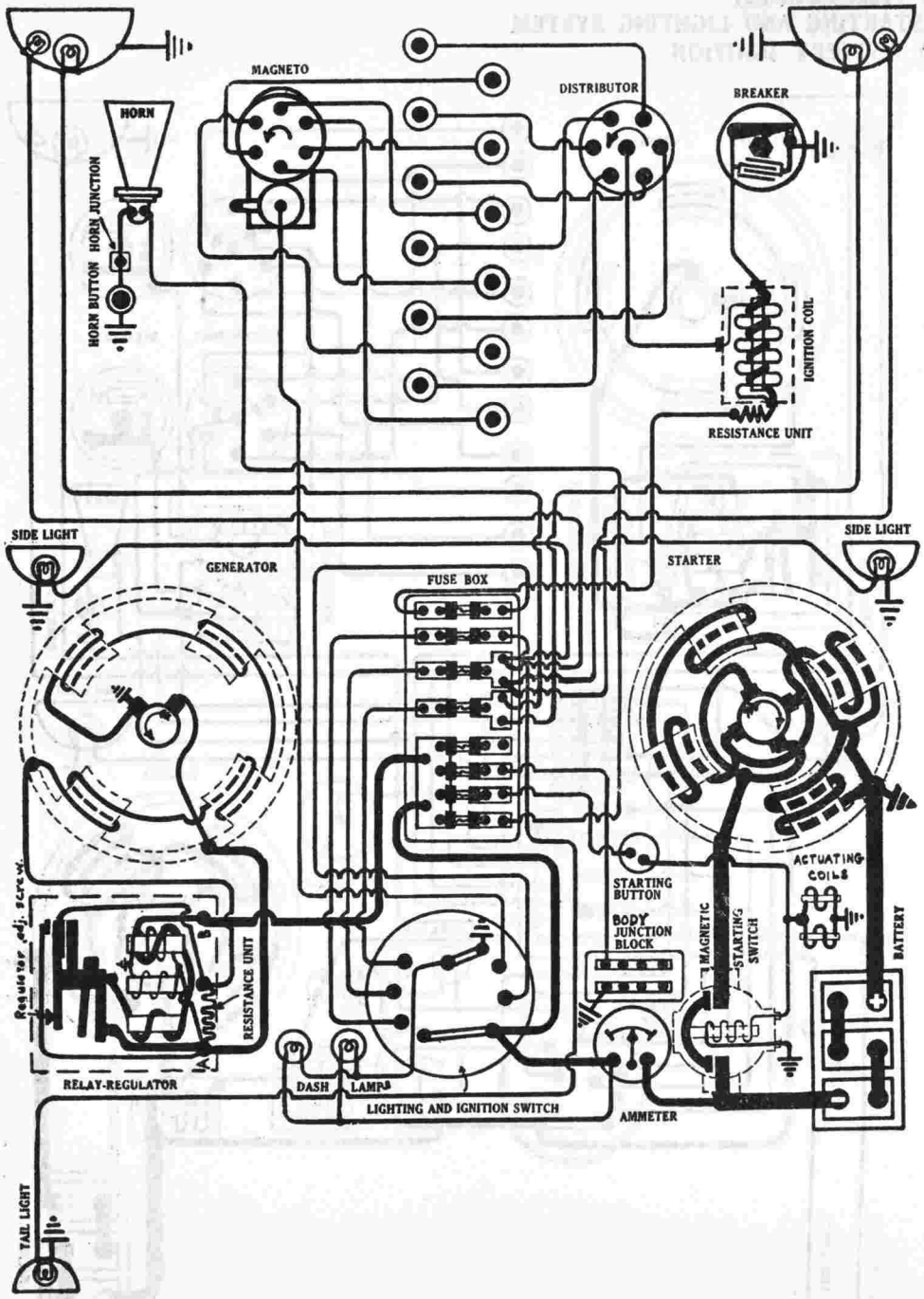
LIGHTING.—Head lights are each 12 volts, 21 cp. Side and tail lights are each 12 volts, 4 cp. Dash and body lights are each 12 volts, 2 cp.

FUSES.—All fuses for chassis parts are 10 amperes. All body fuses are 5 amperes. The fuses are standard 1¼ inch S.A.E.

NOTICE.—The Rolls-Royce Co. of America, Springfield, Mass., reccommends that no one should tamper with any of their machines who are not familiar with the same but should consult their nearest service engineer or write to the factory at the above



ROLLS ROYCE
MODEL 40/50 (1925)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH BATTERY AND MAGNETO IGNITION.



BATTERY:—Exide. Type 3-XX-21-1. 6 volt. The starting capacity is 163 amperes for 20 minutes. The lighting capacity is 5 amperes for 30 hours. The positive (+) terminal is grounded at the starting motor.

IGNITION:—Two independent systems are used. Battery breaker contacts separate .014 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone. Magneto contacts separate .014 inch.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the distributor housing every week or each 500 miles if the car is driven more than 500 miles in a week Put several drops of light engine oil in each of the magneto oilers and on the battery ignition distributor, remove the distributor cap, rotor and contact breaker cup and apply a few drops of engine oil to the joints and sliding sleeve of the advance mechanism. This must be done every month or each 2000 miles if the car is driven more than 2000 miles in a month.

Timing:—Battery breaker contacts begin to separate when the piston entering power stroke reaches a position 10^0 after top dead center (measured on flywheel) with the breaker assembly in the fully retarded position. Magneto breaker contacts begin to separate when the piston entering power stroke is 6^0 before top dead center (measured on the flywheel) with the breaker assembly in the fully retarded position. These points are indicatd by flywheel markings.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plug diameters are metric. Gaps are .028 inch.

STARTER:—Frame No. 778 Style S-382435-A. Starter is connected to the engine through a system of epicyclic gears and chain to the transmission. The direction of rotation is clockwise, looking at the commutator end. Starter cranks the engine at 70 R.P.M. Lock torque is 31 lb. ft. starter drawing 800 amperes at 4 volts. The pressure of the starter brushes should be 2½ to 3 pounds each.

Oiling:—Fill the starter bearing oilers with light engine oil and also fill the oilers on the epicyclic gear casing at either end. of the starter driving chain every month or each 2000 miles if the car is driven more than 2000 miles in a month. Put a few drops of heavy oil on the starter driving chain.

GENERATOR:—Frame No. 77-R, Style S-382436 and 57-IR, Style S-416699. Generator is chain driven from the transmission case. The direction of rotation is counter-clockwise, looking at the commutator end. Generator regulation is by a constant voltage relay-regulator. This causes the charging rate to vary with the condition of the battery giving a high rate when charging a discharged battery and tapering off as the battery becomes charged. The maximum charging rate is reached at 1200 R.P.M. or 20 M.P.H. Charging rate is adjusted by increasing or decreasing the regulator voltage by turning the regulator adjusting screw.

Generator Data.

Frame 77-R.			Frame 57-IR		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	—	475	0	—	400
5	—	575	8	—	525
20	6.5	1200	15	6.5	1200

Operating freely as a motor these machines draw 5 amperes. The field current is 1.5 amperes on the Frame 77-R and 1.4 amperes on the Frame 57-IR.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator oilers and put a few drops on the generator belt links every month or each 2000 miles if the car is driven more than 2000 miles in a month.

RELAY:—Relay contacts close at 600 R.P.M. of the generator armature at 10-11 M.P.H. and open at 500 R.P.M. or 9 M.P.H. with a discharge current of 0-1 ampere.

LIGHTING:—Westinghouse Switch. Head lamps and stop lamp are each 6-8 volt, 21 cp. Dash, dome, tail, side and tonneau lamps are each 6-8 volt, 2 cp.

FUSES:—All fuses are 10 ampere.

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ROLLS ROYCE

MODEL 40-50 (1925-26-27-28)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM

AMERICAN BOSCH BATTERY IGNITION

BATTERY.—Exide. Type 3-XX-21-1. 6 volt. The starting capacity is 163 amperes for 20 minutes. The lighting capacity is 5 amperes for 30 hours. The positive (+) terminal is grounded at the starting motor.

IGNITION.—A double ignition system using two coils and two distributor heads is used. The breaker contacts in both heads open simultaneously. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone.

Mounting.—Distributor is mounted at right of engine on the governor control assembly.

Oiling.—Remove the plug on the gear case and give the gear compartment one charge of engine oil from the oil gun. Put 8 or 10 drops of engine oil in the oiler on the side of each of the distributors and put one drop of oil on the breaker arm pivot pin after removing the distributor head and rotor. Place a small bit of grease on the face of the breaker cam under the fiber bumper. This oiling must be done every 2,000 miles.

Timing.—Breaker contacts begin to separate when piston No. 1 entering power stroke reaches a position when the flywheel marking "Li" is opposite the aluminum pointer above the flywheel, with the manual spark control lever in the fully retarded position. Both breaker contacts should open at the same time. Set timing by loosening the lock screw on the manual advance lever and rotating the distributor head until the breaker contacts separate. Then tighten the screw. Test ignition by running on one set of plugs by placing ignition switch lever in Positions 1 or 2. In service the car should always be run with double ignition.

Firing Order.—The firing order is 1-4-2-6-3-5.

Spark Plugs.—Spark plug gaps are .030 inch.

STARTER.—Frame No. 778, Style S-382435-A. Starter is connected to the engine through a system of epicyclic gears and chain to the transmission. The direction of rotation is clockwise, looking at the commutator end. Starter cranks the engine at 70 R.P.M. Lock torque is 31 lb. ft. starter drawing 800 amperes at 4 volts. The pressure of the starter brushes should be 2½ to 3 pounds each.

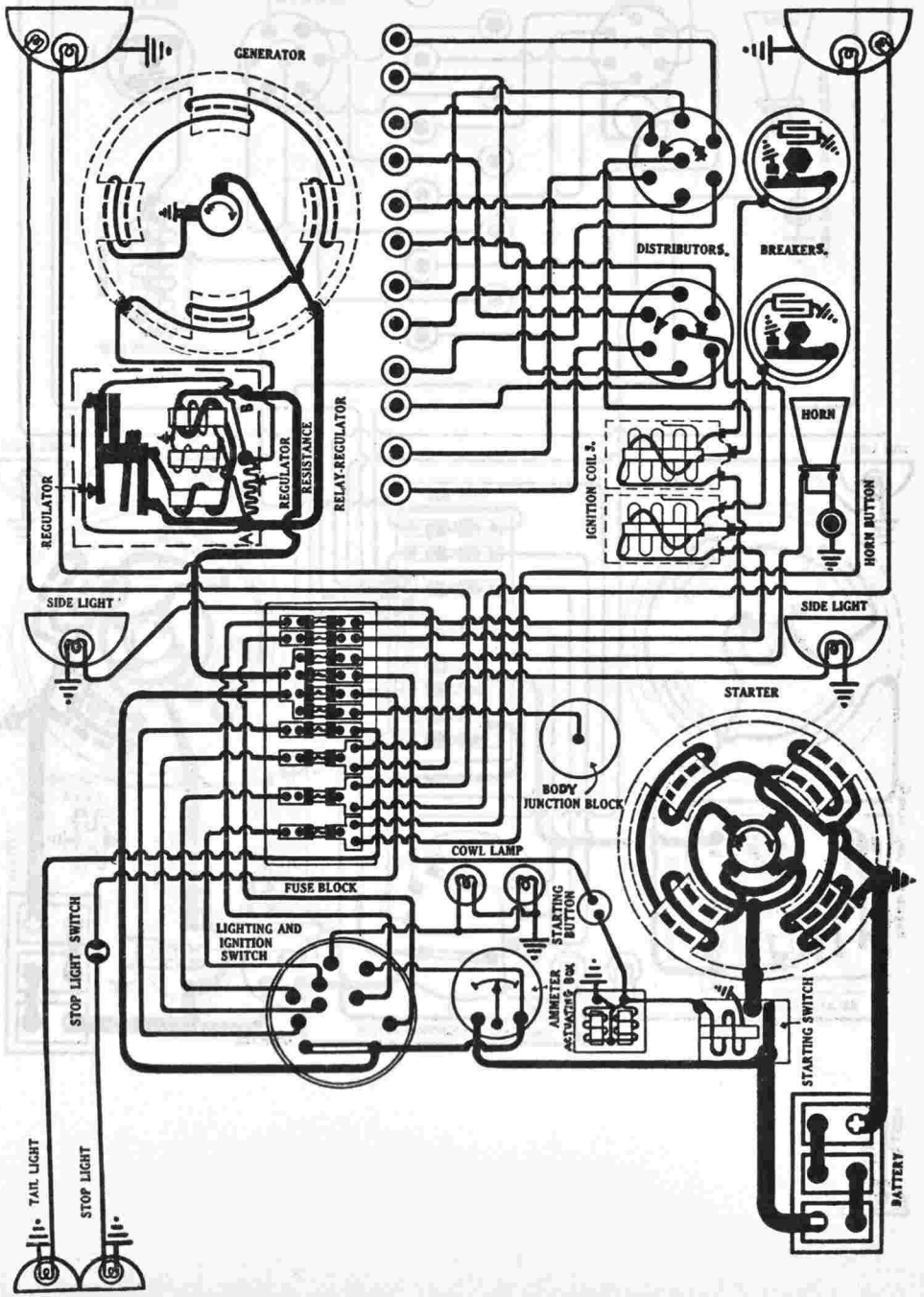
Mounting.—Starter is mounted at the right of the transmission case under the floor boards of the front compartment.

Oiling.—Fill the starter bearing oilers with light engine oil every 2000 miles.

GENERATOR.—Frame No. 57-IR, Style S-416699. The direction of rotation is counter-clockwise, looking at the commutator end. Generator regulation is by a constant voltage relay-regulator. This causes the charging rate to vary with the condition of the battery giving a high rate when charging a discharged battery tapering off as the battery becomes charged. The maximum charging rate is reached at 1200 R.P.M. or 20 M.P.H. Charging rate is adjusted by increasing or decreasing the regulator spring tension by turning the regulator adjusting screw. Turning the screw in a clockwise direction increases the voltage and in the opposite direction decreases the voltage. This regulates the charging rate by changing the shunt field current.

Generator Data.

Amperes	Volts	R.P.M.
0	---	400
8	---	525
15	---	1200



ROLLS ROYCE

MODEL 40-50 (1925-26-27-28)

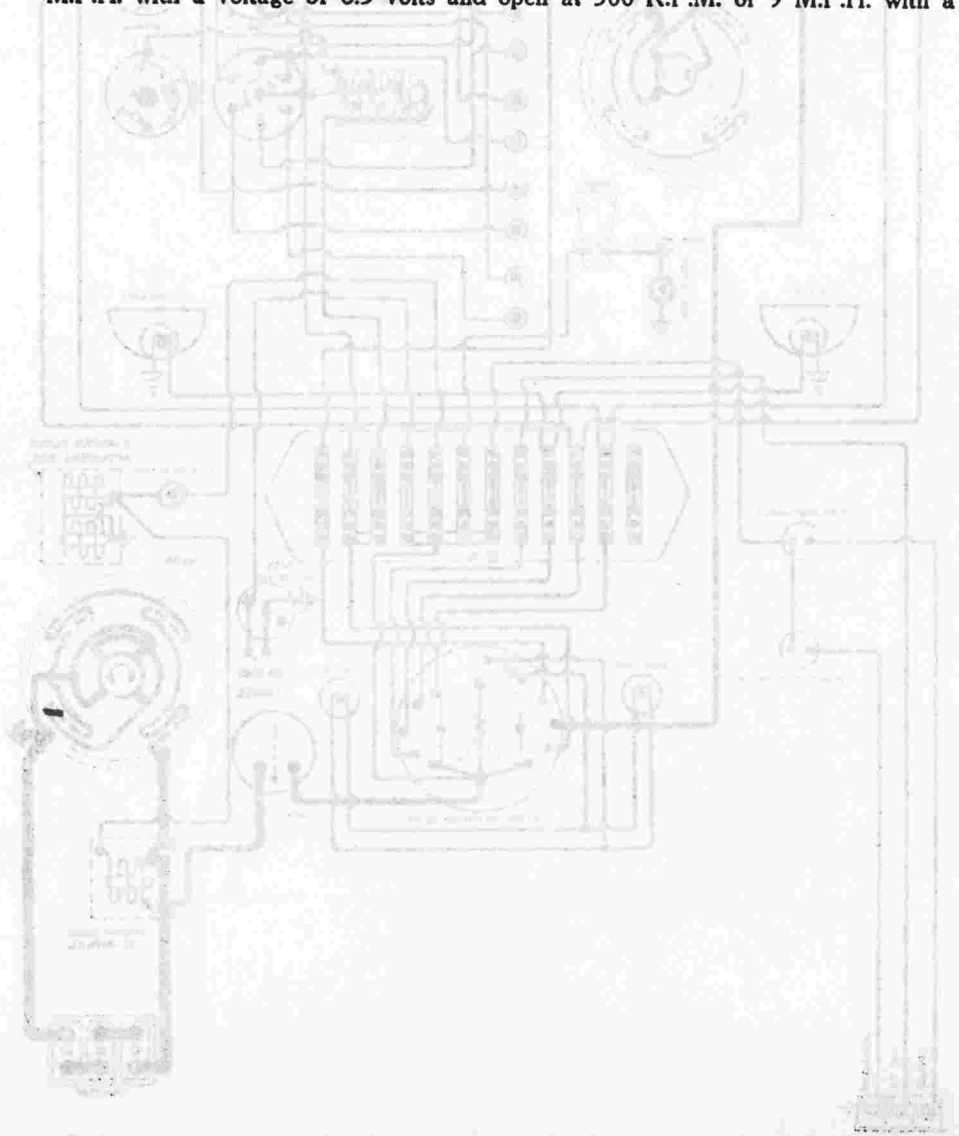
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
AMERICAN BOSCH BATTERY IGNITION

Motoring freely generator draws 5 amperes at 6 volts. Shunt field current is 1.4 amperes.

Mounting.—Generator is mounted at left of engine.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every 1000 miles.

RELAY-REGULATOR—Relay contacts close at 600 R.P.M. of the generator or 10 M.P.H. with a voltage of 6.5 volts and open at 500 R.P.M. or 9 M.P.H. with a discharge current of 0-1 amperes. Air gap between relay armature and frame is .055-.060 inch. Regulator air gap is .055-.060 inch. Center gap is .015 inch.



LIGHTING.—Switch, Delco Model 1216. Head, auxiliary and stop lamps are each 6-8 volt, 21 cp. S. C. Side and tail lamps are each 6-8 volt, 2 cp. S. C. All body lamps are 6-8 volt, 2 cp. D. C.

FUSES.—All fuses are 10 amperes. Four spare fuses are mounted in clips on the fuse box cover.

ROLLS ROYCE

PHANTOM MODEL (1927-28)

ROLLS ROYCE GENERATING, STARTING AND LIGHTING SYSTEM

DE JON IGNITION

BATTERY:—Exide, Type 3-XC-21-1, 6 volts. Starting capacity (20 minute rate) is 164 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 30 hours. The positive (+) terminal is grounded at the starting motor.

IGNITION:—Breaker contacts separate .018-.020 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. A double ignition unit with two heads and two coils is used. Both breakers must operate at the same instant for correct ignition. Distributor is semi-automatic. Manual advance is 15° (distributor). Automatic advance begins at 400 R.P.M. (distributor) and reaches a maximum of 11½° at 2000 R.P.M. Ignition current is 2.5 amperes at 6 volts with engine running and 7.5 amperes at 6 volts with engine stopped. On bench test, coil draws 2.5 amperes at 6 volts with distributor R.P.M. of 221. Spark between needle points at atmospheric pressure will be .800 inch.

Mounting:—Ignition coils and distributor units are mounted on the left of the engine. To remove, disconnect manual advance rod and primary leads and remove distributor caps with cables attached. Then remove four hold-down nuts and lift unit from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of each distributor head every 2000 miles. Put one drop of oil on the breaker arm pivot pin after removing the rotor button every six months. Put a small bit of vaseline on the face of the breaker cam under the fiber bumper of the contact arm every six months.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark lever in the fully retarded position. To set timing, crank engine until piston No. 1 reaches this position. The flywheel mark 'LI' will be opposite the line on the crankcase directly above the flywheel. Make certain that spark lever is fully retarded. If breaker contacts are not separating loosen advance arm clamp screw and rotate distributor housing until contacts begin to separate. Tighten the clamp screw. The contacts in each distributor head should open at the same instant.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plugs are metric longbody. Gaps should be .030 inch.

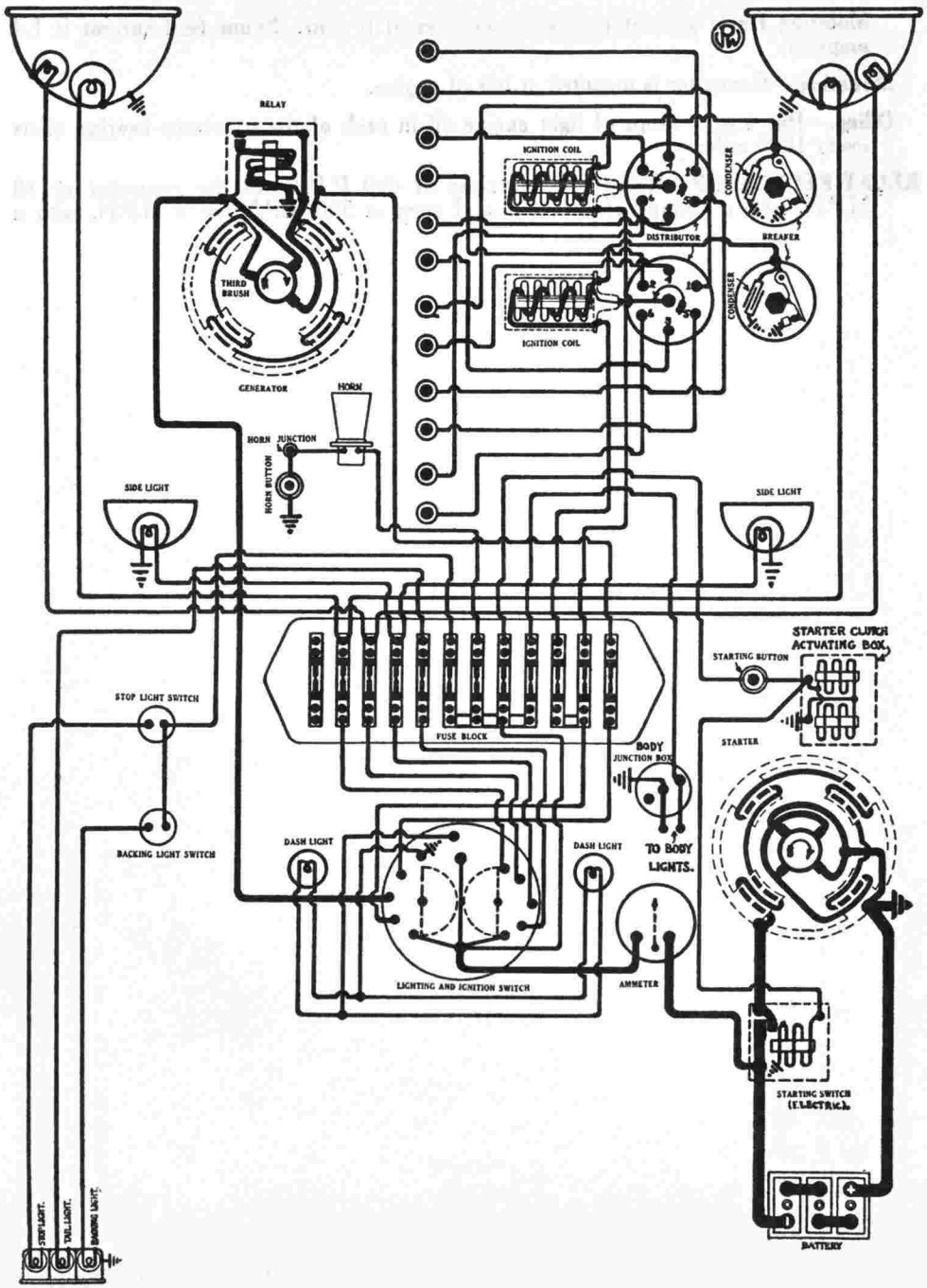
STARTER:—Part No. A-9860. Starter is connected to the engine through a chain and drives through transmission. Starter is engaged through an electromagnetic clutch. The direction of rotation is clockwise, looking at the commutator end. Starter cranks the engine at 86 R.P.M. Brush spring tension is 12-14 ounces. Main starter switch is Model A-2644. Push button switch is Model G-5560.

Starter Data

Torque	R.P.M.	Volts	Amperes
24 lb. ft.	Lock	3.8	750

Mounting:—Starter is mounted at right of transmission case under the floor boards of the front compartment. To remove starter, remove floor boards and disconnect battery cable and drive chain. Then remove caps from two mounting brackets and lift starter from place.

Oiling:—Starter front bearing is oiled from the chassis lubricating system. Put 4 or 5 drops of light oil in rear bearing oiler every six months.



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ROLLS ROYCE

PHANTOM MODEL (1927-28)

ROLLS ROYCE GENERATING, STARTING AND LIGHTING SYSTEM

DE JON IGNITION

GENERATOR:—Part No. A-9547. The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, rotate generator end plate in a clockwise direction increasing charging rate and in a counter-clockwise direction decreasing charging rate. With maximum third brush setting generator output is 26 amperes at 9 volts reached at 1450 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
20	8.25	1350	17	8.75	1460

Main brush tension is 8-10 ounces. Third brush spring tension is 6-8 ounces. Shunt field current is 2.5 amperes at 4 volts.

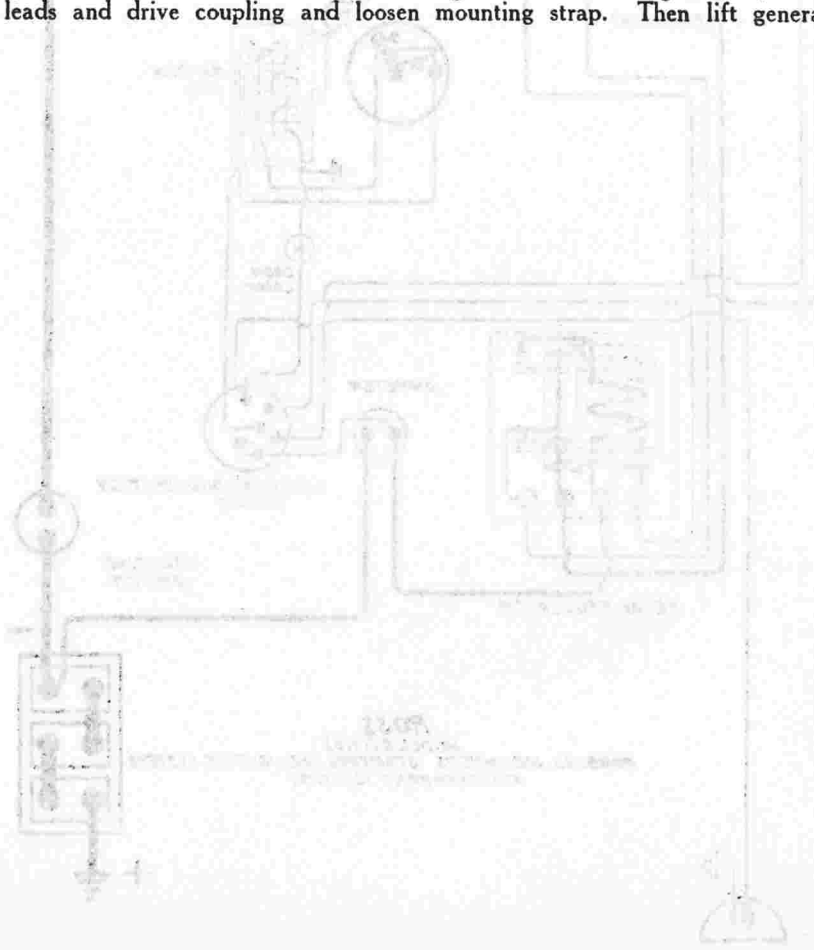
Mounting:—Generator is mounted at left of engine. To remove generator, disconnect leads and drive coupling and loosen mounting strap. Then lift generator from place.

Oiling:—Generator bearings are oiled from central chassis lubricating system.

CUTOUT:—Part No. A-10194. Cutout is mounted on the generator. Contacts close at 450-475 R.P.M. with a generator voltage of 6.75 volts and open at 400 R.P.M. with a discharge current of 3 amperes. Cutout contacts separate .030 inch. Air gap is .025 inch with contacts open and .012 inch with contacts closed. Cutout is adjusted by turning nut on armature spring.

LIGHTING:—Rolls Royce Part No. A-10257. Switch is mounted on the instrument board. Head lamps are 6-8 volt, 21 cp. double filament Mazda No. 1110. Side lamps are 6-8 volt, 3 cp. S.C. Mazda No. 63. Instrument board lamps are 6-8 volt, 2 cp. D.C. Mazda No. 62. Tail lamps are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop and backing lamps are 6-8 volt, 21 cp. S.C. Mazda No. 1129.

FUSES:—Generator field fuse is 10 amperes. Lighting fuses are 10 amperes.



ROSS

MODELS A, B, C (1916-17-18)
ROBBINS & MYERS GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER-KENT IGNITION

BATTERY.—Willard, Type SC-305, 6 volt, 150 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type K-2. Breaker contacts separate .010 to .012 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put a drop of light machine oil on each of the wearing parts of the breaker and 4 or 5 drops in the oil hole beside the notched shaft every two weeks. Put a small amount of vaseline on the notched shaft, applying with a toothpick. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1R, 1L, 3R, 3L, 4R, 4L, 2R, 2L.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 70 R.P.M., current 450 amperes. Operating freely, armature revolves at 2500 R.P.M., current 80 amperes. Tension of brushes on commutator is ½ pound.

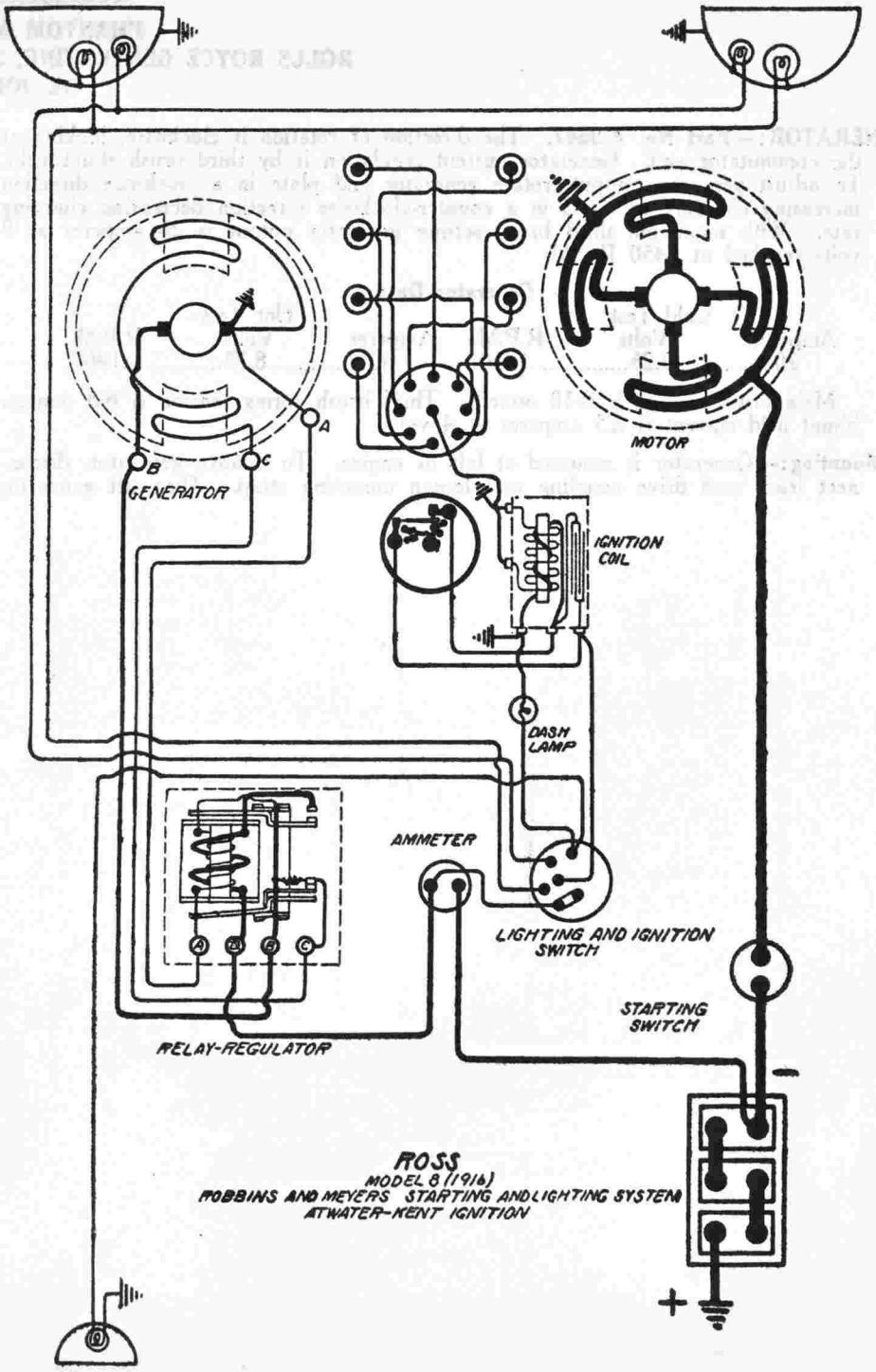
OILING.—Clean out and repack starter bearings with soft cup grease every six months.

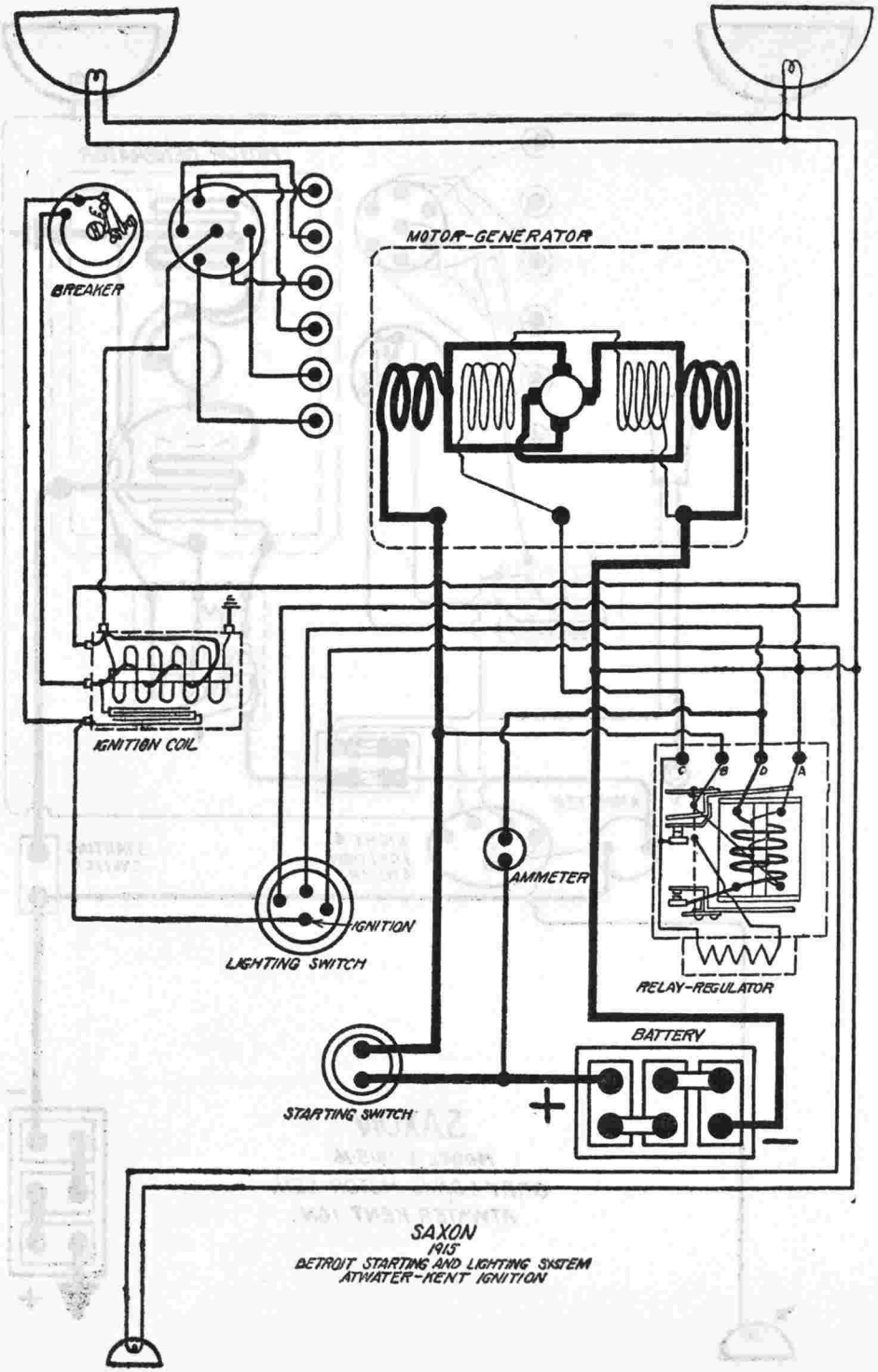
GENERATOR.—Generator current regulation is by vibrating regulator. Maximum current output is 10 amperes, reached at 10 miles per hour. Operating freely as a motor, generator armature revolves at 125 R.P.M., current 10 amperes at 6 volts. Shunt field current is 2.5 amperes. Brush tension is 6 ounces.

OILING.—Clean out and repack generator bearings with soft cup grease every three months.

RELAY-REGULATOR.—Ward-Leonard. Relay closes at 8-9 miles per hour, or 475 R.P.M. of armature, and opens at 7-8 miles per hour or 450 R.P.M. of armature. Relay and regulator contacts separate .015 inch. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 24 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.





SAXON

MODELS A, B-14 (1915-16)

DETROIT WARD-LEONARD GENERATING, STARTING AND LIGHTING SYSTEM

ATWATER KENT IGNITION

BATTERY.—Battery is 6 volt, 60 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type K-3. Breaker contacts separate .010 to .012 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put a drop of light engine oil on each of the wearing parts of the breaker and and 4 or 5 drops of light engine oil in the oil hole beside the notched shaft every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Breaker contacts separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.— The firing order is 1, 5, 3, 6, 2, 4, or 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .027 to .030 inch.

STARTER-GENERATOR.—Model R.S. Starter and generator are combined into a single unit. Starter is connected to the engine through a chain drive.

Starter Data

Torque	R. P. M.	Amperes	Volts
2 lb. ft	1250	100	5.4
4 lb. ft	1000	135	5.1
6 lb. ft	700	175	4.8
8 lb. ft	500	220	4.5
10 lb. ft	300	260	4.2
12 lb. ft	200	300	3.9

The lock torque is 20-23 pound-feet. Starter cranks the engine at 220 R. P. M.

GENERATOR.—Generator current regulation is by the Ward-Leonard Vibrator Regulator. Maximum current output of 10 amperes is reached at 1800-2000 R. P. M. of armature, or 11-12 miles per hour. Generator current remains constant at all speeds above 13 miles per hour.

OILING.—Put 5 or 6 drops of light engine oil in each of starter-generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY-REGULATOR.—Type CC. Relay closes at 8-9 miles per hour. Adjust regulator to limit the maximum current output to 10 amperes. Increasing spring tension on regulator armature (moving member) will increase the output. Decreasing spring tension will decrease the output. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 14 cp. Dash and tail lamps are each 6-8 volt, 2 cp.

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Saxon

Model "Six" 1915-16
Gray & Davis Starting and Lighting System
Atwater-Kent Ignition

Battery.—Battery is 6 volt, 85 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate .010 inch to .012 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become burned or corroded, affecting the ignition, remove and resurface them by drawing across a piece of fine emery cloth laid on a flat surface, as on the bed of a drill press, finishing on a hard oil stone.

Timing.—Spark should occur when the piston entering power stroke is on top dead center spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be .027 inch to .030 inch.

Oiling.—Put 4 or 5 drops of light engine oil in the oil hole at the side of the shaft every two weeks. At the same time put a small amount of oil or vaseline on all the other wearing parts of the breaker. See that no oil or vaseline reaches the contacts. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Motor-Generator.—Motor and generator are combined into one unit.

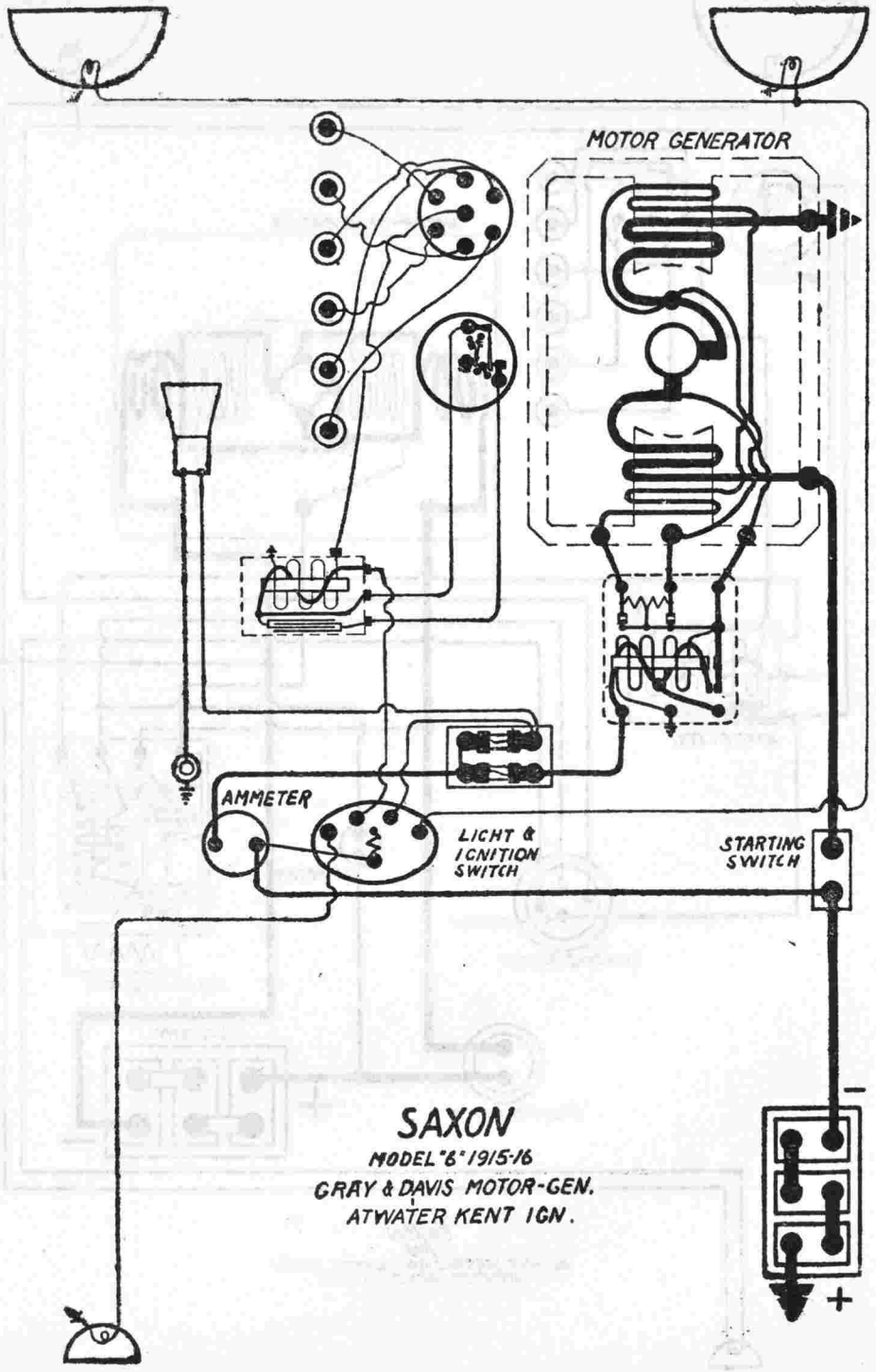
Generator.—Generator voltage regulation is by a vibrating regulator mounted on top of generator. Relay is combined with the regulator. Clean relay and regulator contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface by drawing a piece of worn No. 00 sand paper between them, drawing a piece of unglazed paper between them, to remove all grit, before again putting into service. After cleaning, regulator contacts may require adjusting. Directions for adjusting are given below. The air gap between relay armature (moving member) and coil core should be .030 inch. Air gap between regulator armature and coil core should be .025 inch. When operating freely as a motor, generator should take 10 amperes, armature turning at 700 R. P. M. To take this reading, the three terminals leading from the generator field to regulator should be connected together. A variation of 10% from these ratings is allowable. If machine does not test O. K., remove regulator and repeat the test, field terminals still connected together. Much higher speed indicates damp, grounded or short circuited field coils. Greater current or lower speed indicates tight bearings or damp, grounded or short circuited armature windings or commutator. Periodic swinging of ammeter needle indicates grounded or short circuited armature coils or commutator bars. Shunt field should take .96 to 1.2 amperes at 6 volts. Generator should deliver 8 amperes at 1575 R. P. M. To take this reading, the three terminals on top of generator should be connected together as above, to give full field current. If it does not, adjust the regulator. With a 7½ ampere lamp load, charging rate should be 1 to 4.5 amperes. The maximum generator output, with a 7½ ampere lamp load should be 8.5 to 11 amperes, depending on the state of charge of the battery.

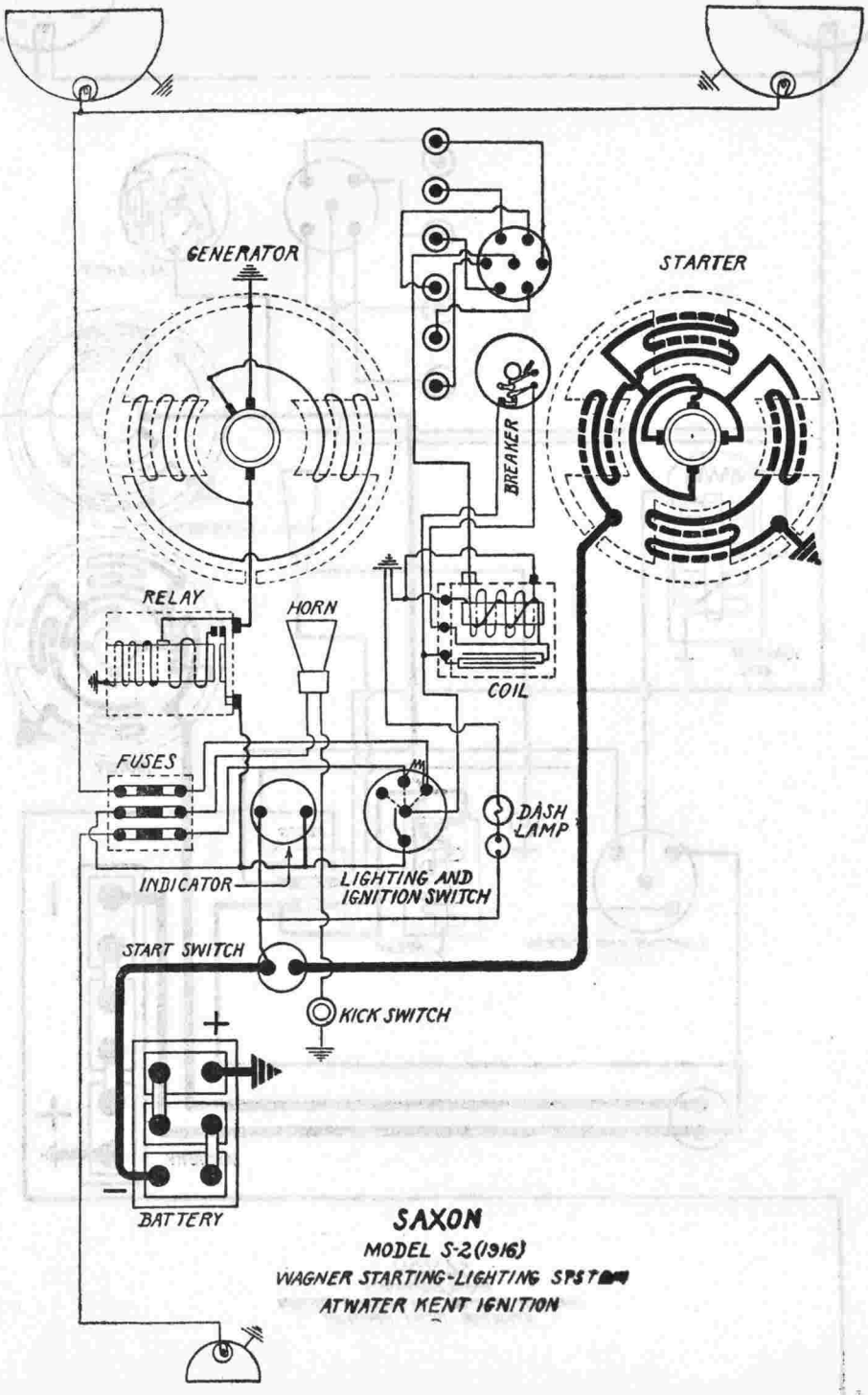
Adjusting Regulator.—To adjust regulator, hold upper contacts open and adjust lower set until the desired output is attained. Then hold open lower set and adjust the upper set. When both are allowed to operate together, the output should be the desired rate.

Oiling.—Put 6 to 8 drops of light engine oil in each of the motor-generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 12 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.

Model Numbers.—Motor-generator is Model MG-9. Atwater-Kent breaker is type K-2, standard coupling being used.





Saxon

Model S-2 (1916) (Serial Nos. 5100 to 9099)
Wagner Generating, Starting and Lighting System
Atwater Kent Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Type K-3. Breaker contacts separate .010 to .012 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Put a drop of light engine oil on each of the wearing parts of the breaker and 4 or 5 drops of light machine oil in the oil hole beside the notched shaft, every two weeks If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles

Timing.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .027 to .031 inch.

Starter.—Model EM-158 or EM-167, Type 36-T. Starter is connected to the engine through a Bendix drive.

Oiling.—Put 5 or 6 drops of light engine oil in each of starter bearing oilers every month.

Generator.—Wagner, Model 157, Type 41-V. Generator current regulation is by third brush system. Rotation is clockwise, viewed from commutator end. Maximum current output of 16 amperes is reached at 20 miles per hour or 2650 R. P. M. of armature.

Amperes	Generator Data	R. P. M.
4		1400
9		1700
12.5		2000
15		2300
16		2650
15		3000
13		3500

Oiling.—Put 5 or 6 drops of light engine oil in each of generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—Relay closes at 8-10 miles per hour and opens at 6-8 miles per hour. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No 00 sand paper. Remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 17 cp. Dash and tail lamps are each 6-8 volt, 2 cp.

Fuses.—Fuses are 15 ampere.

Saxon

Models B-5-R, B-6-R (1917) (Serial Nos. 9600 to 19399)
Wagner Generating, Starting and Lighting System
Atwater Kent Ignition

Battery.—Exide, Type 3-XC-13-1, 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Type K-3, clockwise rotation. Breaker contacts separate .010 to .012 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Oiling.—Put a drop of light engine oil on each of the wearing parts of the breaker, and put 4 or 5 drops of light machine oil in the oil hole beside the notched shaft, every two weeks. Put a very small amount of vaseline on the notched shaft, applying with a toothpick. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps are .028 to .031 inch.

Starter.—Model EM-156, Type 36-T. Starter is connected to the engine by a Bendix drive.

Oiling.—Put 4 or 5 drops of light engine oil in each of starter oilers every month.

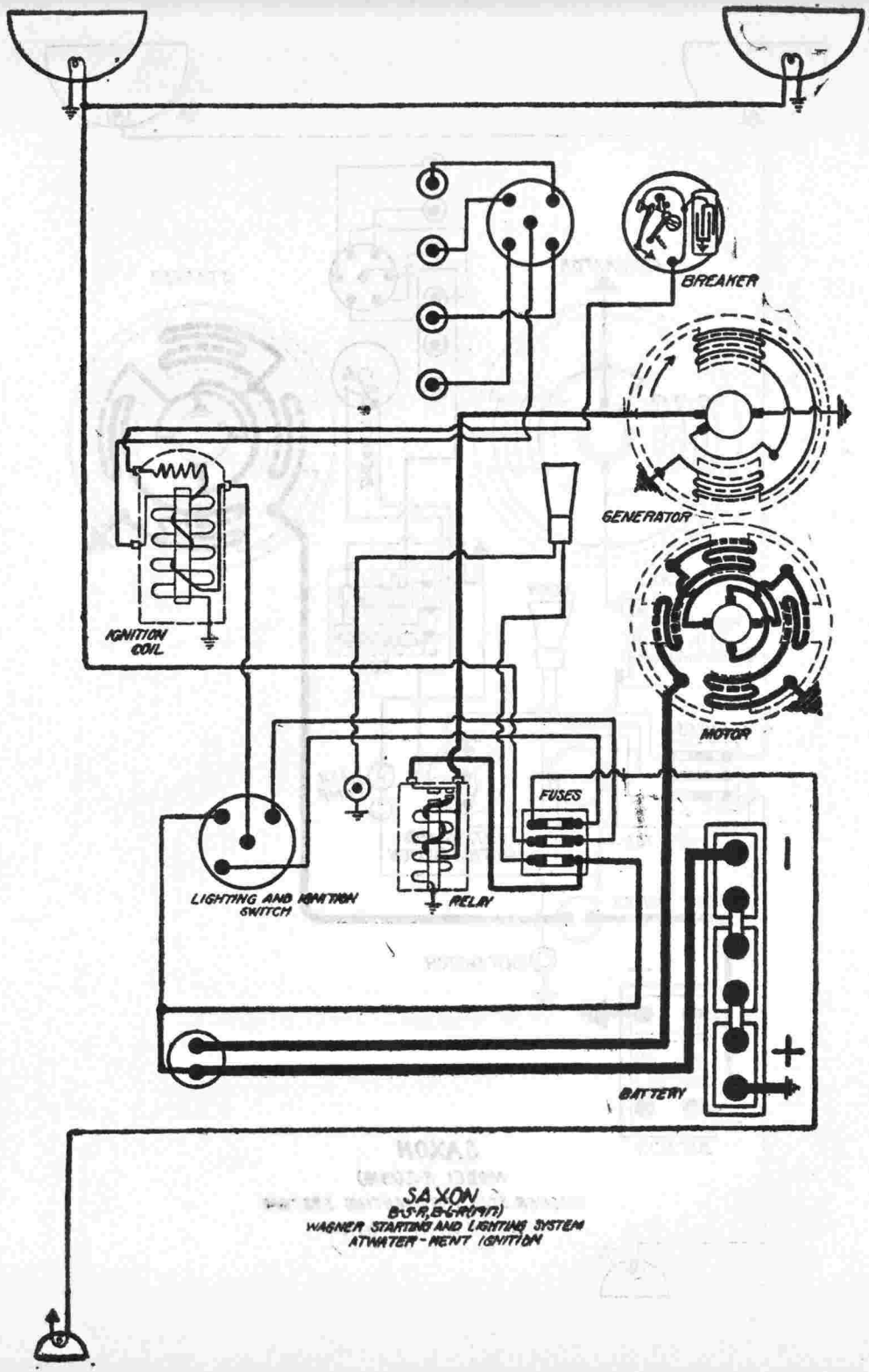
Generator.—Model EM-174, Type 41-T. Generator current regulation is by third brush system. Rotation is clockwise, viewed from commutator end. Maximum output of 16 amperes is reached at 20 miles per hour.

Amperes	Generator Data	R. P. M.
3		1600
8		2000
14		2800
16		3600
15.5		4000
13		5000

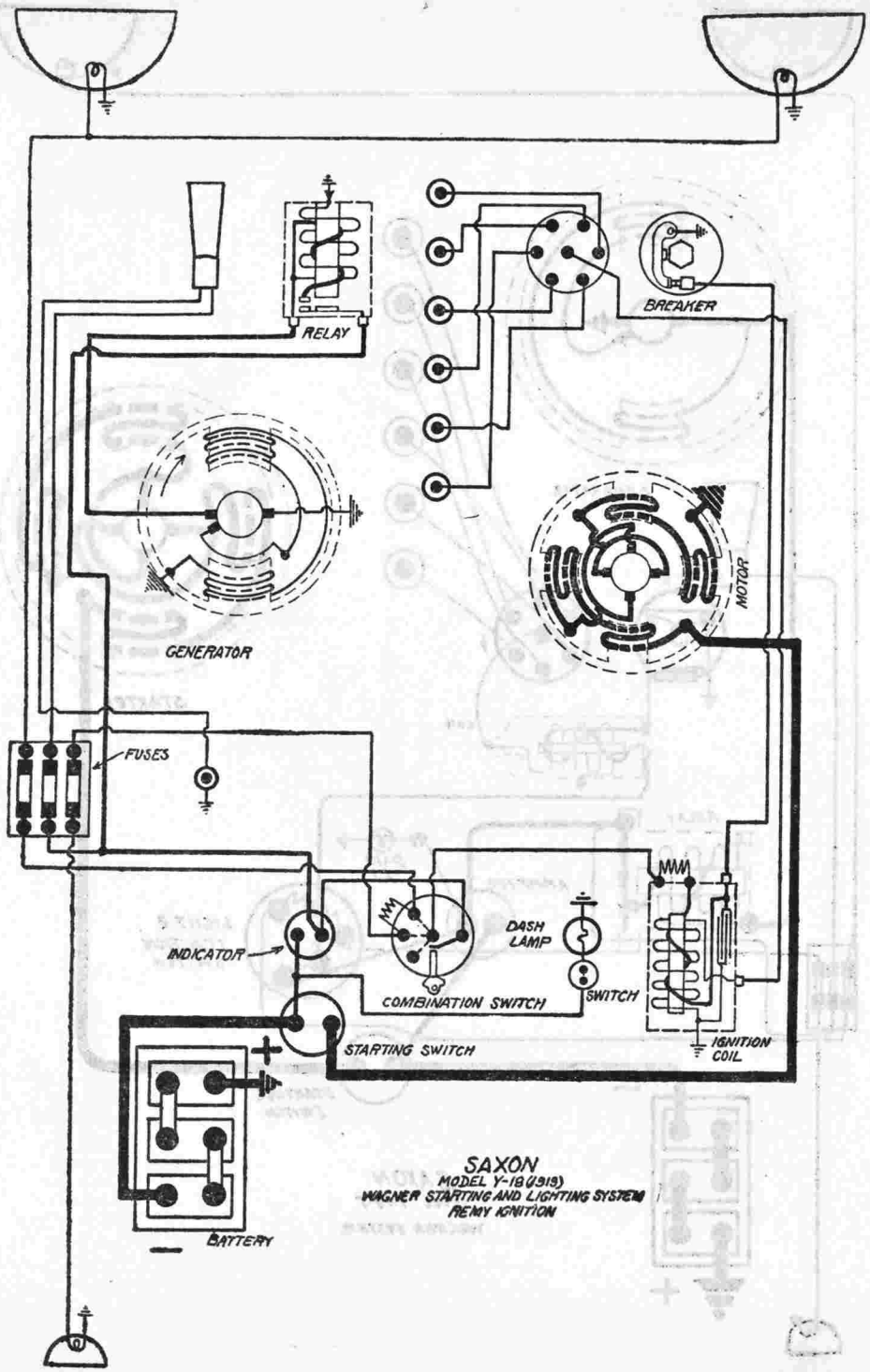
Oiling.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—Relay closes at 8-10 miles per hour and opens at 6-8 miles per hour. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 12 cp. Tail lamp is 6-8 volt, 2 cp.



SAXON
B-5-R, B-6-R (1917)
WAGNER STARTING AND LIGHTING SYSTEM
ATWATER-KENT IGNITION



Saxon

MODELS S-2 T, S-4 T, S-4-R, S-4-S (1917-18) Y-18 (1918-19)
WAGNER GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Exide, Type XC-13-1, 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .020 to .025 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions should be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the "D.C." mark on flywheel is one inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model E.M.-167, Type 36-T. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 125 R.P.M., taking 160 amperes. Operating freely, armature revolves at 8000 R.P.M., current 60-90 amperes. Lock torque is 11.5 pound-feet, current 475 amperes.

OILING.—Put 5 or 6 drops of light engine oil in each of starter bearing oilers every month.

GENERATOR.—Model E.M.-155, Type 41-W. Generator current regulation is by third brush system. Rotation is clockwise, looking at commutator end. Maximum current output of 16 amperes is reached at 2200 R.P.M. of armature or 20 miles per hour.

Amperes	Generator Data	R.P.M.
12.0		1500
15.5		2000
16.0		2200
15.4		2500
13.0		3000

OILING.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour and opens at 6-8 miles per hour. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volts, 15 cp. Tail and dash lamps are 6-8 volt, 2 cp.

FUSES:—Fuses are 15 or 20 ampere

SAXON

MODEL Y-18-T (1920)

WAGNER GENERATING, STARTING AND LIGHTING SYSTEM
WAGNER IGNITION

BATTERY.—Prest-O-Lite, Type 611 RHN, 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .020 to .025 inch. When the condition of the points affects the ignition, renew the breaker lever and contact screw.

OILING.—Screw up the grease cup under the breaker head one-half turn every two weeks. If car is driven more than 500 miles in two weeks, this must be done every 500 miles. Put 3 or 4 drops of light engine oil on the wick in the breaker lever spindle every six months.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .028 inch.

STARTER.—Model E.M.-167-A or 218. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 125 R.P.M., current being 160 amperes. Lock torque is 11.5 pound feet, current 475 amperes. Running freely, starter current is 60-90 amperes, armature revolving 8000 R.P.M.

OILING.—Put 5 or 6 drops of light engine oil in each of starter oilers every month.

GENERATOR.—Model E.M.-200, Type 41-Y, or **Model E.M.-155, Type 41-W.** Generator current regulation is by third brush system. Maximum current output of 15-16 amperes is reached at 20-22 miles per hour.

Generator Data

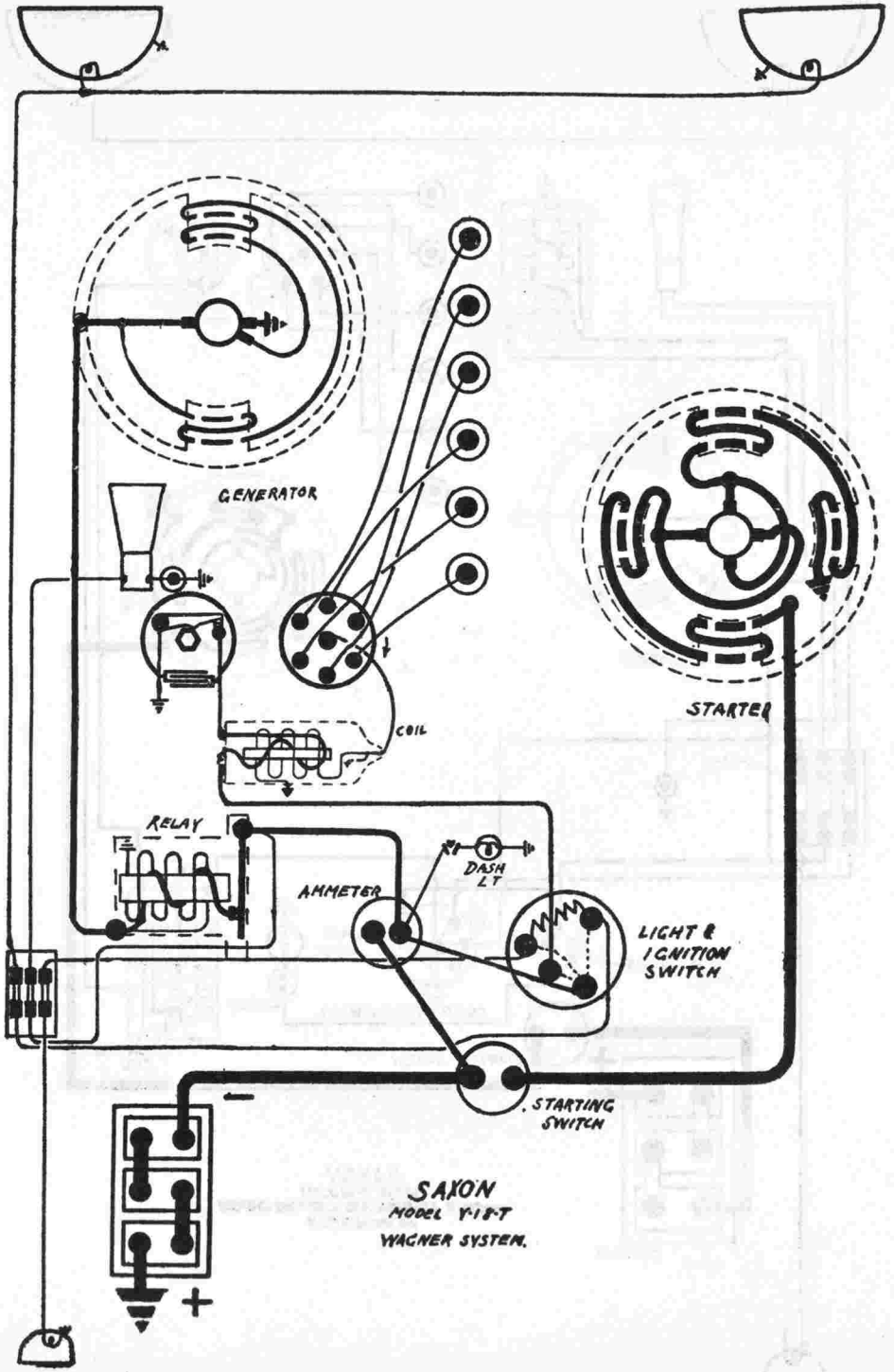
Model E.M.-200, Type 41-Y		Model E.M.-155, Type 41-W	
Amperes	R.P.M.	Amperes	R.P.M.
0	660	0	850
6	880	8	1225
12	1200	12	1500
15	1650	16	2100
11	2500	13	3000

OILING.—Put 5 or 6 drops of light engine oil in each of generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Model I-471. Relay closes at 8-10 miles per hour or 800-1000 R.P.M. of the armature, and opens at 6-8 miles per hour or 600-800 R.P.M. of the armature. Charging current is 2 amperes at closing, and the discharge current 0-4 amperes at opening of relay contacts. Contacts separate .035 to .065 inch. Air gap between relay armature (moving member) and coil core is .025 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

FUSES.—Fuses are 15 ampere.

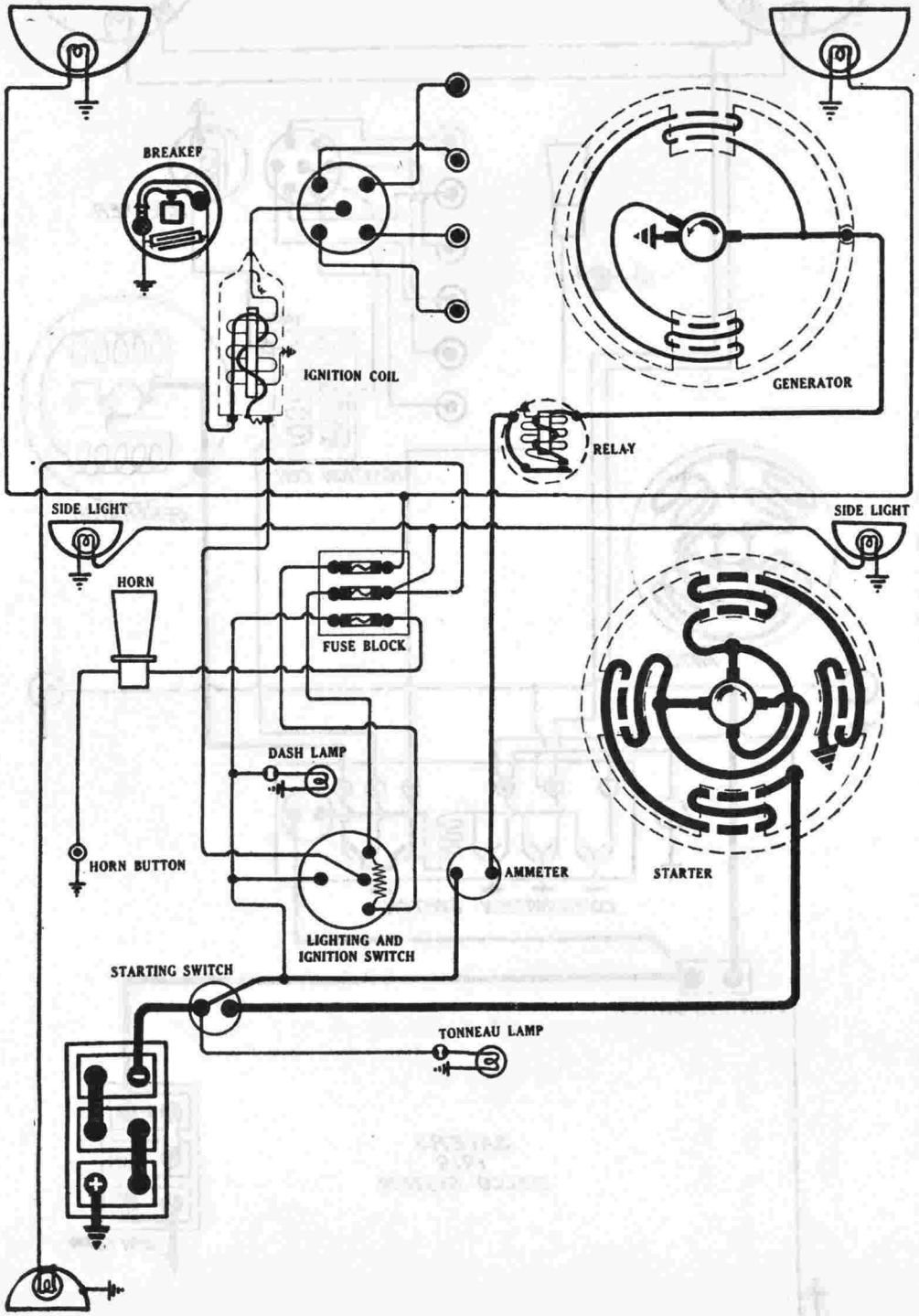


SAXON

MODELS 125, 125-G (1920-21-22)

WAGNER GENERATING, STARTING AND LIGHTING SYSTEM

WAGNER IGNITION



BATTERY.—Prest-O-Lite, Type 613RHN, 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model K.D. 286. Distributor Model K.D. Breaker contacts separate .020 to .025 inch. When the condition of the points affects the ignition, renew the breaker lever and contact screw.

Oiling.—Screw up the grease cup under the breaker head one-half turn every two weeks. If car is driven more than 500 miles in two weeks, this must be done every 500 miles. Put 3 or 4 drops of light engine oil on the wick in the breaker lever spindle every six months.

Timing.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—The spark plug gaps are .030 inch.

STARTER.—Model 36-T, Type E.M. 396. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, looking at the commutator end. Starter cranks the engine at 170 R.P.M., taking 125 amperes. The lock torque is 13 foot-pounds, the current being 600 amperes. Running freely the starter current is 60-90 amperes, the armature revolving 8000 R.P.M.

Oiling.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR.—Model 46-V-5, Type E.M. 395. Generator current regulation is by the third brush system. The direction of rotation is counter-clockwise, looking at the commutator end. The peak setting should be 16 amperes at 8.6 volts.

Generator Data.—E.M. 395

Amperes	R.P.M.
5	700
12	1000
16	1400
14	2000
10	2600

The charging rate is varied by adjustment of the third brush setting. After loosening the third brush locking screw, which is sealed into place in the commutator end, the brush may be moved in either direction. Move in the direction of rotation to increase the charging rate, or in the opposite direction to decrease the charging rate. Tighten the locking screw and reseat the brush after positon adjustment.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—The relay is mounted on the dash. Relay closes when the voltage of the generator reaches 6.5 to 7.0 volts, and opens when there is a discharge current of 0 to 2 amperes. The contacts separate .035 to .065 inch. The air gap between the relay armature and coil core is .025 inch, contacts closed. Clean relay contacts by drawing glazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again puttting into service.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Dash, tail and tonneau lamps are 6-8 volt, 2 cp.

FUSES.—Fuses are 15 ampere.

SAYERS
1917-18-19
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

Battery:—(1918) 6 volt, 85 ampere hour. (1919) 6 volt, 100 ampere hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts should separate .018 inch. They are made of tungsten. They will operate properly even though very irregular, due to the fact that the rough surfaces fit each other perfectly. Their natural color is dark gray, not silver. Should they become badly burned or pitted, affecting the ignition, remove and resurface them by drawing across a piece of fine emery cloth laid on a flat surface, as on the bed of a drill press, finishing on a very hard oil stone. Clean all oil from contacts before again putting into service.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be .027 inch to .030 inch.

Oiling.—Put 5 or 6 drops of light engine oil in the top distributor bearing every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Starter.—Starter is connected to the engine through a Bendix drive. The lock torque is 16 pound-feet. When running freely starter takes 40 amperes. Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils or commutator bars or open circuits are the chief causes of low speed and low current.

Oiling:—Put several drops of light engine oil in the starter oilers every month. Models No. 106 and 136 require no oil as they have oilless bearings.

Generator Models No. 101, 105 and 135.

Generator.—Generator current regulation is by third brush system.

GENERATOR DATA, MODEL 101

Hot Test		Cold Test	
Amperes	R. P. M.	Amperes	R. P. M.
Neutral	500	Neutral	500
10-12	900	10.5-12.5	900
14-16	1400	15.5-18.0	1400
11-13	2000	13.0-17.0	2000

Generator should begin to supply current at 8-10 miles per hour and reach its maximum output of 16-18 amperes at 20-25 miles per hour.

Oiling.—Put several drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

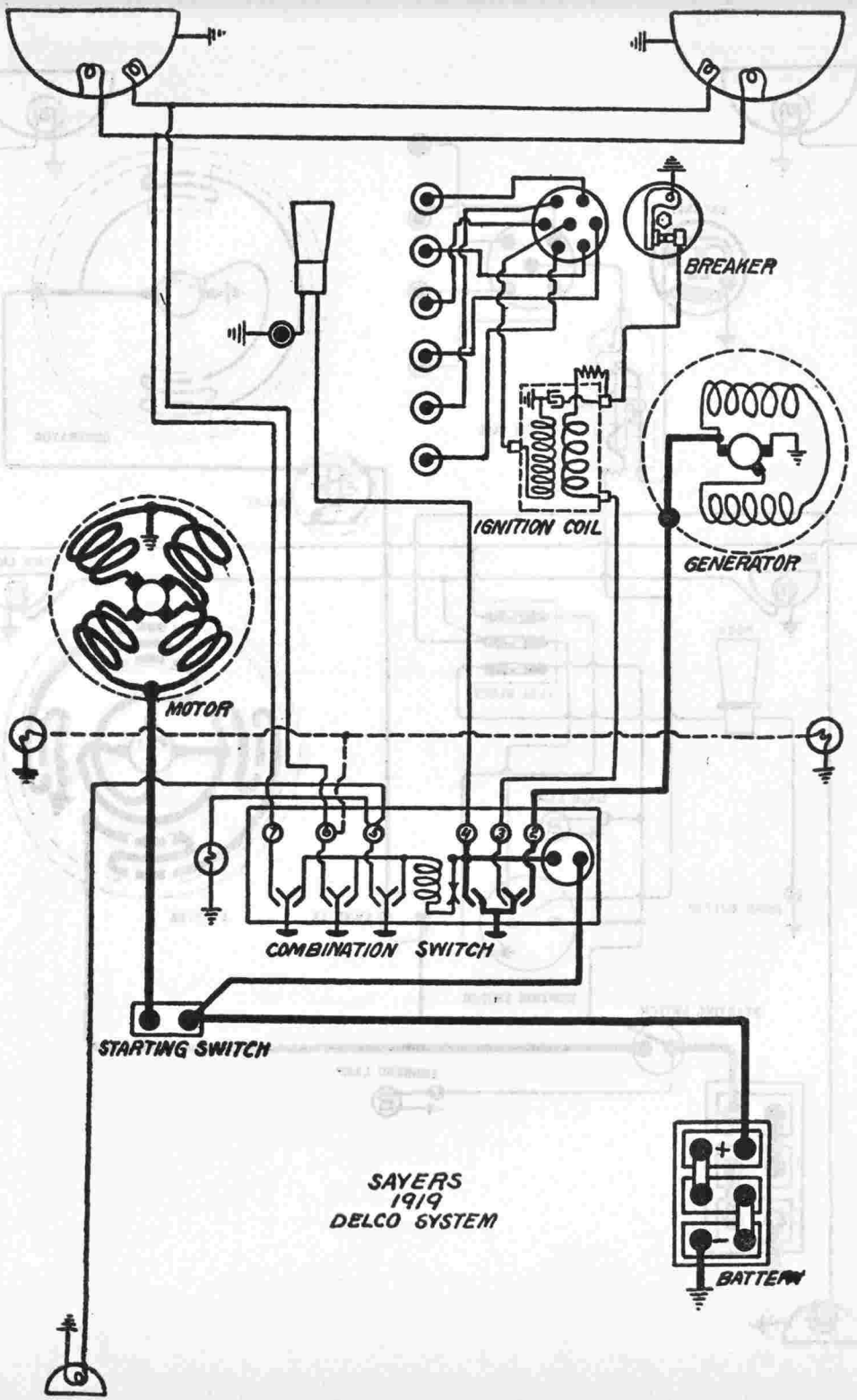
Relay.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

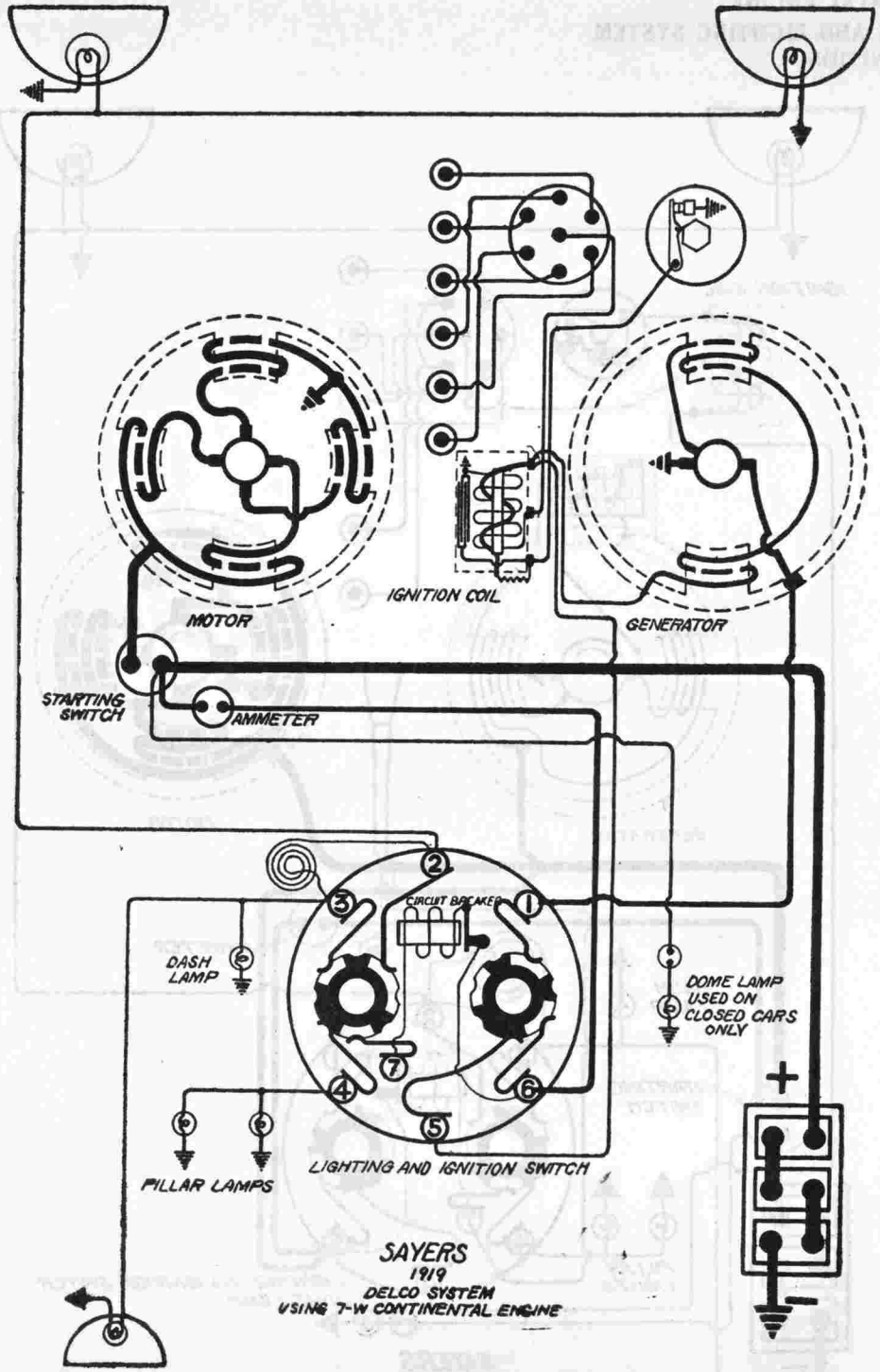
Lamps.—Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 4-6 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

Circuit Breaker.—There is a vibrating type circuit breaker on the back of lighting switch, to take the place of fuse in the lighting circuit. It should take about 25 amperes to start this device vibrating, but once set vibrating, 3 to 5 amperes will cause it to continue.

Model Numbers.—Generator is No. 101. Starter is No. 102.

Note:—On some models in 1918 the generator shunt field was connected to the switch terminal of the ignition coil.





SAYERS

(1919-20) 7-W CONTINENTAL ENGINE

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Willard, 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2158. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 4 or 5 drops of light engine oil in the distributor unit oilers every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering the power stroke is on top dead center, spark control lever and breaker assembly one-third advanced.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER:—Model No. 106, 136. Starter is connected to the engine through a Bendix drive. Lock torque is 10.5 pound-feet. Running freely, starter takes 40 amperes.

OILING.—Starter bearings are of the oilless type.

GENERATOR:—Model No. 105, 135. Generator current regulation is by the third brush system. Generator begins to supply current at 500 R.P.M. of the armature or 7-8 miles per hour, and reaches the maximum current output of 16 amperes at 18-25 miles per hour.

Cold Test	**Generator Data**	Hot Test	
Amperes	R.P.M	Amperes	R.P.M.
Neutral	500	Neutral	500
10.5-12.5	900	10-12	900
15.5-18.0	1400	14-16	1400
13.0-17.0	2000	11-13	2000

To vary the charging rate loosen the two screws which hold the third brush arm. Move the third brush to the right (facing the commutator end) to increase the charging rate, and to the left to decrease the charging rate. Tighten the two screws and reseat the brush after adjusting the position.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—There is no relay. The circuit between the generator and battery is controlled by the ignition switch.

LAMPS.—The head lamps are 6-8 volt, 17 cp. Dash and tail lamps are 6-8 volt, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start the vibrator, but 3-5 amperes will cause it to continue.

MODELS F, AL, DP (1920-21) GH (1922)
7R CONTINENTAL ENGINE
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Willard, Type, SJR-3, 6 volt 80 ampere hour and Type SJRN-3 6 volt, 93 ampere hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2159. Distributor Model No. 5207. Breaker contacts separate .020-.025 inch with the breaker arm on lobe of cam. They are made of tungsten. When the condition of the contacts affects the ignition, resurface on a fine flat contact file or on a medium hard oilstone. Distributor is full manual advance. Maximum manual advance is 50 degrees. Breaker arm spring tension is 16-20 ounces.

Mounting:—Distributor is mounted on the engine block. To remove distributor, disconnect primary lead and manual advance rod. Remove distributor head with high tension cables intact. Remove manual advance stop screw and lift unit from place.

OILING.—Put 4 or 5 drops of light engine oil in each of the ignition unit oilers every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1⅜ inches past the indicator, spark control lever and breaker assembly in the fully retarded position. To check timing, crank engine over until piston No. 1 is coming up on the compression stroke. This is the up stroke with both valves closed. Fully retard the spark. Continue to crank engine until piston reaches a position 1⅜ inches past top dead center (measured on the flywheel). Breaker contacts should separate at this point. If they do not, loosen the timing adjustment screw in the center of the breaker cam and rotate cam until contacts open. Tighten the screw. Make certain that the rotor is opposite the segment connected to the spark plug in cylinder No. 1 and connect the remaining plugs in order 5-3-6-2-4 clockwise around the distributor head.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

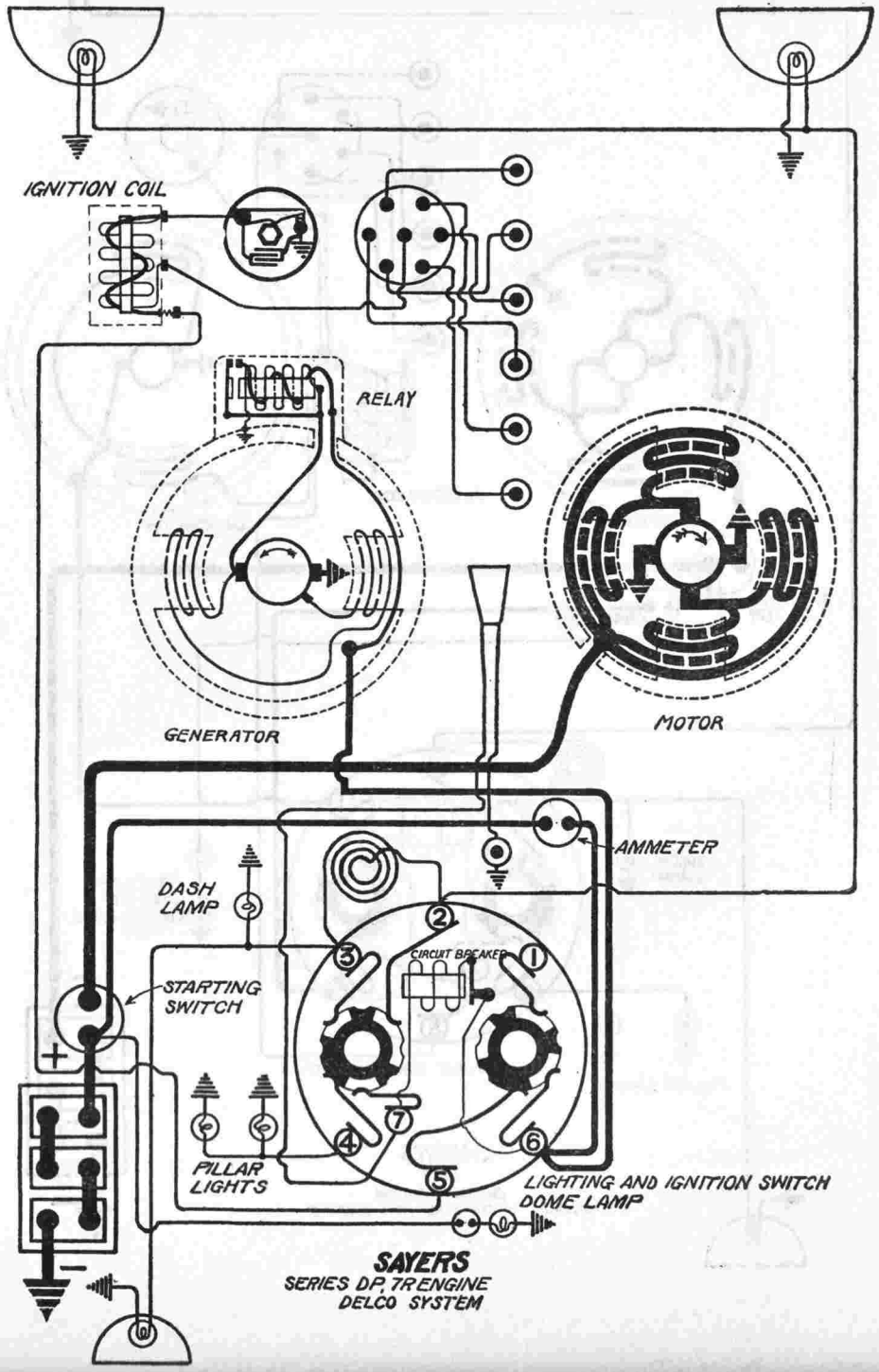
STARTER:—Model No. 179, 181, 200. Starter is connected to the engine through a Bendix drive. Lock torque is 28 pound-feet at 4 volts, the current being 5.25 amperes. Remove the grease plug in the reduction gear case and inject soft cup grease every six months.

Mounting:—Starter is sleeve mounted. To remove starter, disconnect lead from starter terminal and remove tapered pilot screw. Pull starter forward and out from engine.

Oiling:—Put 8 or 10 drops of light engine oil in each of the starter oilers every month or each 1000 miles. Saturate wick in oiler on Bendix gear end of starter once a year. Remove grease plug in the reduction gear case and inject soft cup grease every six months.

GENERATOR:—Model No. 165, 180. Rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Maximum charging rate is 16 amperes, reached at 1200 R.P.M. of the armature or 16-20 miles per hour.

Amperes	Generator Data	R.P.M.
Neutral		550
4		800
8		1000
11-15		1200
11-14		2000



SAYERS

MODELS F, AL, DP (1920-21) GH (1922)
7R CONTINENTAL ENGINE
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

Charging rate is varied by the adjustment of the third brush setting. To move the third brush, loosen the three screws holding the bearing retainer plate on the commutator end and shift the plate. Move in a counter-clockwise direction to increase the charging rate, or in the opposite direction to decrease the charging rate. Tighten the adjusting screws and reseat the brush after making the adjustment. Maximum charging rate must not exceed 16 amperes.

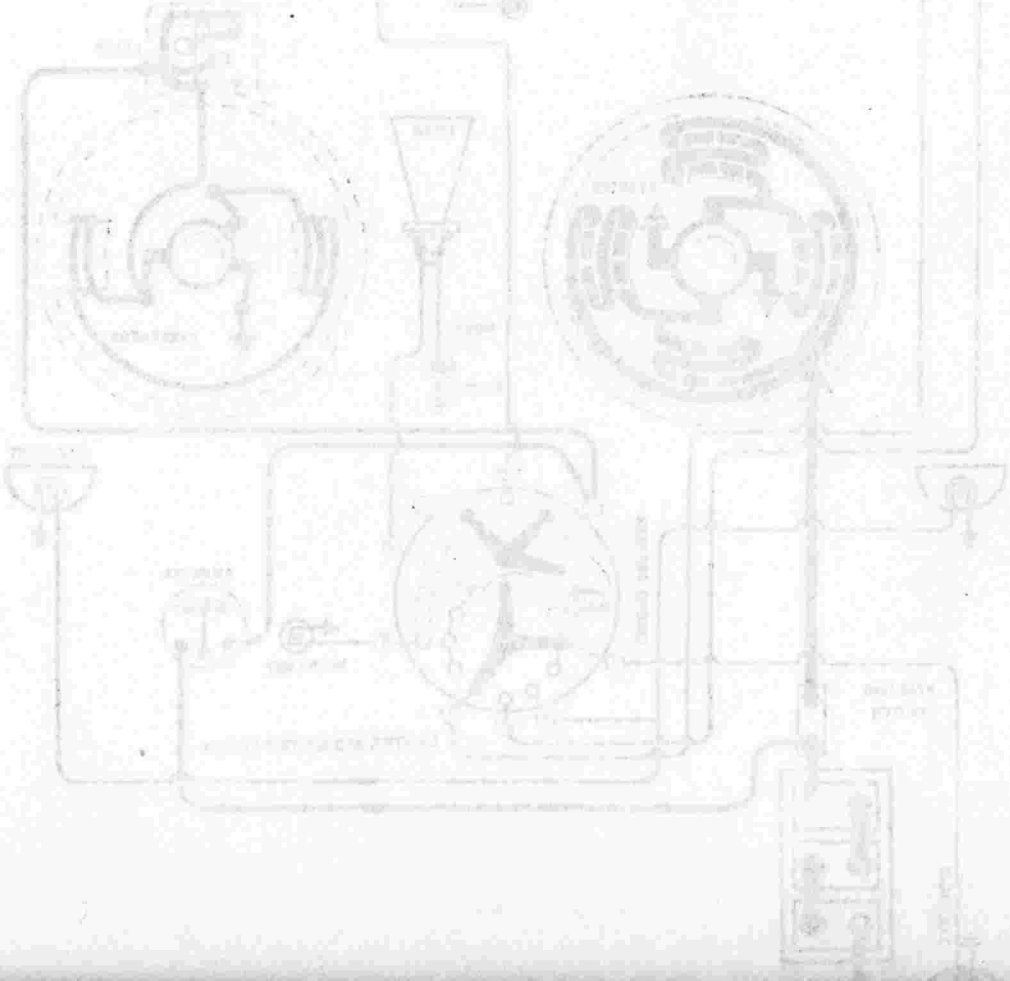
OILING.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Mounting:—Generator is base mounted. To remove generator, disconnect generator lead and coupling. Remove hold-down screws and lift generator from place.

RELAY.—Relay is mounted on the generator frame. Relay closes at 550-600 R.P.M. of the armature or 7-8 miles per hour, and opens at 500-550 R.P.M. of the armature or 5-6 miles per hour. Relay contacts separate .046 to .062 inch. Air gap between the relay armature and coil core is .020 to .035 inch, contacts closed. To adjust relay connect a voltmeter between the positive (+) generator brush and ground. Then slowly speed up the generator and adjust the relay spring tension by turning the thumb nut until the contacts close when the voltmeter indicates 7.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6 volt, 21 cp. Dash and tail lamps are 6 volt, 2 cp. Cowl lamps are 6 volt, 6 cp. On 1920 cars, head lamps are 6-8 volt, 15 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker, mounted on the back of the combination switch, takes the place of fuses. It requires 25 amperes to start the vibrator, but 3-5 amperes will cause it to continue.



SAYERS AND SCOVILL

MODEL CL, 6-T CONTINENTAL ENGINE (1923)
MODEL GL, 6-B AND 6-J CONTINENTAL ENGINES (1924)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

IGNITION:—Coil Model 2178. Distributors Model 5251, 5208. Distributors are semi-automatic. On **Model 5251** the manual advance is 30 degrees. Automatic advance begins at 450 R.P.M. Maximum automatic advance is 24-28 degrees reached at 2000 R.P.M. On **Model 5208** the manual advance is 15 degrees. Automatic advance begins at 800 R.P.M. Maximum automatic advance is 16-22 degrees reached at 2000 R.P.M. Breaker contacts separate .020-.0275 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone or with a fine jeweler's file.

Mounting:—To remove distributor, disconnect primary lead and manual advance rod. Remove distributor head with high tension cables intact. Remove manual advance stop screw and lift distributor out.

Oiling:—Put 8 or 10 drops of light engine oil into each distributor oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles. Repack the distributor housing with medium soft cup grease up to the advance ring and yoke once a season. Apply a little vaseline to the rotor track occasionally during the first 2000 miles, after this, the track will be glazed, and it will be necessary to keep the track wiped clean with a clean cloth. Apply a very small amount of vaseline about the size of a match head to the surface of the breaker arm every 2000 miles.

Timing:—Breaker contacts just begin to separate when piston No. 1 on compression stroke is at top dead center mark "UD" on flywheel is opposite indicator on wheel housing, spark control lever and breaker assembly in the fully retarded position. To check timing, crank engine over until piston No. 1 reaches top dead center on the compression stroke. This is the up stroke with both valves closed. The flywheel mark "UD" should be opposite the indicator on the flywheel housing. Loosen the lock screw in the distributor cam and rotate cam until contacts separate. Tighten the screw. Make sure the rotor is opposite the segment connected to the spark plug in cylinder No. 1 and connect the remaining plugs in order 5-3-6-2-4 around the distributor.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—The spark plug diameters are 7/8 inch, and the gap is .030 inch.

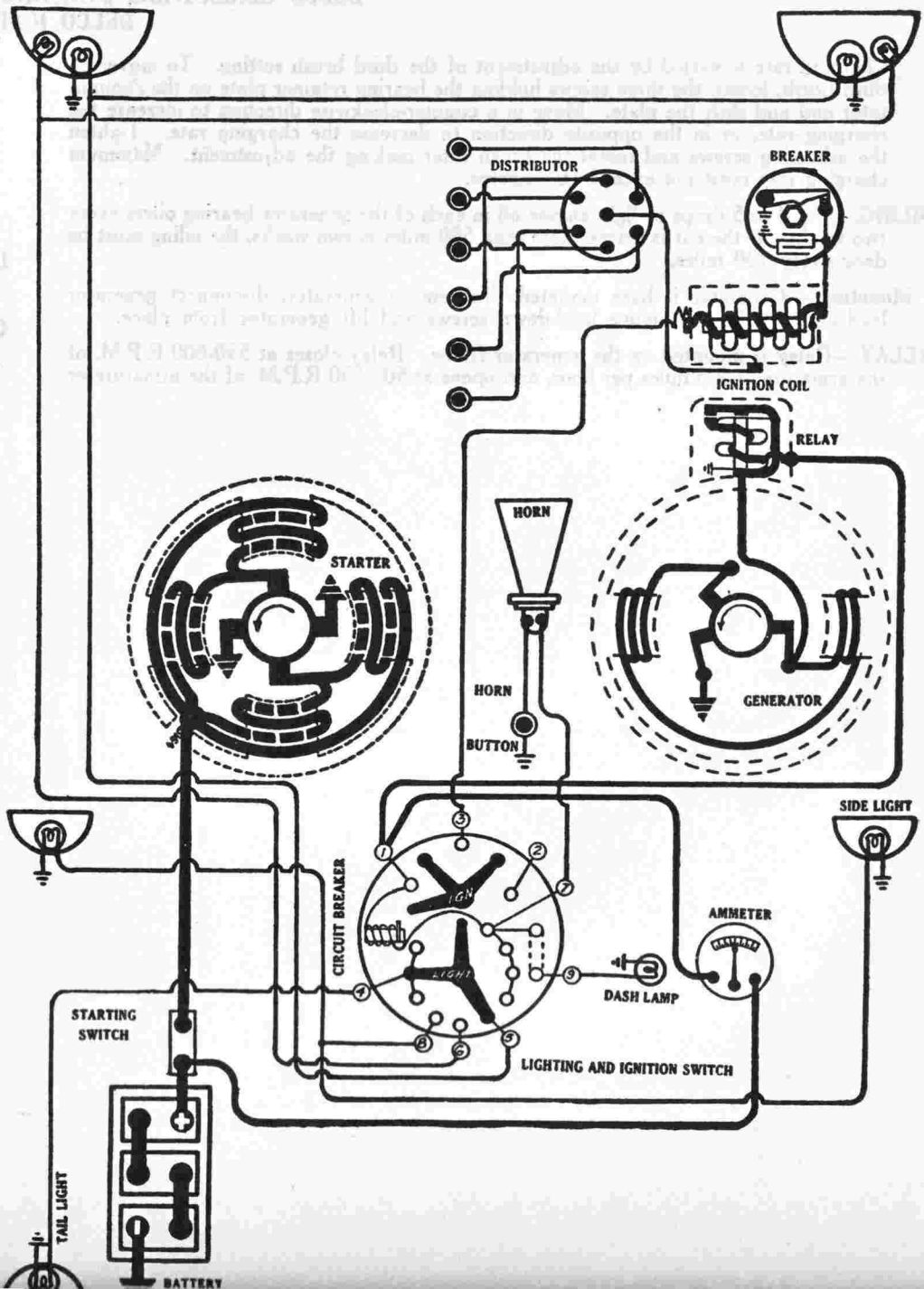
STARTER:—Model 181, 208. Starter is connected to the engine through a Bendix drive with reduction gears. The electrical circuit to the starter is completed through the starter switch. **Model 1955.** The direction of rotation is clockwise, looking at the commutator end. Starter brush tension is 2¼-2¾ pounds.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	36
27 "	Lock	2.75-3.5	500-600

Mounting:—Starter is mounted at left of engine. To remove starter, disconnect starter cable and remove large pilot hold-down screw. Pull starter forward and lift out.

Oiling:—Put 8 or 10 drops of light engine oil into each starter oiler once a month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles. Keep oil off the commutator. Keep dirt and grit off of Bendix drive to insure perfect operation. Saturate the wick oiler in the end of the Bendix gear case with light engine oil every year.



SAYERS AND SCOVILL

MODEL CL, 6-T CONTINENTAL ENGINE (1923)
MODEL GL, 6-B AND 6-J CONTINENTAL ENGINES (1924)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

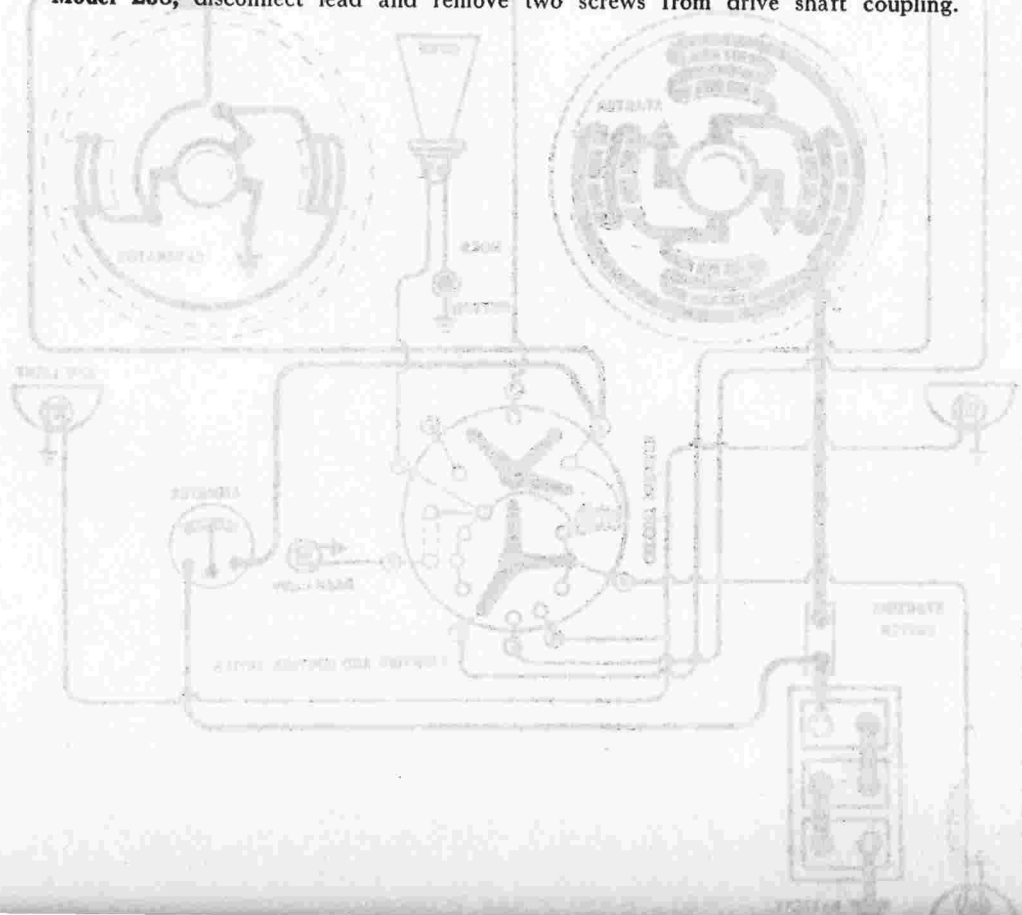
GENERATOR:—Model 256, 258. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. To adjust the charging rate of the generator, remove the cover band, and by means of an extension handle, shift the third brush in the direction of rotation (counter-clockwise) to increase the charging rate, and in the opposite direction (clockwise) to decrease the charging rate.

Generator Data

Amperes	R.P.M.
5	700
11	1000
Max. 14-16	1600
15	2000

The tension of each of the generator brushes should be from 1¼ to 1¾ pounds.

Mounting:—Generator is mounted at the right of engine. To remove generator **Model 256,** disconnect lead from generator terminal and disconnect the coupling. Remove hold-down screws and lift generator from engine. To remove generator **Model 258,** disconnect lead and remove two screws from drive shaft coupling. Remove four screws from generator base and lift unit out.



Oiling:—Put 8 or 10 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY:—Relay closes at 8-9 M.P.H. or at 6-8 volts, and opens with a current discharge of 0-3 amperes. The contact gap is .025-.035 inch, fully separated. The air gap between relay armature and coil core is .025-.035 inch, contacts fully closed.

LIGHTING:—Combination Switch Model No. 1246 is used. The head lights are each 6-8 volts, 21 cp. Auxiliary lights are each 6-8 volts, 4 cp. Dash and tail lights are each 6-8 volts, 2 cp. All the above lights are of the single contact type.

CIRCUIT BREAKER:—A circuit breaker mounted on the back of the combination switch is used in the place of fuses. A current flow of 25-30 amperes will cause circuit breaker to operate, and it will continue to operate with a current flow of not more than 15 amperes. Also not over 15 amperes must pass with a dead short circuit across the circuit breaker terminals.

SAYERS AND SCOVILL

SERIES HL AND IL (1925)
SERIES JL AND KL (1926)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SJR-5. 6 volt, 135 ampere hour. Starting capacity is 135 amperes for 20 minutes. Lighting capacity is 5 amperes for 26 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2178. Distributor Model No. 5208. Breaker contacts separate .020-.0275 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone or with a fine flat jeweler's file. Distributor is of the semi-automatic type. Manual advance is 30°. Automatic advance begins at 600 R.P.M. and reaches a maximum of 16-22° at 1600 R.P.M. The breaker arm spring tension should be 16-20 ounces.

Mounting.—Distributor is mounted at right of engine. To remove, remove distributor head and disconnect breaker lead and manual advance rod. Then remove manual advance stop screw. Lift distributor from place.

Oiling.—Put 8 or 10 drops of light engine oil into each distributor oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles. Repack the distributor housing with medium soft cup grease up to the advance ring and yoke once a season. Apply a little vaseline to the rotor track occasionally during the first 2000 miles, after this, the track will be glazed, and it will be necessary to keep the track wiped clean with a clean cloth. Apply a very small amount of vaseline about the size of a match head to the surface of the breaker cam every 2000 miles.

Timing.—Breaker contacts just begin to separate when piston No. 1 on compression stroke is at top dead center, mark "UD" on flywheel is opposite indicator on flywheel housing with the spark control lever and breaker assembly fully retarded. To set timing, crank engine until piston No. 1 reaches this position. Then fully retard spark control lever. Loosen timing adjustment screw in center of breaker cam and rotate cam until contacts begin to separate. Tighten the screw being careful not to disturb the adjustment. Check position of rotor button and see that it is under segment connected to spark plug in cylinder No. 1.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

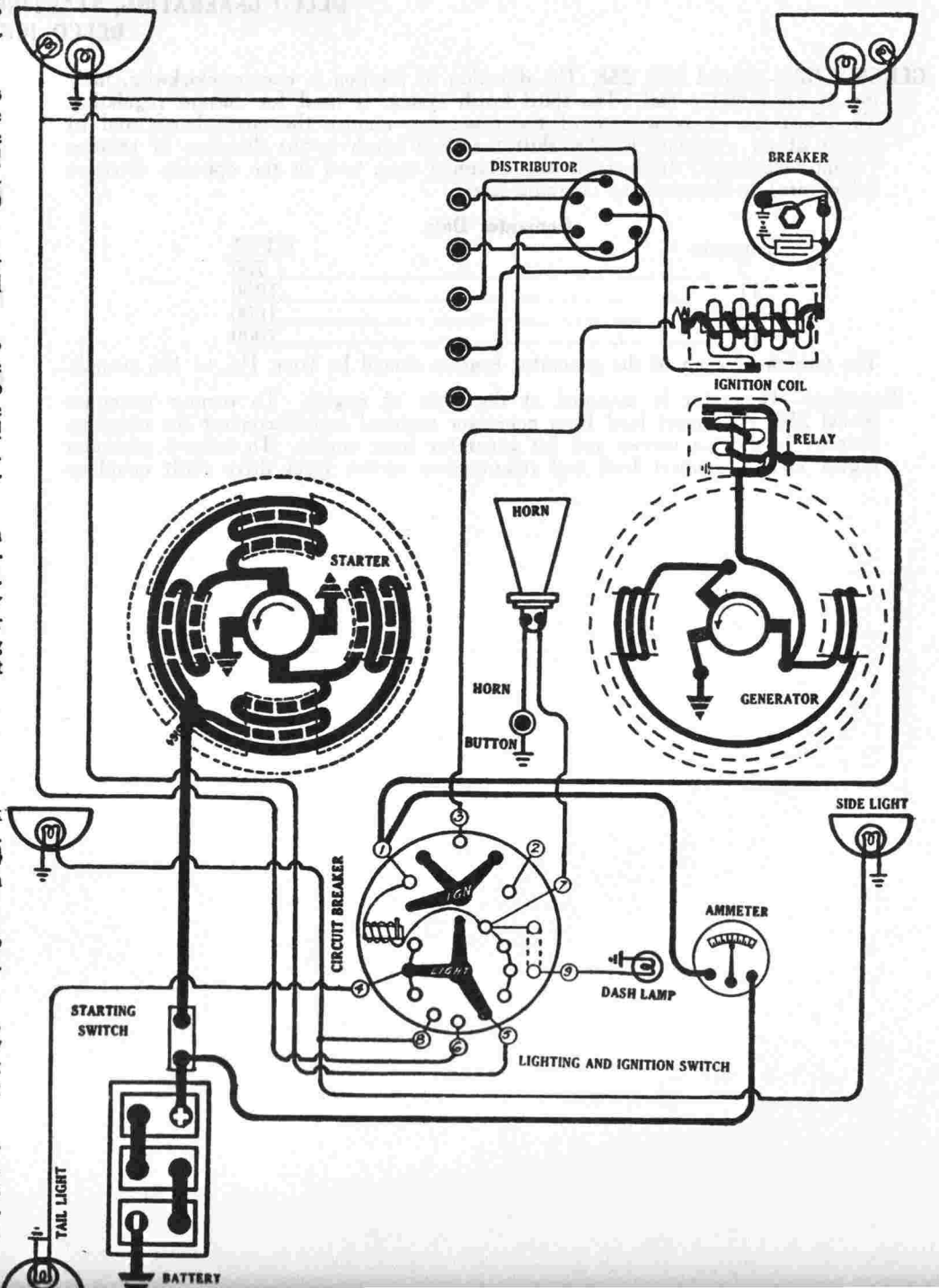
Spark Plugs.—The spark plug diameters are 7/8 inch, and the gap is .030 inch.

STARTER.—Model No. 200. The starter is connected to the engine by a Bendix drive. The direction of rotation is counter-clockwise, looking at commutator end. When running free the starter takes 50 amperes at 6 volts. Lock torque is 24 pound feet at 2.75 volts. The tension on each of the starter brushes should be from 2¼ to 2¾ pounds.

Mounting.—Starter is mounted at right of engine at rear of flywheel housing. To remove starter, disconnect starter cable and remove large pilot mounting screw. Then slide starter to rear and lift from position.

Oiling.—Put 8 or 10 drops of light engine oil into each starter oiler once a month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles. Keep oil off the commutator. Keep dirt and grit off of Bendix drive to insure perfect operation. Saturate the wick oiler in the end of the Bendix gear case with light engine oil every year.

GENERATOR.—Model No. 258. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. To adjust the charging rate of the generator, remove the cover band, and by means of an extension handle, shift the third brush in the direction of rotation (counter-clockwise) to increase the charging rate, and in the opposite direction (clockwise) to decrease the charging rate.



SAYERS AND SCOVILL

SERIES HL AND IL (1925)
SERIES JL AND KL (1926)
DELCO GENERATING, STARTING, AND LIGHTING SYSTEM
DELCO IGNITION

Generator Test Data

Amperes	R.P.M.
5	700
11	1000
16-18	1600
15	2000

The tension of each of the generator brushes should be from 1¼ to 1¾ pounds.

Mounting.—Generator is base mounted at left of engine. To remove, disconnect generator lead and coupling. Then remove hold down screws and lift generator from place.

Oiling.—Put 8 or 10 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Relay closes at 8-9 M.P.H. or at 7-8 volts, and opens with a current discharge of 0-3 amperes. The contact gap is .025-.035 inch, fully separated. The air gap between relay armature and coil core is .015-.020 inch, contacts fully closed.

LIGHTING.—Combination Switch Model No. 1246 is used. The head lights are each 6-8 volt, 32 cp. Auxiliary and side lamps are each 6-8 volt, 4 cp. Stop light is 6-8 volt, 15 cp. Dash, tail, dome and tonneau lamps are each 6-8 volt, 2 cp.

CIRCUIT BREAKER.—A circuit breaker mounted on the back of the combination switch is used in the place of fuses. A current flow of 25-30 amperes will cause circuit breaker to operate, and it will continue to operate with a current flow of not more than 15 amperes. Also not over 15 amperes must pass with a dead short circuit across the circuit breaker terminals.

S AND S

SERIES AA (1926-27-28) CONTINENTAL 6-B ENGINE
SERIES KL (1926-27) CONTINENTAL 6-B ENGINE
SERIES LHI (1926-27-28) CONTINENTAL 8-R ENGINE
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—(Series KL and LHI) Willard, Type SJRR-5, 6 volt. Starting capacity (20 minute rate) is 145 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 26 hours.

(Series AA) Willard, Type SJRR-6, 6 volt. Starting capacity (20 minute rate) is 160 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 30 hours. The negative (—) terminal is grounded. Battery is mounted under the driver's seat.

IGNITION:—Coil Model 2178. Distributor Model 4009 (5208 on KL Series). Breaker contacts separate .020-.0275 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Maximum manual advance is 40° (crankshaft). Automatic advance begins at 700 R.P.M. and reaches a maximum of 20° (crankshaft) at 1600 R.P.M. Breaker arm spring tension is 16-20 ounces.

Mounting:—Ignition coil is mounted on the engine side of the dash. Distributor is mounted at right of engine. To remove distributor, disconnect primary lead and manual advance rod. Then remove distributor head with high tension cables intact. Remove manual advance stop screw and lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil into each distributor oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles. Repack the distributor housing with medium soft cup grease up to the advance ring and yoke once a season. Apply a little vaseline to the rotor track occasionally during the first 2000 miles, after this, the track will be glazed, and it will be necessary to keep the track wiped clean with a clean cloth. Apply a very small amount of vaseline about the size of a match head to the surface of the breaker cam every 2000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever in the fully retarded position. To check timing, crank engine until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Fully retard spark control lever and continue to crank engine until piston No. 1 reaches top dead center when the flywheel mark 'UD' will be opposite the indicator on the flywheel case. If breaker contacts do not separate at this point, loosen lock screw in center of breaker cam and rotate cam until contacts begin to separate. Tighten the screw and make certain that the rotor is under the segment connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

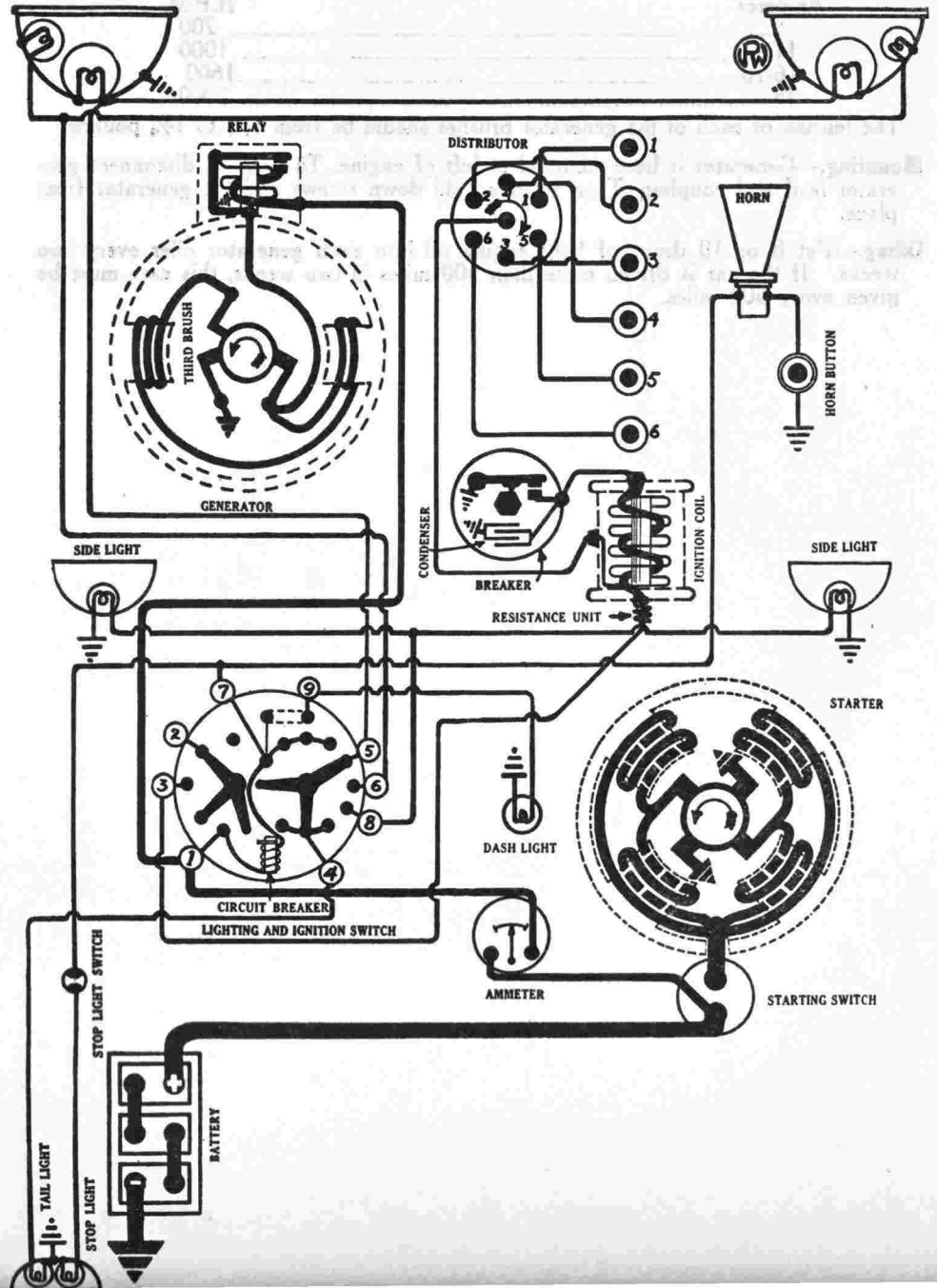
Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Gaps are .030 inch.

STARTER:—Model 339 (Series LHI), Model 355 (Series AA and KL). Sarter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 2¼-2½ pounds.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	60
19 "	Lock	4	500

Mounting:—Starter is mounted at right of engine on rear side of flywheel housing. To remove starter, disconnect starter cable and remove large pilot mounting screw. Then slide starter to rear and lift from place.



S AND S

SERIES AA (1926-27-28) CONTINENTAL 6-B ENGINE
SERIES KL (1926-27) CONTINENTAL 6-B ENGINE
SERIES LHI (1926-27-28) CONTINENTAL 8-R ENGINE
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

Oiling:—Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles.

GENERATOR:—Model 258. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush by means of the handle on the third brush mounting plate. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Maximum charging rate is 16-18 amperes reached at 1600 R.P.M.

Generator Data

Amperes	R.P.M.
5	700
11	1000
16-18	1600
15	2000

Generator motoring draws 5 amperes at 6 volts. Shunt field current is 2 amperes at 6 volts. Brush spring tension is 1¼-1¾ pounds each.

Mounting:—Generator is base mounted at left of engine. To remove generator, disconnect generator lead and remove hold-down screws in base. Then lift generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles.

RELAY:—Relay is mounted on the generator. Relay closes at 8-9 M.P.H. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-3 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .015-.020 inch, contacts closed.

LIGHTING:—Switch Model 1246 and 1257. Head lamps are each 6-8 volt, 21 cp. S.C. Mazda No. 1129. Auxiliary head lamps and side lamps are each 6-8 volt, 4 cp. S.C. Mazda No. 81. Stop lamp is 6-8 volt, 21 cp. S.C. Mazda No. 1129. Dome, dash and tail lamps are each 6-8 volt, 2 cp. S.C. Mazda No. 61.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on back of the switch. It begins to operate with 25-30 amperes limiting the current flow to 10-15 amperes until the short circuit is removed.

SCRIPPS – BOOTH

Model C (1915-16) SERIAL NOS. 1 UP.

Bijur Single Unit Generating, Starting and Lighting System

Remy Ignition

Battery.—Battery is 12 volt, 35 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts separate .020 to .025 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper.

Oiling.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

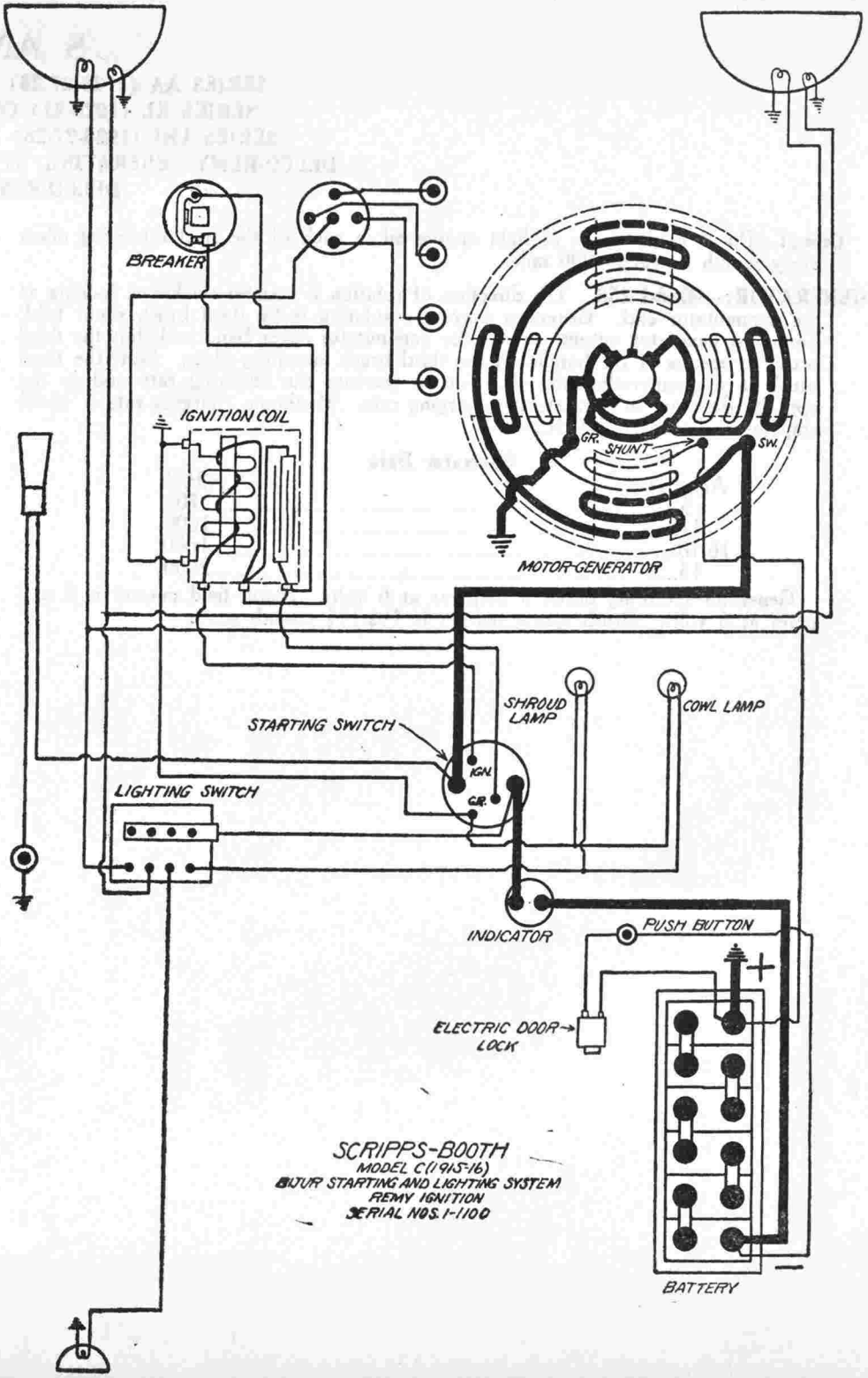
Spark Plug Gaps.—The spark plug gaps are .025 to .030 inch.

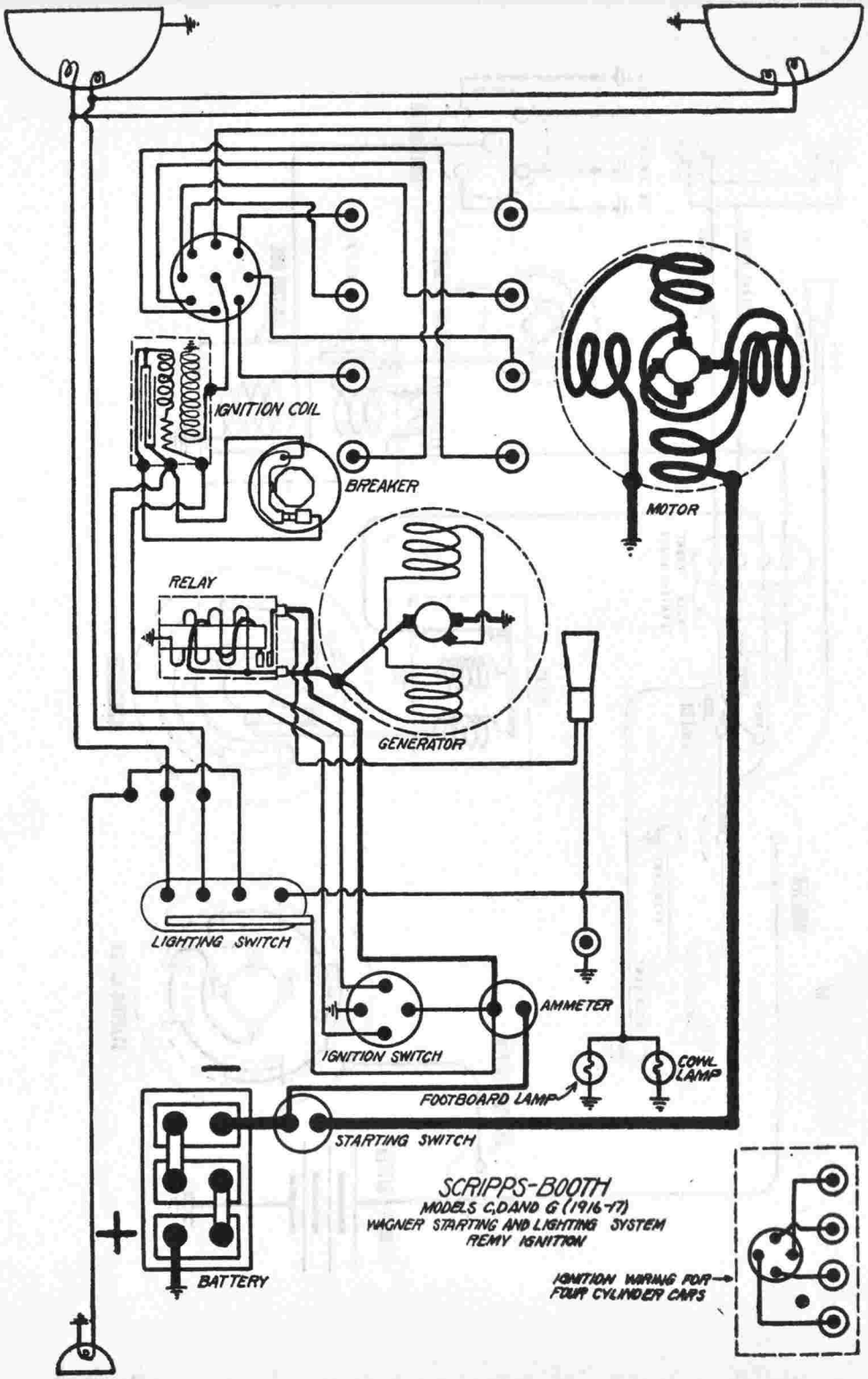
Starter-Generator.—Model MG-1213. Starter and generator are combined into one unit. Armature is permanently chain connected to engine crank shaft. Running freely starter current is 30-40 amperes at 12 volts, armature revolving at 500-700 R. P. M The torque is 2.3 pound-feet at 430-480 R. P. M., current 100 amperes at 11.7 volts

Generator.—Generator current regulation is by third brush system. Generator begins to supply current at 10 miles per hour, or 720-750 R. P. M. of armature. Maximum generator current output of 7-9 amperes is reached at 20-25 miles per hour, or 1600-1800 R.P.M. On cars from 1-1100, generator is connected directly to battery. The cars must not be operated, in coasting, with the ignition switch off, as the excessive voltage will cause damage to the generator and lights. On cars from 1100 up, the shunt field is connected to the switch and since opening the ignition circuit, opens the shunt field as well no damage can be done to the field winding.

Oiling.—Put several drops of light engine oil in each of starter-generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Lamps.—Head lamps are 12-16 volt, 15 cp. Dimmer lamps are 12-16 volt, 4 cp. Dash lamp is 12-16 volt, 2 cp. Tail lamp is 12-16 volt, 2 cp.





Scripps-Booth

Models C, D and G (1916-17)

Wagner Generating, Starting and Lighting System

Remy Ignition

Battery.—Willard, Type SJW-3, 6 volt, 90 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts separate .020 to .025 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper.

Oiling.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order of the 8 cylinder car is 1R, 1L, 3R, 3L, 4R, 4L, 2R, 2L. The firing order of the 4 cylinder cars is 1, 2, 4, 3.

Spark Plug Gaps.—Spark plug gaps are .030 inch.

Starter.—Model EM-161, Type 36-T, or Model EM-168, Type 36-T. Starter is connected to the engine through a Bendix drive.

Oiling.—Put 5 or 6 drops of light engine oil in each of starter oilers every month.

Generator.—Model EM-169, Type 41-W, or Model EM-162, Type 41-W. Generator current regulation is by third brush system. Rotation is counter-clockwise, viewed from commutator end. Maximum current output of 16 amperes is reached at 20 miles per hour.

GENERATOR DATA

MODEL EM-169 (8 cylinder cars)		MODEL EM-162 (4 cylinder cars)	
Amperes	R. P. M.	Amperes	R. P. M.
3	1000	6	1000
10	1400	11	1300
15	1800	13.5	1500
16	2100	16	1900
14.5	2500	14	2500
10.5	3000	11.5	3000

Oiling.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—Relay closes at 8-10 miles per hour and opens at 6-8 miles per hour. Clean relay contacts by drawing unglazed paper between them. It badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-8 volt, 20 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash, tail and footboard lamps are 6-8 volt, 2 cp.

Scripps-Booth

Model G (1917) (Serial Nos. 3 to 855)

Remy Generating, Starting and Lighting System

Remy Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate .020 to .025 inch. If burned or pitted, affecting the ignition, resurface them with a very fine, flat jeweler's file or a strip of worn No. 00 sand paper.

Timing.—Breaker contacts should just separate when engine is turned 3/8 inch past dead center, measured on flywheel, with spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 4, 3, 2.

Spark Plug Gaps.—Spark plug gaps should be .025 to .030 inch.

Oiling.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions should be given every 500 miles.

Starter.—Starter is connected to the engine through a Bendix drive.

STARTER DATA, No. 290-B

Torque	R. P. M.	Amperes	Volts
0 lb. ft.	3300	60	6.0
1 lb. ft.	2400	110	5.7
4 lb. ft.	1000	270	4.0
7 lb. ft.	225	395	3.7
9 lb. ft.	50	435	3.6
10-11 lb. ft.	Lock	450	3.6

Oiling.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

Generator.—Generator current regulation is by third brush method. A thermostat located in the rigging of the generator, cuts in a resistance at 175° F. temperature, reducing the maximum charging rate 6 amperes Resistance also acts as a shunt field fuse. The thermostat is intended to change the charging rate as demand of seasons or car operation requires. Never touch the thermostat points.

GENERATOR DATA, No. 248-A

Amperes	R. P. M.	Volts
0	580	6.4
7	850	7.1
14	1170	7.9
22	2150	8.6
20	3000	8.4

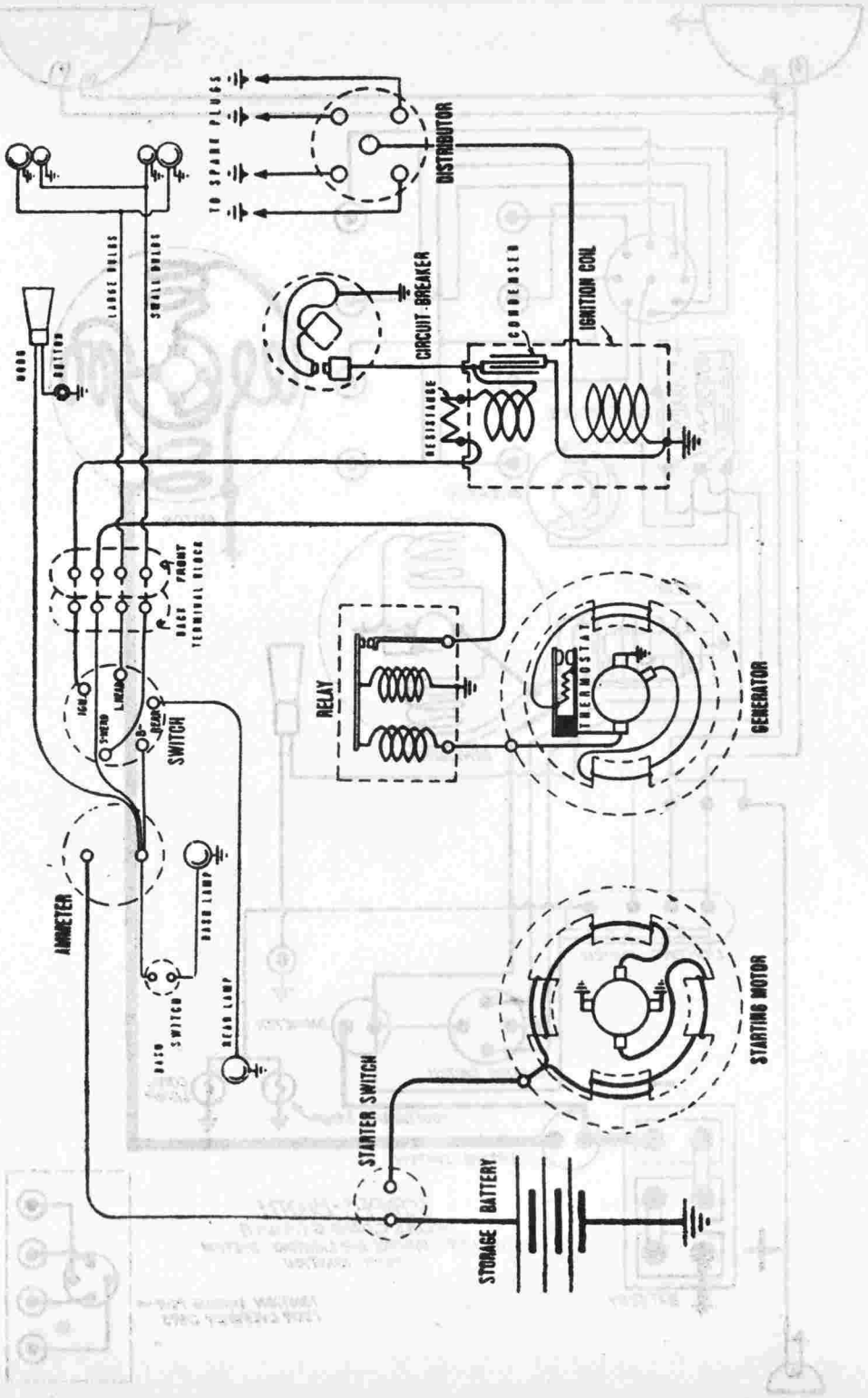
When operating freely as a motor, generator should draw 3.8 amperes at 6.2 volts, and run at 400 R. P. M. Shunt field should take 3.8 amperes at 6.2 volts.

Oiling.—Put 4 or 5 drops of light engine oil in generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—Relay should close at 8-10 miles per hour and open at 6-8 miles per hour. Gap between relay contacts should be .012 to .015 inch. Air gap between relay armature (moving member) and coil core should be .012 to .015 inch. Clean relay contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a strip of well worn No. 00 sand paper, and then draw a piece of unglazed paper between them to remove all grit. Adjust before again putting into service.

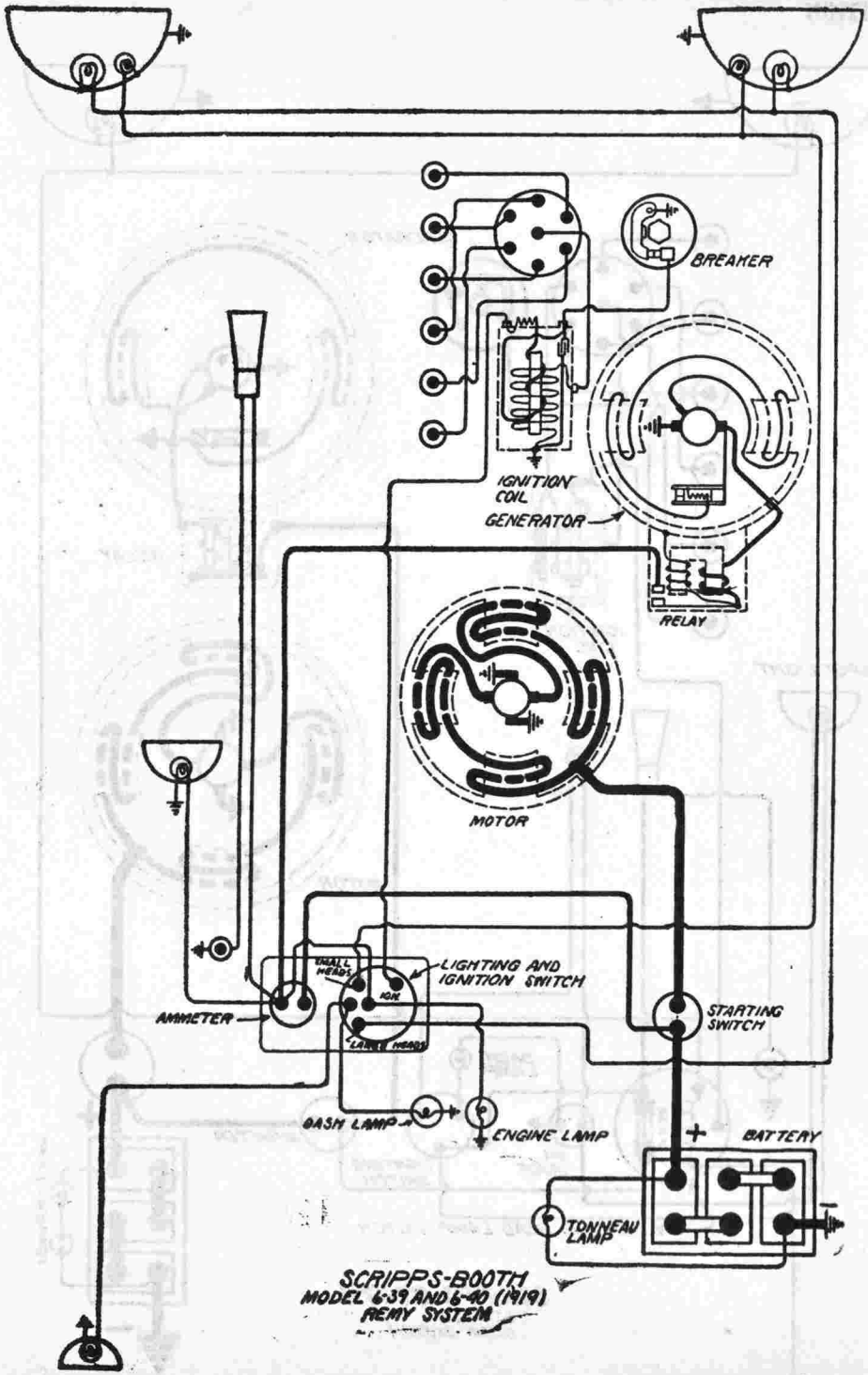
Lamps.—Head lamps are 6-8 volts, 17 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are 6-8 volt, 2 cp.

Model Numbers.—Starter is No. 290-B, Generator is No. 248-A. Distributor is No. 219-A. Ignition coil is No, 248-C. Starting switch is No. 29-J.



SCRIPPS-BOOTH

MODELS 6-39 AND 6-40 (1918-19)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION



BATTERY.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .020 to .025 inch. When condition of contacts affects the ignition, resurface with a very fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER.—Model 307-A. Starter is connected to engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes	Volts
1.0 lb. ft.	2150	140-150	5.50-5.70
2.0 lb. ft.	1650	180-190	5.20-5.40
3.0 lb. ft.	1300	220-230	4.80-4.90
4.0 lb. ft.	1050	258-268	4.35-4.55
5.0 lb. ft.	750	300-310	4.10-4.30
12.5 lb. ft.	Lock	570-590	3.45-3.60

OILING.—Put 5 or 6 drops of light engine oil in each of starter oilers every month.

GENERATOR.—Model 234-A. Generator current regulation is by third brush system. A thermostat, located in the brush rigging of the generator, cuts in a resistance at a temperature of 175°F., reducing the maximum charging rate 6 amperes. Resistance also acts as a shunt field fuse. The thermostat is intended to change the charging rate as demand of seasons or car operation requires. Never touch the thermostat points.

Generator Data

Amperes	R.P.M.	Volts
0	525	6.4
7	780	7.1
14	1100	7.8
19-20	1680	8.6
13-15	3000	8.0

Above tests are made with relay in circuit and thermostat contacts closed. Field current is 5 amperes at 6.4 volts. Pressure of main brushes on commutator is 17 to 20 ounces. Pressure of third brush on commutator is 13 to 17 ounces.

OILING.—Fill generator bearing oilers with light engine oil every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

RELAY.—Relay closes at 7-10 miles per hour or 525-575 R.P.M. of armature, and opens at 5-7 miles per hour, or 475-525 R.P.M. of armature. Air gap between relay contacts is .012 inch to .015 inch, with contacts closed. Clean relay contacts by drawing a piece of unglazed paper between them. If badly worn or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15-20 cp. Dimmer lamps are 6-8 volt, 5 cp. Spot lamp is 6-8 volt, 6 cp. Dash lamp is 6-8 volt, 2 cp. Tonneau lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

SCRIPPS-BOOTH

SERIES B (1920-21)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY:—Prest-O-Lite, Type 613-RHN, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 115 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours.

IGNITION:—Coil Model 284-C. Distributor Model 356-C. Breaker contacts separate .022 inch. Resurface contacts with a fine flat jeweler's file or on a medium hard oilstone. Distributor is of the full manual type. Maximum manual advance is 40 degrees.

Mounting:—Distributor is mounted at right of engine. To remove distributor, disconnect primary lead and manual advance rod and remove head with cables intact. Remove set screw on side of shaft housing and lift distributor from place.

OILING.—Refill the grease cup under the breaker head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is ½ inch past the indicator, spark control lever and breaker assembly in the fully retarded position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Then fully retard spark control lever. Continue to crank engine until the dead center mark on the flywheel is ½ inch past the indicator on the flywheel case. Loosen locknut on breaker cam, pry cam up and rotate until contacts begin to separate. Tighten the cam and make certain that the rotor is under the segment connected to the spark plug in cylinder No. 1.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER.—Model No. 701-A. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 100 R.P.M. drawing 150 amperes at 5 volts.

Starter Data

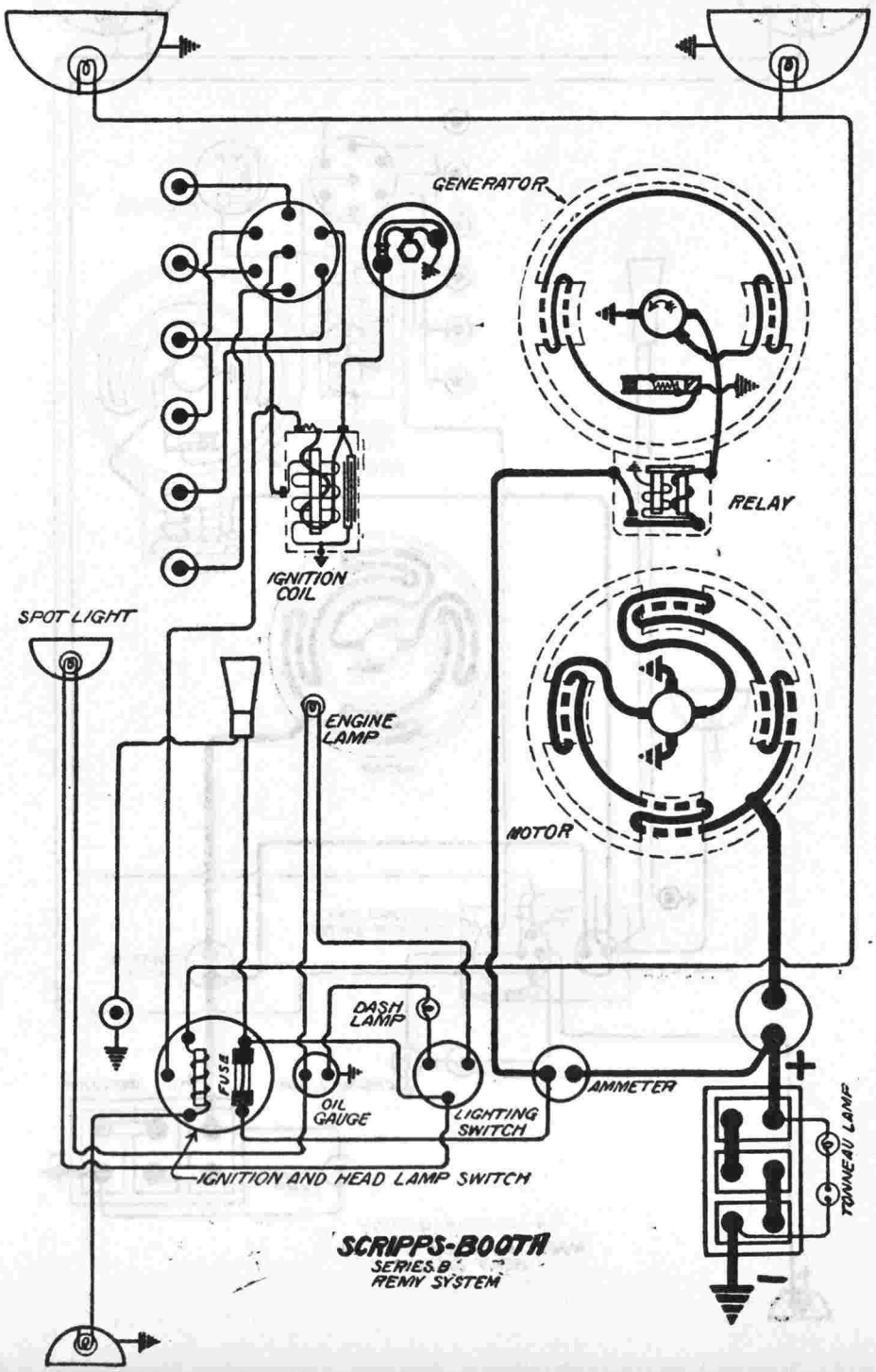
Torque	R.P.M.	Amperes	Volts
0 lb. ft.	10,000	65	5.7
2 lb. ft.	2250	175	5.1
6 lb. ft.	750	365	4.2
10 lb. ft.	225	500	3.5
12 lb. ft.	Lock	575	3.2

Above tests are made without gear reduction. Pressure of brushes on the commutator is 20-24 ounces.

Mounting:—Starter is sleeve mounted at right of the engine on forward side of flywheel case. To remove starter, disconnect cable and remove large pilot mounting screw directly above starter sleeve. Pull starter forward and lift from place.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Model 911-A. Generator current regulation is by the third brush system. A thermostat, located in the brush rigging of the generator, cuts a resistance into the shunt field circuit of the generator at a temperature of 175°F., reducing maximum charging rate 8 amperes. Never touch the thermostat points. Maximum charging rate is 20 amperes with the thermostat closed, reached at 1800 R.P.M. of the armature or 25 miles per hour.



SCRIPPS-BOOTH

SERIES B (1920-21)

REMY GENERATING, STARTING AND LIGHTING SYSTEM

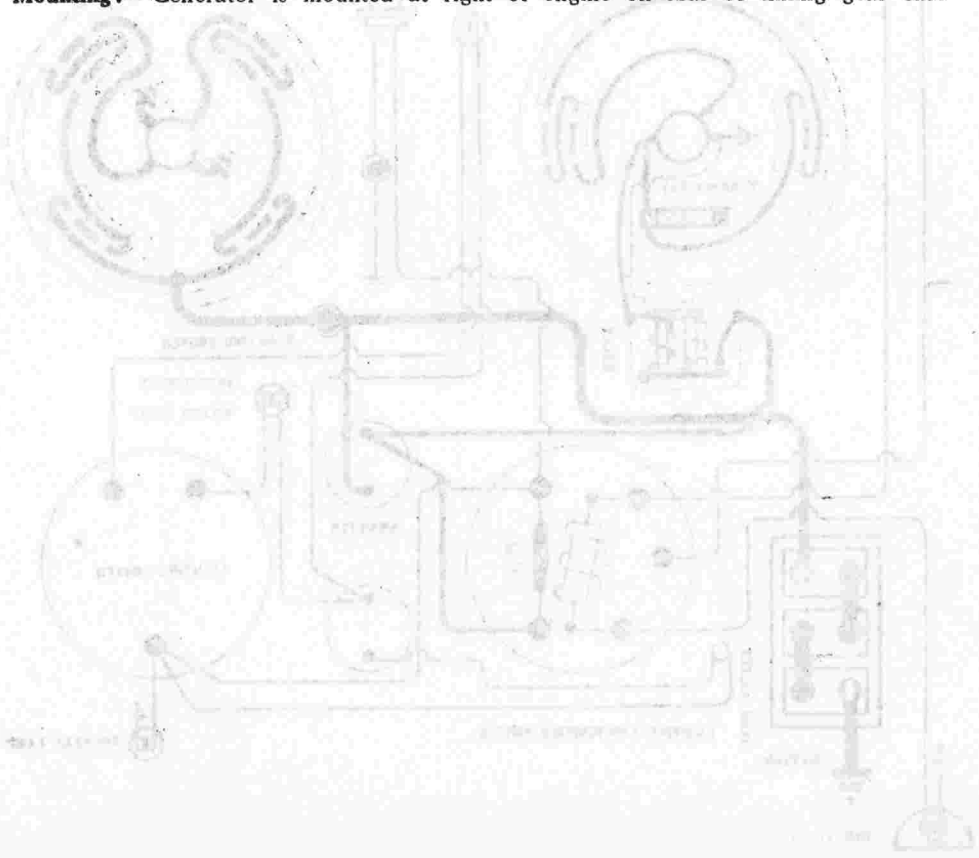
REMY IGNITION

Generator Data

Cold Test. Thermostat Closed		Hot Test. Thermostat Open	
Amperes	R.P.M.	Amperes	R.P.M.
0	600	0	800
5	750	4	1100
10	950	6	1250
14	3200	9	3200
15	1200	8	1450
20	1800	11	2000

Charging rate is varied by adjustment of the third brush setting. Third brush assembly is moved by turning a screw exposed in the commutator end plate. Pressure of main brushes on the commutator is 17-20 ounces. Pressure of the third brush is 13-17 ounces. Motoring, generator draws 6 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts.

Mounting:—Generator is mounted at right of engine on rear of timing gear case and is gear driven. To remove, disconnect all wiring and remove flange mounting screws. Then slide generator to rear and lift from place.



OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 600-650 R.P.M. of the armature and opens at 6-8 miles per hour or 550-600 R.P.M. of the armature. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .020 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES:—Lighting fuse on switch is 20 amperes capacity.

SCRIPPS - BOOTH

SERIES "F" (1921-22)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY:—Prest-O-Lite, Type 613-RHN, 6 volts, 100 ampere hour capacity. Starting capacity is 115 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The negative (—) terminal is grounded.

IGNITION:—Breaker contacts separate .022 inch. When the condition of the contacts affects the ignition, resurface with a fine flat jeweler's file or worn No. 00 sandpaper.

Oiling:—Refill the grease cup under the breaker head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing:—Breaker contacts begin to separate when the top dead center mark on the flywheel is ½ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plug Gaps:—Spark plug gaps are .025 to .030 inch.

STARTER:—Model 705-D. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush spring tension is 20-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2600	5	75
22 "	Lock	3	600

Oiling:—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR:—Model 913-B. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165 degrees F. reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the commutator end plate and shift the third brush. Shift the brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Maximum charging rate is 20 amperes reached at 1800 R.P.M. of the generator or 20 miles per hour.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7.2	825	11	8.2	1900
20	8.5	1800			

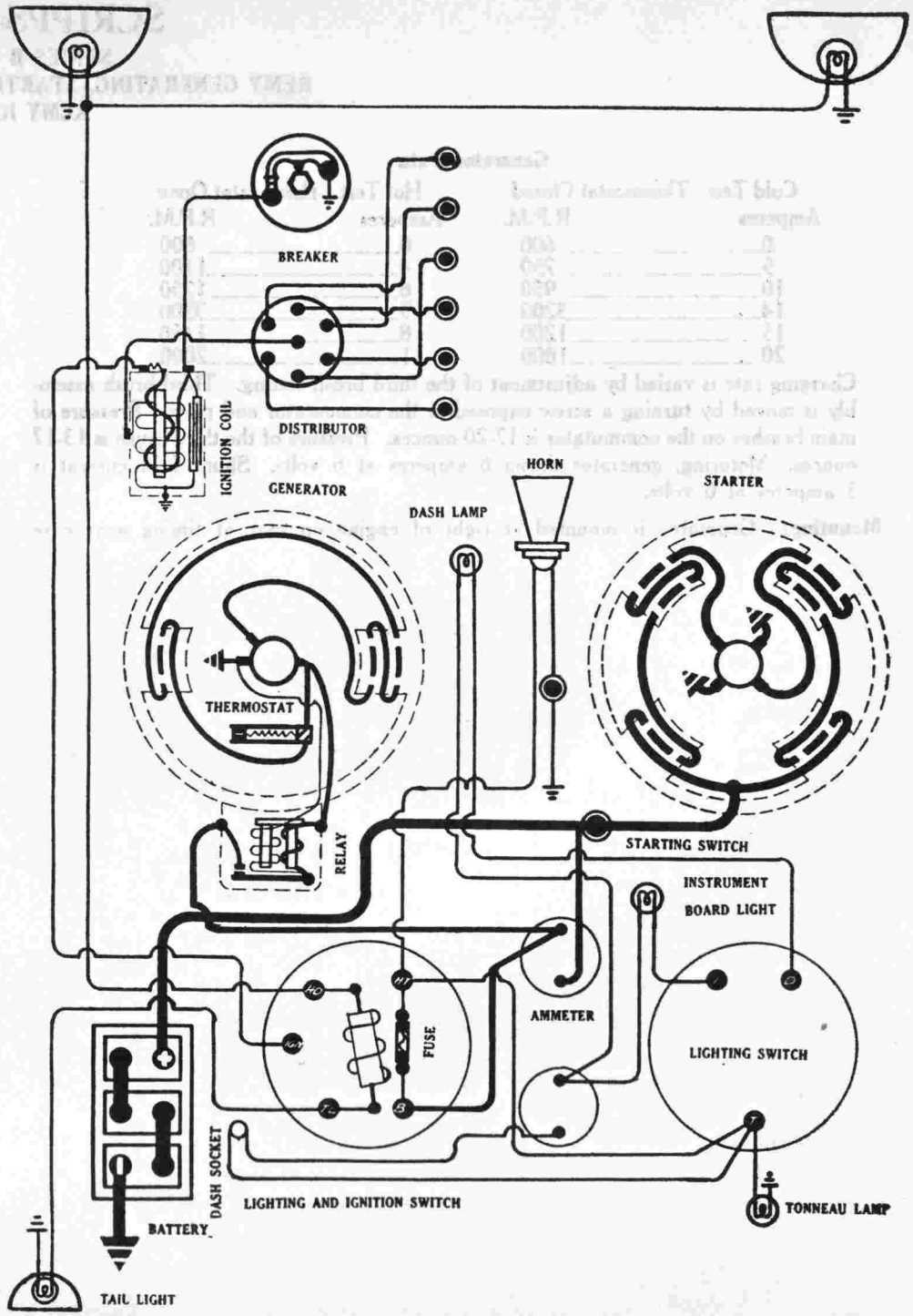
Generator motoring draws 5.5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 16 ounces.

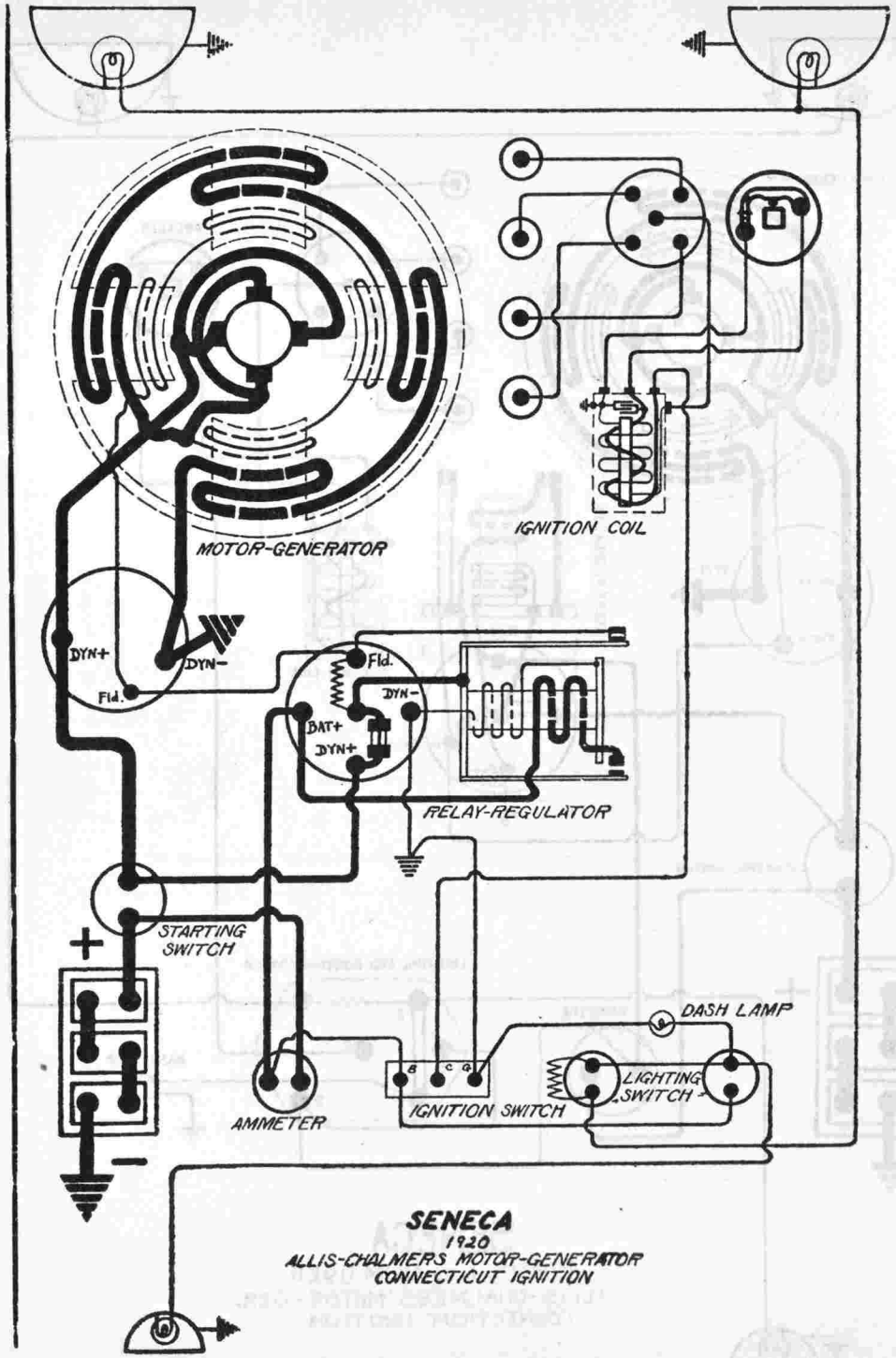
Oiling:—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY:—Relay closes at 8-10 miles per hour or 600-650 R.P.M. of the armature and opens at 6-8 miles per hour or 550-600 R.P.M. of the armature. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .020 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS:—Head lamps are 6-8 volt, 18 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES:—Lighting fuse on switch is 20 amperes.





SENECA

MODELS A, B, C, D, E, F, G (1917-18)
MODELS H, H2 AND L (1919-20)
ALLIS-CHALMERS GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—Prest-O-Lite, Type RHN-611, 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts effects the ignition, renew the inner breaker mechanism For temporary service resurface contacts wth fine emery cloth.

OILING.—Refill the grease cup under the distributor head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is ½ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4 2.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .028 inch.

STARTER-GENERATOR.—Model No. MG9-L or MG16-L. The unit is permanently connected to the engine crankshaft. Acting as a starter, it cranks the engine at 50 R.P.M., taking 125-175 amperes.

Starter Data

Torque	R.P.M.	Amperes
0 lb ft.	1200	10
5 lb. ft.	600	110
10 lb. ft.	400	190
15 lb. ft.	260	265
20 lb. ft.	150	340
28 lb. ft.	Lock	450

GENERATOR.—Generator current regulation is by vibrating regulator. Maximum charging rate is 15 amperes, reached at 2000 R.P.M. of the armature or 20 miles per hour. Shunt field winding takes 2.5 amperes at 6-7 volts.

OILING.—Put 3 or 4 drops of light engine oil in each of the starter-generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles. Thoroughly clean out and repack bearings with soft cup grease once a year.

RELAY.—Relay closes at 10-12 miles per hour or 1000-1200 R.P.M. of the armature and opens at 8-10 miles per hour or 800-1000 R.P.M. of the armature. Relay contacts separate .030 inch. Air gap between relay armature and coil core is 1/16 inch. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSE.—Fuse is 20 ampere.

SENECA

MODELS L, O, AND M (1921)
ALLIS-CHALMERS GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—Prest-O-Lite, Type RHN-611, 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model XA91. Distributor Model XA39. Breaker contacts separate .027 inch. They are made of tungsten. When the condition of the contacts affects the ignition, renew the inner breaker mechanism. For temporary service resurface contacts with fine emery cloth.

Oiling.—Refill the grease cup under the distributor head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Timing.—Breaker contacts begin to separate when the top dead center mark on the flywheel is ½ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Qrder.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps are .027 inch.

STARTER-GENERATOR.—Model No. MG9-L. The unit is permanently connected to the engine crankshaft. Acting as a starter, it cranks the engine at 50 R.P.M., taking 120-150 amperes.

Starter Data

Torque	R.P.M.	Amperes
0 lb. ft.	1200	10
5 lb. ft.	600	110
10 lb. ft.	400	190
15 lb. ft.	260	265
20 lb. ft.	150	340
28 lb. ft.	Lock	450

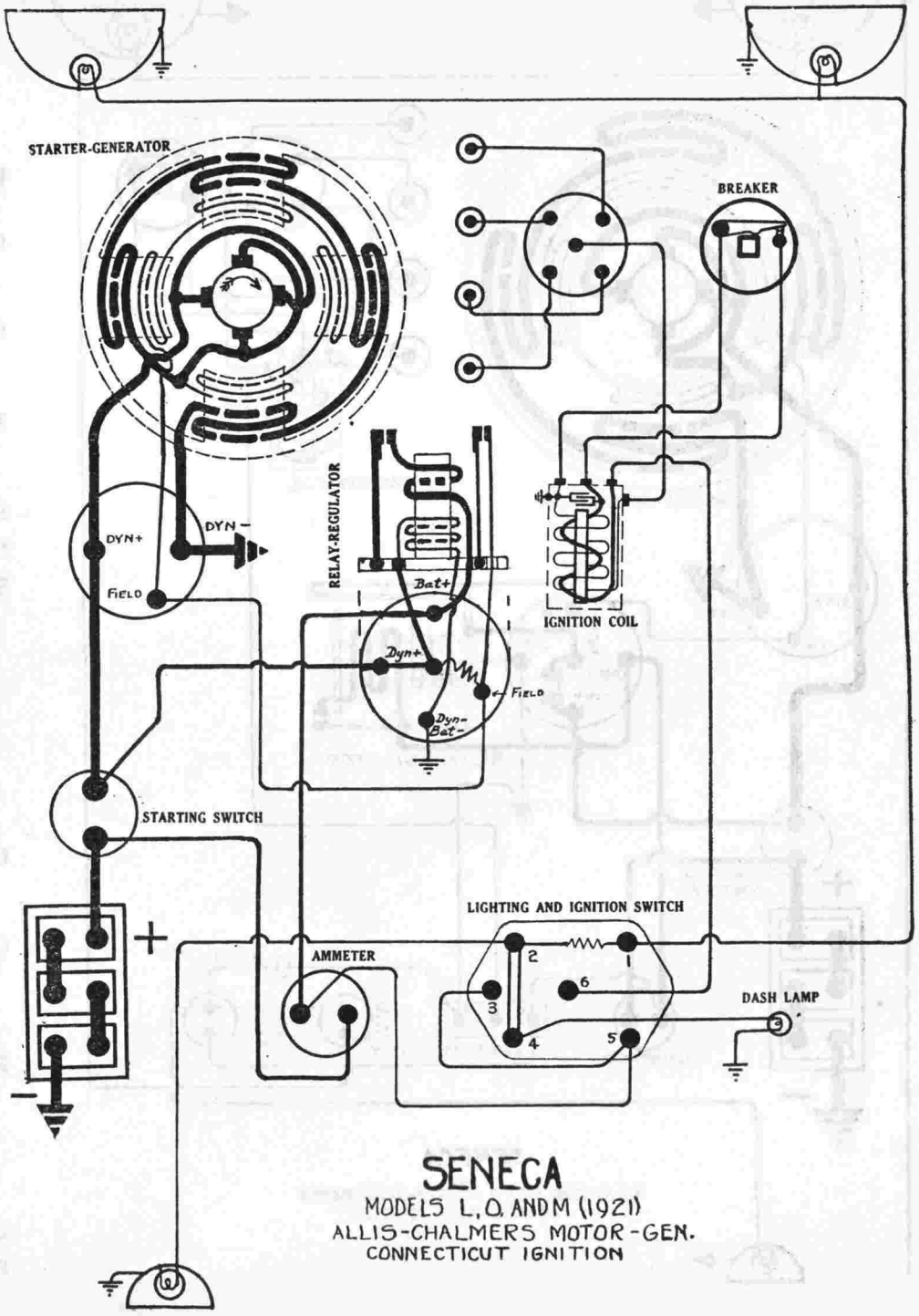
GENERATOR.—Generator current regulation is by vibrating regulator. Maximum charging rate is 15 amperes, reached at 2000 R.P.M. of the armature or 25 miles per hour. Shunt field winding takes 2.5 amperes at 6-7 volts.

Oiling.—Put 3 or 4 drops of light engine oil in each of starter-generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles. Thoroughly clean out and repack bearings with soft cup grease once a year.

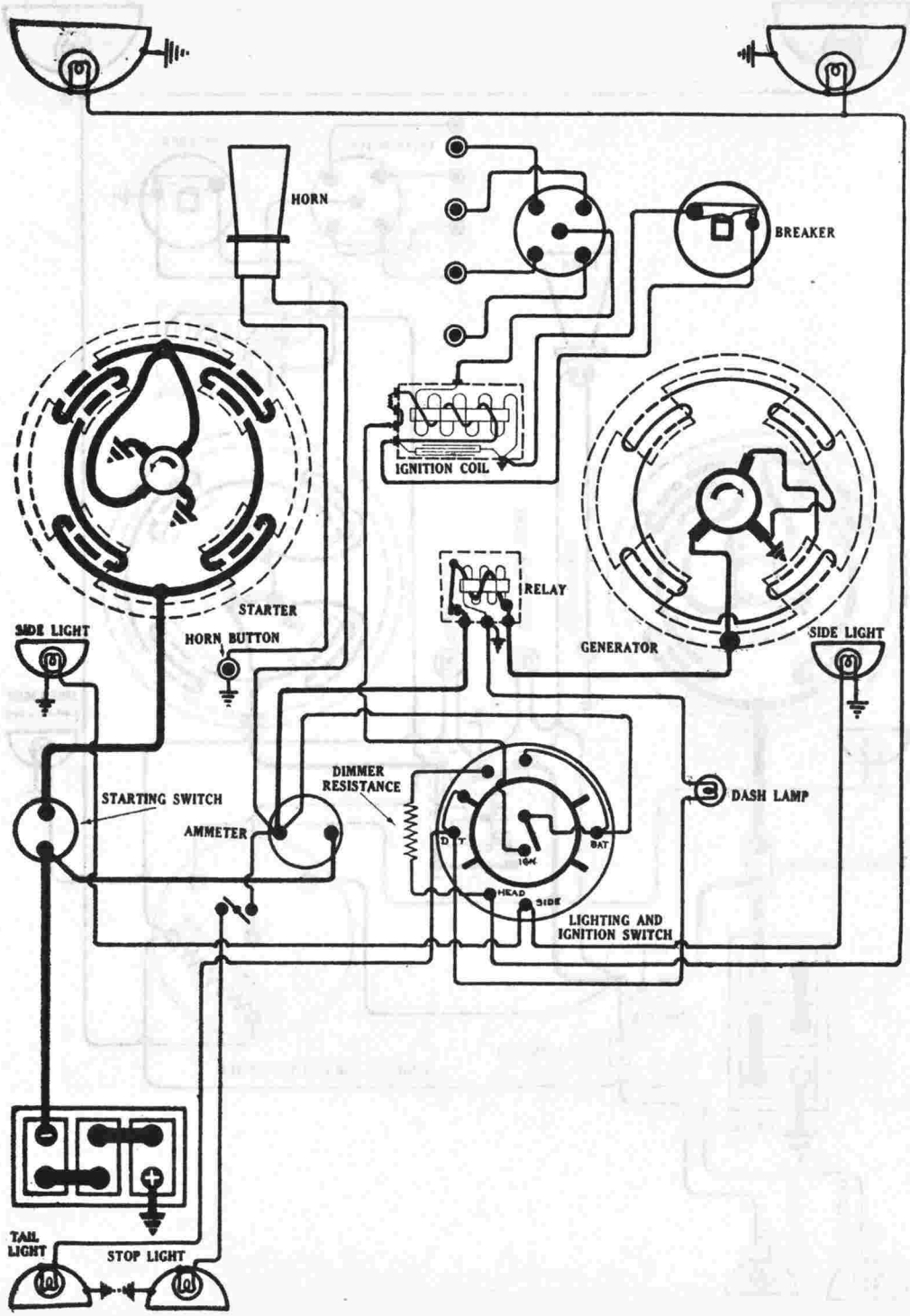
RELAY.—Relay closes at 10-12 miles per hour or 1000-1200 R.P.M. of the armature and opens at 8-10 miles per hour or 800-1000 R.P.M. of the armature. Relay contacts separate .030 inch. Air gap between relay armature and coil core is 1/16 inch. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSE.—None.



SENECA
MODELS L, O AND M (1921)
ALLIS-CHALMERS MOTOR-GEN.
CONNECTICUT IGNITION



SENECA

MODELS L-2 (1921), 0-2 (1922)

AUTO-LITE GENERATING STARTING AND LIGHTING SYSTEM.

AUTO-LITE IGNITION

BATTERY.—Prest-O-Lite, Type 611-RHN, 6 volt, 90 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model IG4012. Distributor Model IG4011. Breaker contacts separate .020 inch. When the condition of the contacts affects the ignition resurface them with worn No. 00 sandpaper. Remove all grit.

Oiling.—Fill the oiler at the side of the distributor with light machine oil every 1000 miles. Put one drop of light machine oil on the breaker arm bearing every 3000 miles.

Timing.—Breaker contacts begin to separate when the piston entering the power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1-3-4-2.

Spark Plug Gaps.—The spark plug gaps are .025 to .027 inch.

STARTER.—Model MG1004. The direction of rotation is counter-clockwise. Starter is connected to the engine through a Bendix drive.

Starter Test Data.

Torque	R.P.M.	Amperes	Volts
2 lb. ft.	1600	150	5.3
4 lb. ft.	1000	225	4.8
6 lb. ft.	510	300	4.5
8 lb. ft.	100	365	4.2

Stall Torque Data.

Lock Torque	Volts	Amperes
4 lb. ft.	2.0	240
10 lb. ft.	3.5	420
16 lb ft.	5.0	600

The brush tension is 2 pounds.

Oiling.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR.—Model G.J.4001. Generator current regulation is by the third brush system. Direction of rotation is clockwise, looking at the commutator end.

Cold Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
0	500	0	460
8	750	6	840
12	960	9	1050
16	1400	12	1360
16.5	1700	12.7	1700
12.0	3400	10	3400

The above readings are obtained with the generator charging a battery of 1.300 solution. The tension of all of the brushes is 1¼ pounds.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Model CB-1072. Relay closes when the voltage of the generator reaches 6.5 to 7.5 volts and opens when there is a discharge of 0 to 2 amperes. Contacts separate .020 inch. The air gap between the relay armature and coil core is .010 to .025 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

COMBINATION SWITCH.—Briggs and Stratton No. 2367.

LAMPS.—Head lamps are 6-8 volt, 16 cp.. Dash and tail lamps are 6-8 volt 2 cp. Side lamps are 6-8 volt, 4 cp. Stop lamp is 6-8 volt 21 cp.

SENECA

MODEL 50-51 (1922-23)

AUTO-LITE GENERATING, STARTING, AND LIGHTING SYSTEM

AUTO-LITE IGNITION.

BATTERY.—Prest-O-Lite, Type 611-RHN, 6 volts, 90 amperes-hour capacity. The starting capacity is 95 amperes for 20 minutes. The lighting capacity is 5 amperes for 16 hours. The positive (+) terminal is grounded.

IGNITION.—Auto-Lite, Type CB-1072. Breaker contacts separate .025 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone. It is not necessary to grind the points if they are burned or pitted. Just brighten the surface of the one point and remove the raised portion of opposite point.

Oiling.—Remove the distributor cap and put 4 or 5 drops of light engine oil into the exposed oil hole every 250 miles and put a very small amount of vaseline on to breaker cam, applying with a toothpick.

Timing.—Breaker contacts just begin to separate when piston No. 1 is 7° past top dead center, entering power stroke, spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plugs.—The spark plug diameters are 7/8 inch, and the gaps are .028 inch.

STARTER.—Model MG. The starter is connected to the engine by a Bendix drive. The direction of rotation is counter-clockwise, looking at commutator end. The starter cranks the engine at 125 R.P.M. taking a current of 150 amperes, at 5 volts.

Starter Test Data

Amperes	Volts	Torque	R.P.M.
40-60	6	Running Free	4000
450	3-4	12 lb.-ft.	Lock

Oiling.—Put 4 or 5 drops of light engine oil into starter oilers every month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles.

GENERATOR.—Model GJ. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. To adjust the charging rate of the generator, loosen the nut holding the third brush and shift the third brush in the direction of rotation (counter-clockwise) to increase the charging rate, and move the same in the opposite direction (clockwise) to decrease the charging rate. The maximum charging rate is 16 amperes, reached at 1800 R.P.M. of armature, or at 25 M.P.H. car speed in high gear.

Generator Test Data

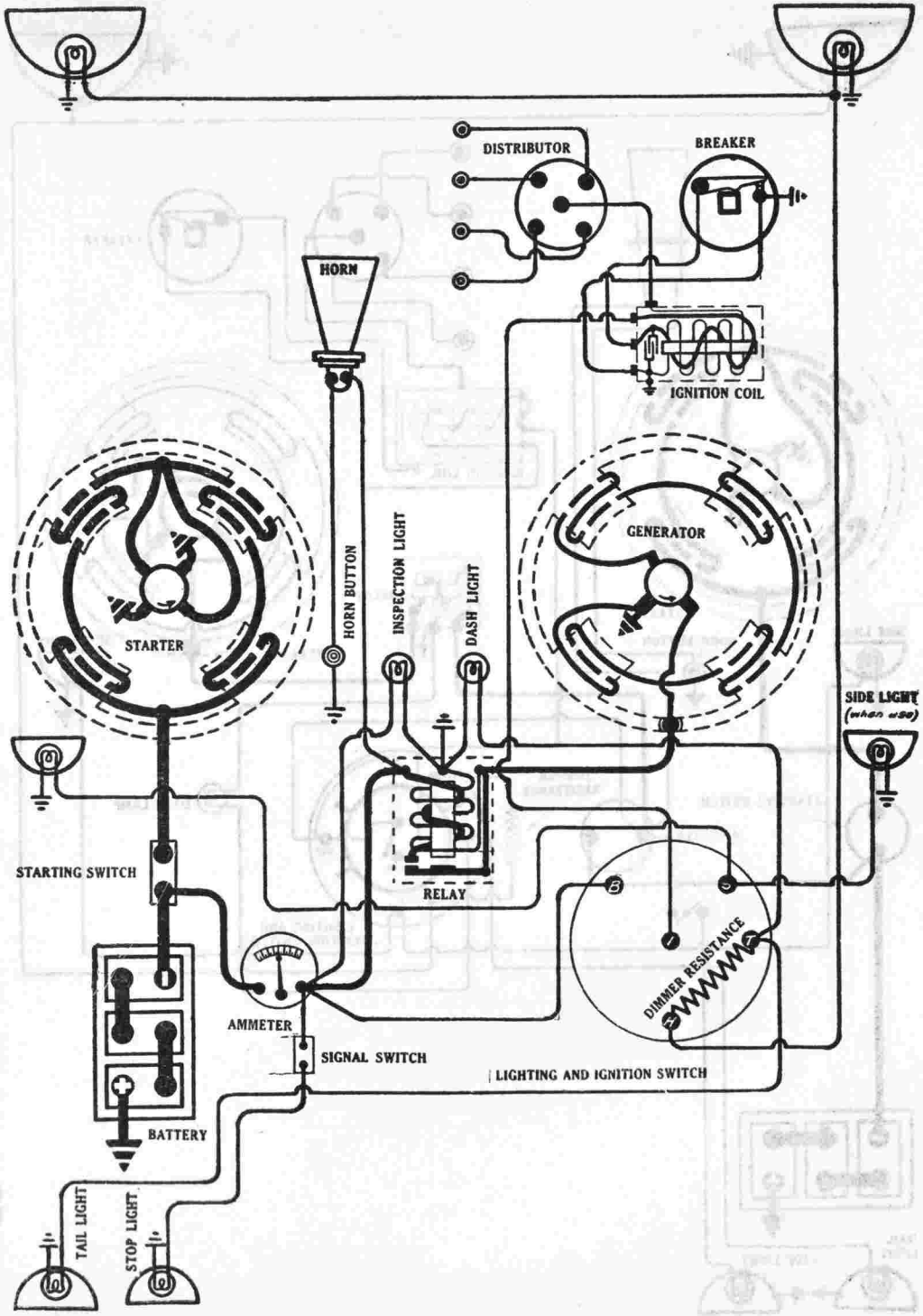
Amperes	R.P.M.	M.P.H.
0	500	
16	1750-2000	20-25
10-11	3000-3500	

The generator motoring freely, takes a current of 4-5 amperes, at 6 volts. The field draws a current of 2.2 amperes, at 6 volts, and each coil separately draws 8.8 amperes at 6 volts.

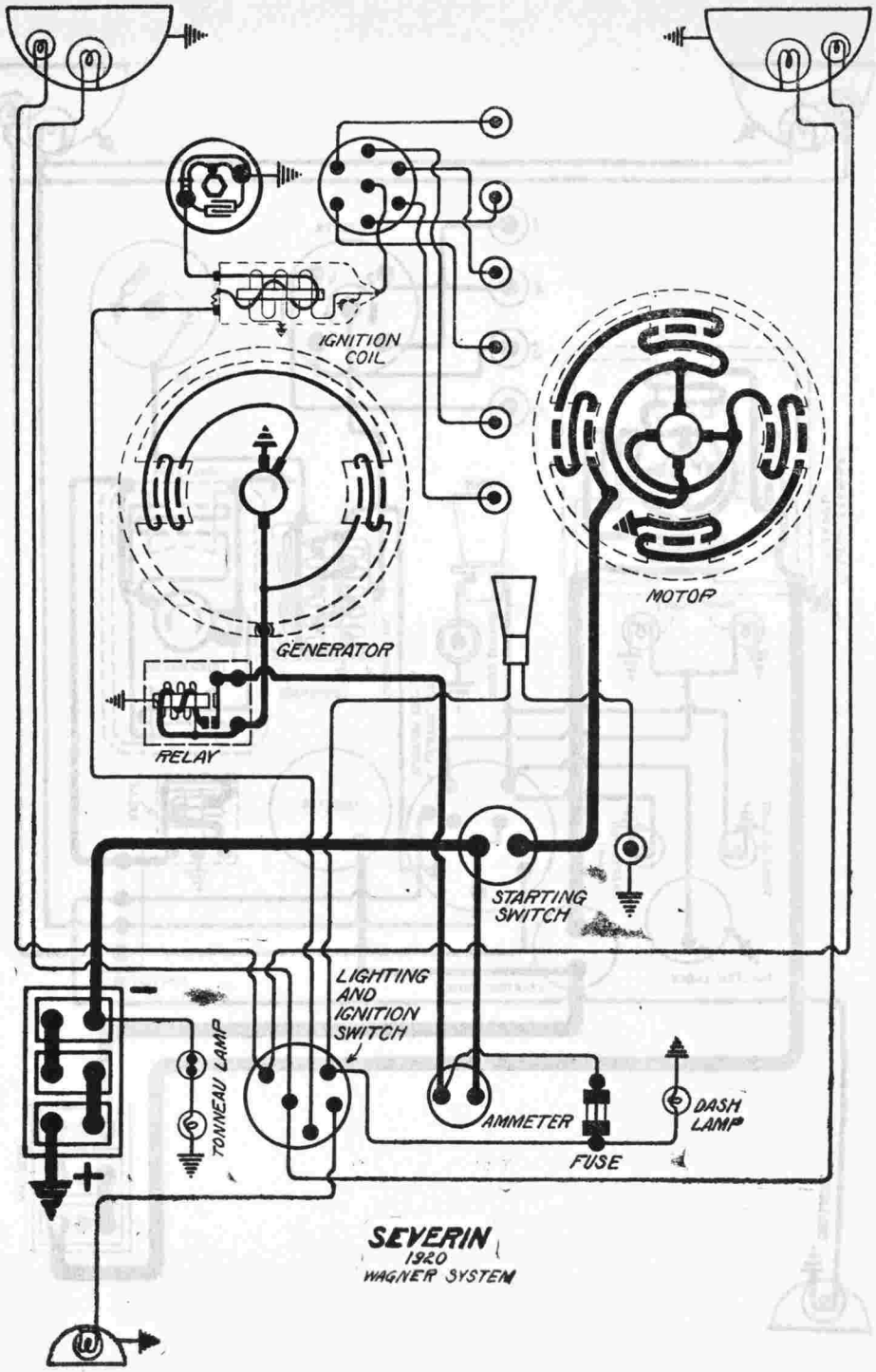
Oiling.—Put 4 or 5 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Relay closes at 500-550 R.P.M. of armature, or 7-9 M.P.H. at 6.5 volts, and opens at 450-500 R.P.M. of armature, or 5-7 M.P.H. with a current discharge of 0-1 amperes. The contact gap is .025-.035 inch, contacts fully separated. The air gap between coil core and relay armature is .010-.015 inch, relay contact fully closed.

LIGHTING.—Head lights are each 6-8 volts, 21 cp. S. C. Stop or signal light is 6-8 volts, 21 cp. S. C. Side and tail lights are each 6-8 volts, 2 cp. S. C. Dash light is 6-8 volts, 2 cp. D. C.



Copyright 1929



SEVERIN

1920-21

WAGNER GENERATING, STARTING AND LIGHTING SYSTEM
WAGNER IGNITION

BATTERY.—Battery is 6 volt, 110 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model K-67. Distributor Model K-51. Breaker contacts separate .022 inch. They are made of tungsten. When the condition of the contacts affects the ignition, renew the lever arm and contact screw. Ignition current is 5.5 amperes, engine idle, ignition switch and breaker contacts closed.

OILING.—Screw up the grease cup under the breaker head one-half turn every two weeks. If the car is driven more than 500 miles in two weeks, this must be done every 500 miles. Put 3 or 4 drops of light engine oil on the wick in the breaker lever spindle every six months.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model EM-322. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 115-120 R.P.M., current being 160-170 amperes. Running freely, starter takes 80-90 amperes, armature revolving at 2000 R.P.M. Lock torque is 17.25 pound-feet, current being 650 amperes at 2.6 volts. Pressure of brushes on the commutator is 2.5 to 3 pounds.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Model EM-276. Generator current regulation is by the third brush system. Maximum current output is 18 amperes at 20-25 miles per hour or 1450-1600 R.P.M. of the armature.

Amperes	Generator Data	R.P.M.
0		640
18		1450-1600
8		3000

Shunt field current is 7 amperes at 4.5 volts. Move the third brush in the direction of armature rotation to increase the charging rate and in the opposite direction to decrease the charging rate.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 9-11 miles per hour or 640-780 R.P.M. of the armature and opens at 7-9 miles per hour or 500-640 R.P.M. of the armature. Relay contacts separate .025 inch. Air gap between relay armature and coil core is .015 to .025 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Fuses are 10 ampere.

SHERIDAN

MODELS B-40, B-41, B-42, B-43 (1921)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L. Type 3-HVX-6X. 6 volt. The positive (+) terminal is grounded at the starting motor. The starting capacity (20 minute rate) is 127 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 23.4 hours.

IGNITION:—Coil Model 287-A. Distributor Model 350-A. Break contacts separate .018-.020 inch. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is full manual advance. Maximum manual advance is 46 degrees.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one turn every month or each 1000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark lever and breaker assembly fully retarded. To set timing, crank engine until piston No. 1 reaches top dead center on compression stroke (the upstroke with both valves closed). Then fully retard spark lever. Loosen locknut on top of breaker cam and rotate cam until contacts begin to separate. Tighten the locknut and connect the segment directly above the rotor to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-2-4-3.

Spark Plugs:—Spark plugs are S.A.E. 7/8-18. Gaps are .030 inch.

STARTER:—Model MH. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	6	40-60
1.3 "	1500	5.5	100
5 "	800	5	200
9 "	400	4.5	300
17.5 "	Lock	4	600

Oiling:—Put 4 or 5 drops of light engine oil in the starter bearing oilers every two weeks or each 500 miles.

GENERATOR:—Model GH. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust the generator output, remove the commutator cover band and loosen the nut holding the third brush. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the nut after making the adjustment. Maximum charging rate is 16 amperes at 2400 R.P.M.

Generator Data

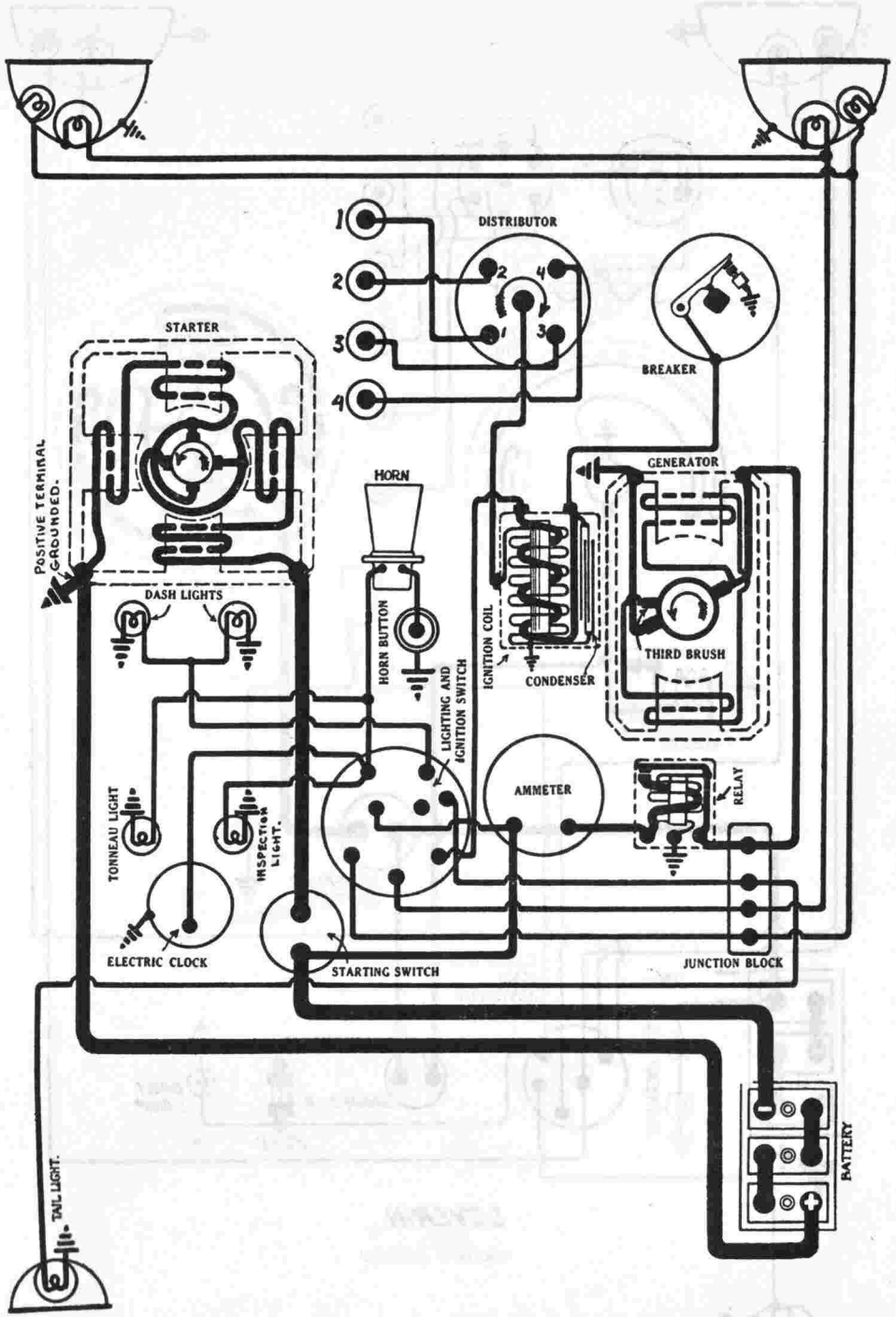
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
2	6.8	760	2	7.0	900
6	7.2	1000	6	7.5	1200
12	7.6	1500	10	8.0	1600
16	7.9	2400	14	8.4	2600
14	7.8	3350	12	8.0	3600

Motoring generator draws 2.7 amperes at 6 volts. Shunt field current is 1.6 amperes at 6 volts. Brush tension is 1¼-1¾ pounds each.

RELAY:—Relay is mounted on the dash. Relay contacts close at 600 R.P.M. or 8 M.P.H. when the generator voltage reaches 6.5-7 volts and open at 500 R.P.M. or 7 M.P.H. with a discharge current of 0-2 amperes. Contacts separate .025-.035 inch. Air gap is .015 inch with contacts closed.

LIGHTING:—Head light are 6-8 volt, 21 cp. S.C. Dimmer lights are 6-8 volt, 4 cp. S.C. Dash and tail lights are each 6-8 volt, 2 cp. S.C. Tonneau light is 6-8 volt, 4 cp. S.C. Inspection light is 6-8 volt, 21 cp.

FUSES:—Lighting fuse on switch is 20 amperes.

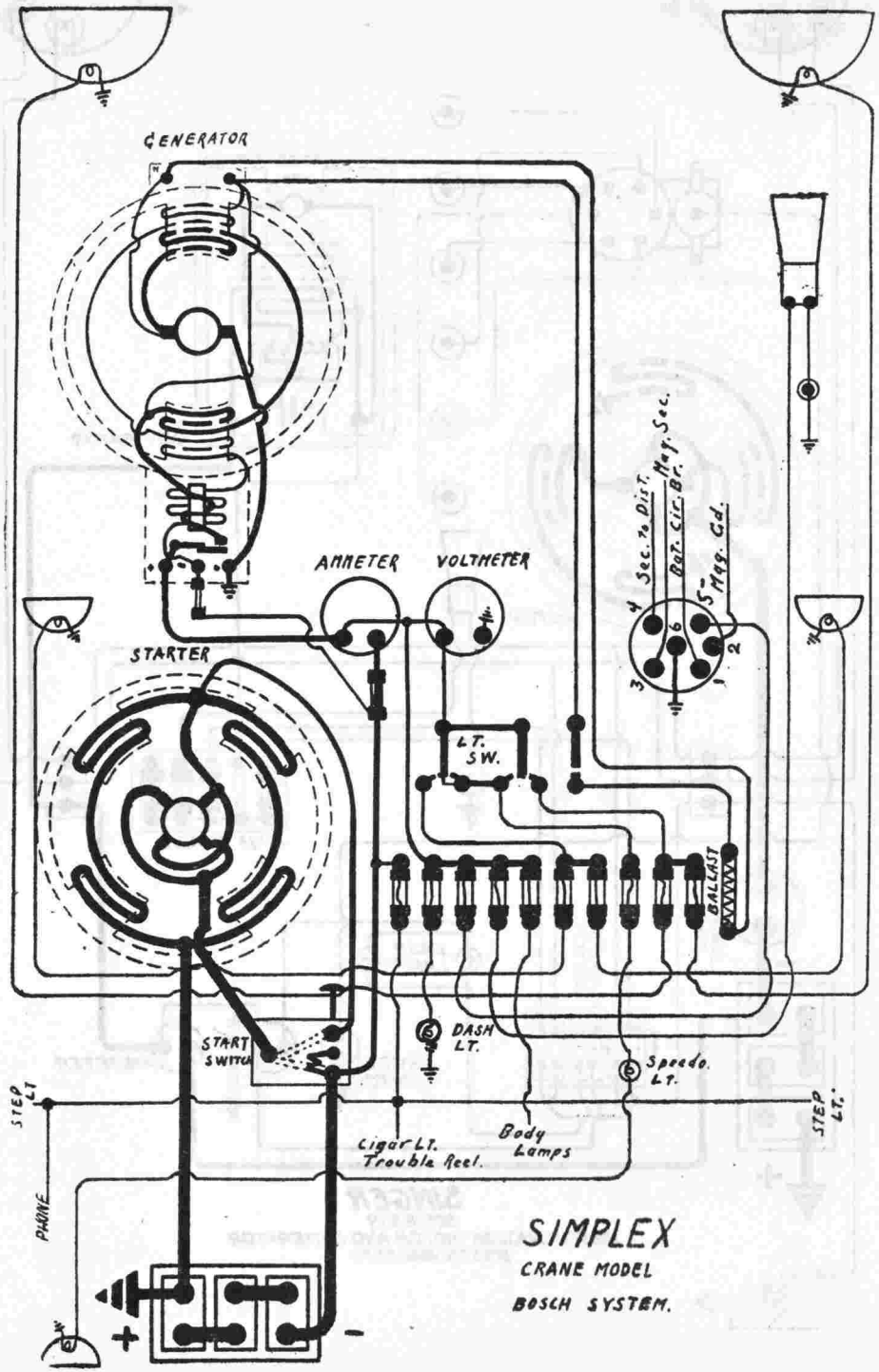


SIMPLEX

CRANE-SIMPLEX AND SIMPLEX MODELS (1915-16-17-18)

Bosch-Rushmore Starting and Lighting System.

Bosch Dual Ignition



SIMPLEX
CRANE MODEL
BOSCH SYSTEM.

Battery.—Battery is 6 volt, 150 ampere-hour. The positive (+) terminal is grounded from cable leading to the starting motor.

Ignition.—The Bosch type ZR magneto is used. This magneto is treated on Page 186. Breaker contacts should separate .014 inch to .016 inch. Should they become badly burned or pitted, affecting the ignition, resurface then with a fine, flat jeweler's file or a strip of worn No. 00 sand paper.

Timing.—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever about 1 inch from the fully retarded position. (First see that breaker assembly is fully retarded when lever is in the fully retarded position).

Firing Order.—The firing order of the four cylinder cars is 1, 3, 4, 2. The firing order of the six cylinder cars is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—Spark plug gaps should be about .018 inch.

Oiling.—Put 2 or 3 drops of light machine oil in each of the magneto oilers every two weeks. At the same time put a very small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If car is driven more than 500 miles in two weeks these attentions must be given every 500 miles.

Starter.—The starter pinion is meshed with the flywheel gear by moving of the armature. The armature is constructed so that it has considerable end play. A spring at the commutator end normally holds the armature in such a position that the gears are demeshed. When the starting switch is moved so as to connect the first and second contacts a large current is allowed to flow through the motor field and a small current through the armature. This causes a strong attraction between the armature and field with the result that the armature is drawn further into the frame, meshing the gears. The current through the armature causes it to turn slowly, facilitating meshing of the gears. When the engine starts, the current taken by the starter decreases sufficiently to allow the spring to force the armature out, demeshing the gears.

Oiling.—Put 3 or 4 drops of light engine oil in each of the starter oilers every two weeks.

Generator.—Generator current regulation is by reverse series field and a regulating resistance. This regulating resistance is connected in shunt with the reverse series field. When cold, this unit has a very small resistance, but when hot it has a greatly increased resistance. When cold, it forms practcailly a short circuit across the series field terminals, allowing but little current to flow through the series field. As the current through the resistance increases, the temperature and resistance increases, causing more current to flow through the reverse winding, reducing the output. As the resistance of the regulating coil increases in proportion to the current through it, the current is held practically constant at speeds above that necessary to produce the maximum output. The output is changed by changing the regulating resistance unit.

Diling.—Put several drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 39 cp., on 1917-18 cars and 6-8 volts, 27 cp., on previous cars. Dimmer lamps are 6-8 volts, 4-7 cp. Dash and tail lamps are in series. They are each 3-4 volts, 2 cp. Step lamp and trouble lamp is 6-8 volts, 2 cp. Dome lamp is 6-8 volts, 4-6 cp.

Fuses.—Main fuse is 250 volts, 30 ampere on the 1915-16 cars and 250 volts, 2[illegible] ampere on the 1917 cars. Other fuses are 10 ampere.

SINGER

SERIES 15, 16, 17, 18, 19 (1915-16-17-18-19)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH IGNITION

BATTERY.—Willard, SJR-4, 6 volt, 115 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type DU-6. Breaker contacts separate .015 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 2 or 3 drops of light engine oil in each of the magneto oilers every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly n the fully retarded position.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .022 inch.

STARTER.—Frame No. 750. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes	Volts
0	3500-5000	40	5.5
8 lb. ft.	1100	170	5.5
17.5 lb. ft.	Lock	500	4.0

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR:—Frame No. 203, 208. Generator current regulation is by reverse series field. Maximum current output is 11-15 amperes, reached at 1500 R.P.M. of the armature or 25 miles per hour.

Generator Data

Amperes	R.P.M.
0	425
8	650
11-15	1500

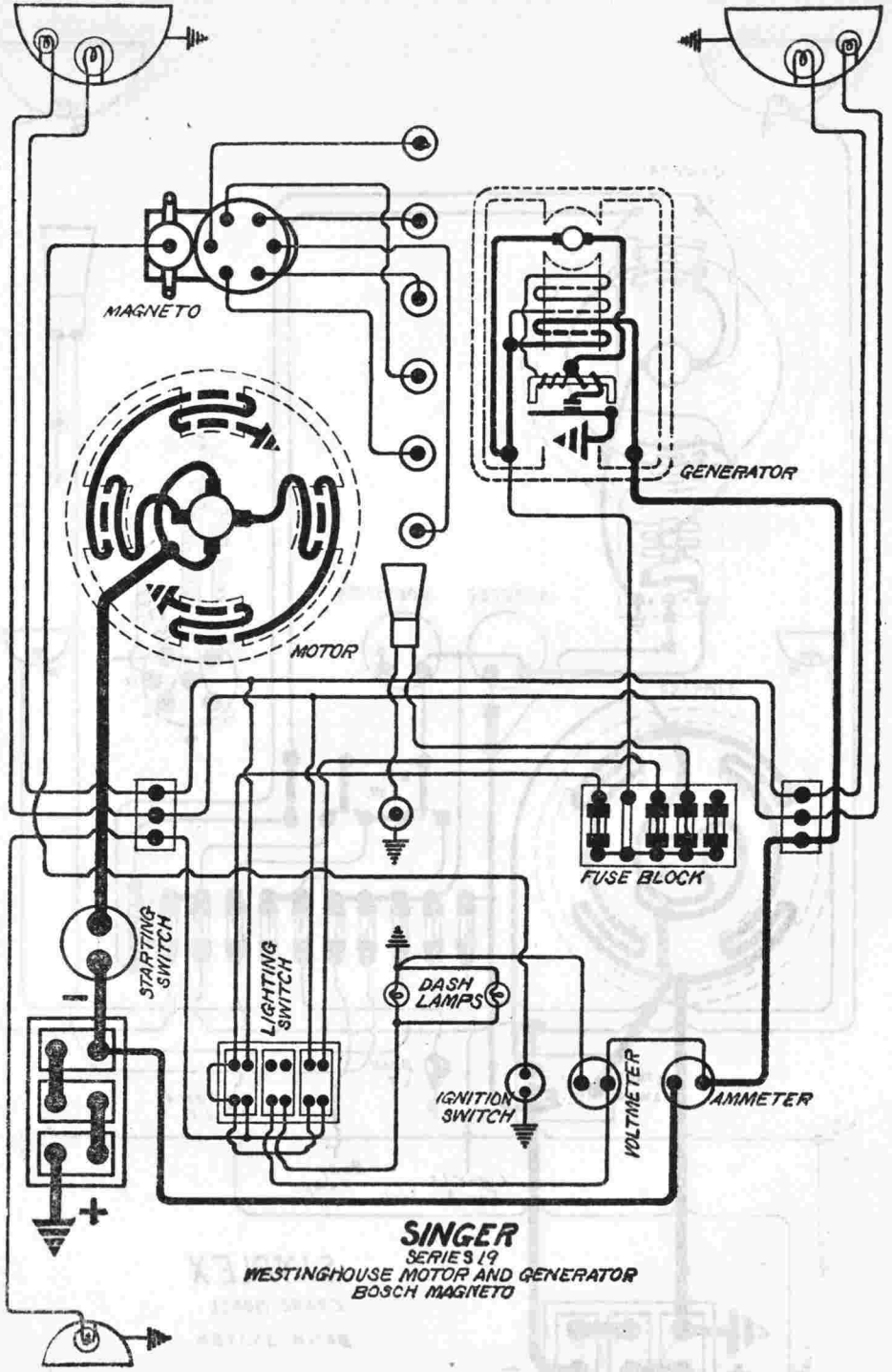
Shunt field winding takes 1.5 to 2.5 amperes at 6 to 6.3 volts. Running freely as a motor, generator takes 2.5 to 3.5 amperes at 6 to 6.3 volts. The current taken by the lamps does not pass through the series field, hence has but little effect on the charging rate.

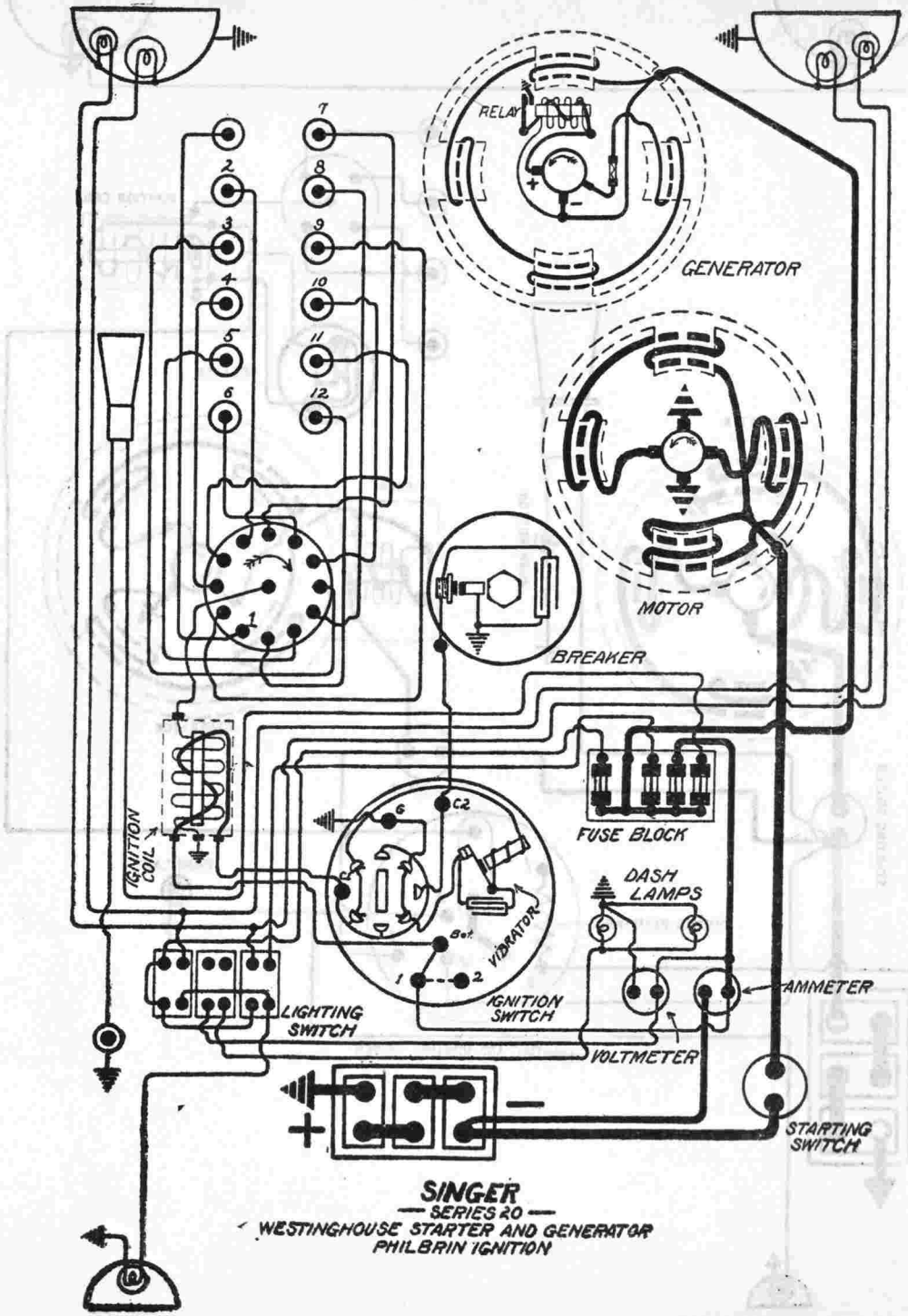
OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in the generator frame. Relay closes at 425-475 R.P.M. of the armature or 8 miles per hour, and opens at 375-425 R.P.M. of the armature or 6 miles per hour. Relay must be adjusted to close when the generator voltage reaches 7-7.5 volts, battery disconnected, and opens with a discharge current of 0-2 amperes from the battery. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 32 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Fuses are 20 ampere.





SINGER

SERIES 20 (1919-20)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
PHILBRIN IGNITION

BATTERY.—Willard, 6 volt, 115 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Model D, Duplex. Breaker contacts separate .008 to .012 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file. When filing, hold the plunger contact so that it does not swing to one side. Remove all grit by drawing unglazed paper between the contacts. When the ignition switch is in the "H" position, a magnetic vibrator is connected in the primary circuit in place of the breaker, and a shower of sparks is produced at the plugs.

OILING.—Put 4 or 5 drops of light engine oil in the ignition unit oiler every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Breaker contacts separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 9, 4, 11, 2, 7, 6, 10, 3, 8, 5, 12, cylinders being numbered as shown in the diagram.

SPARK PLUG GAPS.—Spark plug gaps are .020 inch.

STARTER.—Frame No. 751. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes
2.5 lb. ft.	1450	140
7.5 lb. ft.	1150	200
12.5 lb. ft.	650	400
17.5 lb. ft.	500	530
21.0 lb. ft.	Lock	650

OILING.—Put 5 or 6 drops of light engine oil in the starter bearing oilers every month.

GENERATOR.—Frame No. 760. Generator current regulation is by the third brush system. Maximum current output is 15-17 amperes, reached at 1250 R.P.M. of the armature or 16-20 miles per hour.

Generator Data

Amperes	Cold Test R.P.M.	Amperes	Hot Test R.P.M.
0	450	0	500
8	675	6	725
12	840	9	850
15-17	1250	12-14	1250
10	2000	7- 8	2000

The cold test readings are obtained with a generator temperature under 95°F. The hot test readings are obtained after the generator has been operated one hour at 1800 R.P.M., charging a half-charged battery. Shunt field current is 2.8 to 3.25 amperes at 6 volts. When the generator is operating freely as a motor, current is 3.5 to 5 amperes at 6 to 6.6 volts.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in the generator frame. Relay closes at 500-550 R.P.M. of the armature or 7-9 miles per hour and opens at 450-500 R.P.M. of the armature or 5-7 miles per hour. Adjust the spring tension on the relay armature so that the contacts open with a discharge current of 0-3 amperes. Adjust the air gap between the relay armature and coil core so that the contacts close when the voltage of the generator reaches 6.2 to 6.5 volts. Air gap between relay armature and coil core is .005 inch, contacts closed. Contacts separate .030 to .035 inch. Resistance of the shunt coil is 68 ohms. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

SKELTON

MODEL 35 (1919-20-21-22)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM

CONNECTICUT IGNITION

BATTERY.—Prest-O-Lite, Type 611-RHN, 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model M. Distributor Model 15TR. Breaker contacts separate .025 inch. They are made of tungsten. When the condition of the points affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

Oiling.—Every 1000 miles remove the breaker box cover and put 3 or 4 drops of light engine oil around the distributor shaft. This will lubricate the lower bearing. Use care not to allow oil to reach the contact points.

Timing.—The breaker contacts begin to separate when the marking "1 and 4 DC" on the flywheel is 1 inch past the center mark on the crank case, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—The spark plug gaps are .025 inch.

STARTER.—Frame 33AB. Starter is connected to the engine through a Bendix drive.

Starter Data.—33AB

Torque	R.P.M.	Amperes
0.00 lb. ft.	3700-4100	70
1.75 lb. ft.	1600	150
12.00 lb. ft.	Lock	500

Oiling.—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month.

GENERATOR.—Frame 35 AT. Generator current regulation is by the third brush system. Generator output is varied by adjusting the third brush setting. To increase charging rate move the third brush in direction of armature rotation, and to decrease charging rate move in opposite direction. Reseat third brush after position adjustment.

Generator Data.—35AT

R.P.M.	Volts	Amperes
500	6.5	Neutral
750	8.0	8
1100-1600	8.6	15-16
	Hot Check	
2000	8	10

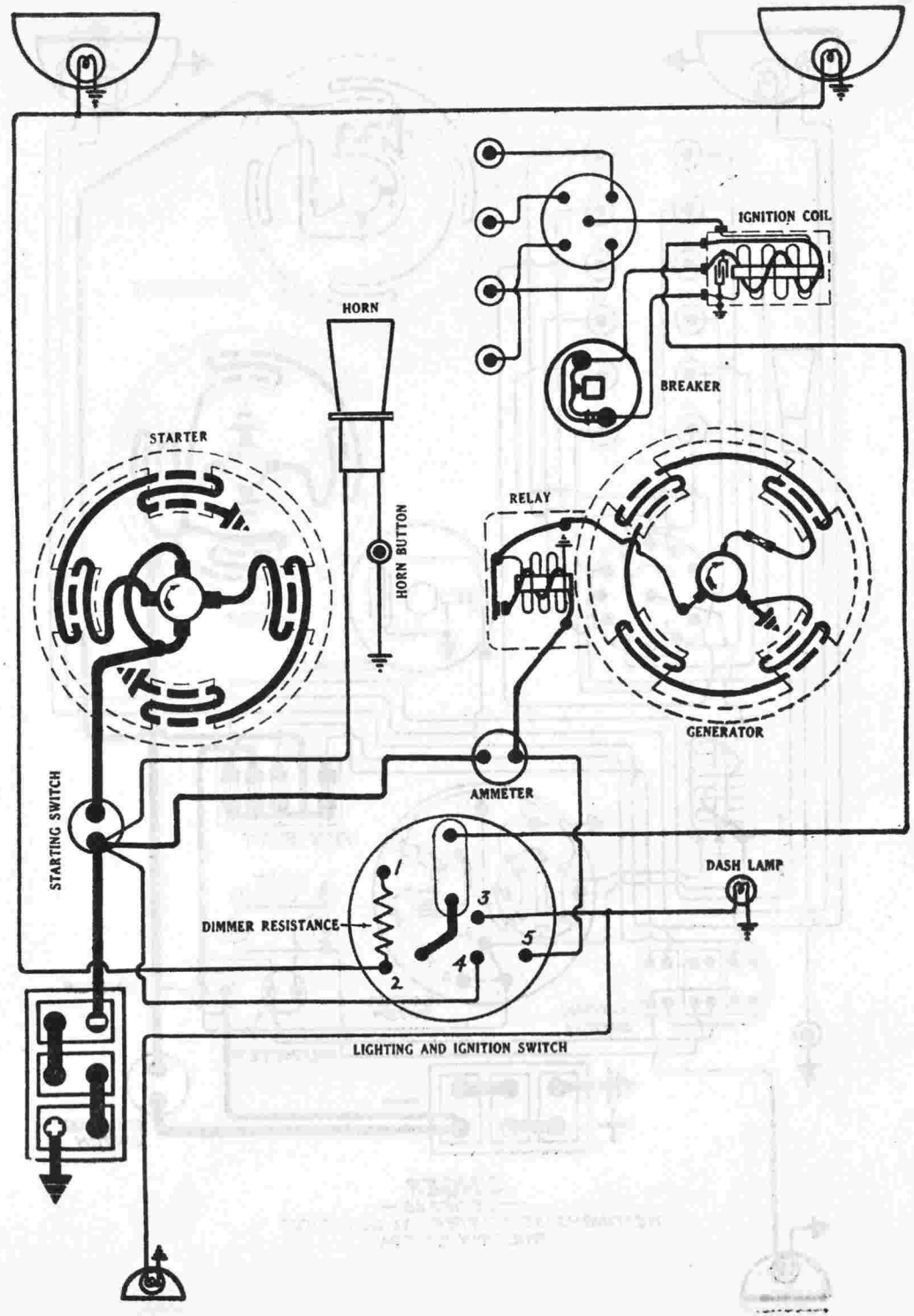
Shunt field takes 2.5 to 3.0 amperes at 6.0 to 6.3 volts. Operating freely as a motor. current is 5 amperes at 6.0 to 6.3 volts.

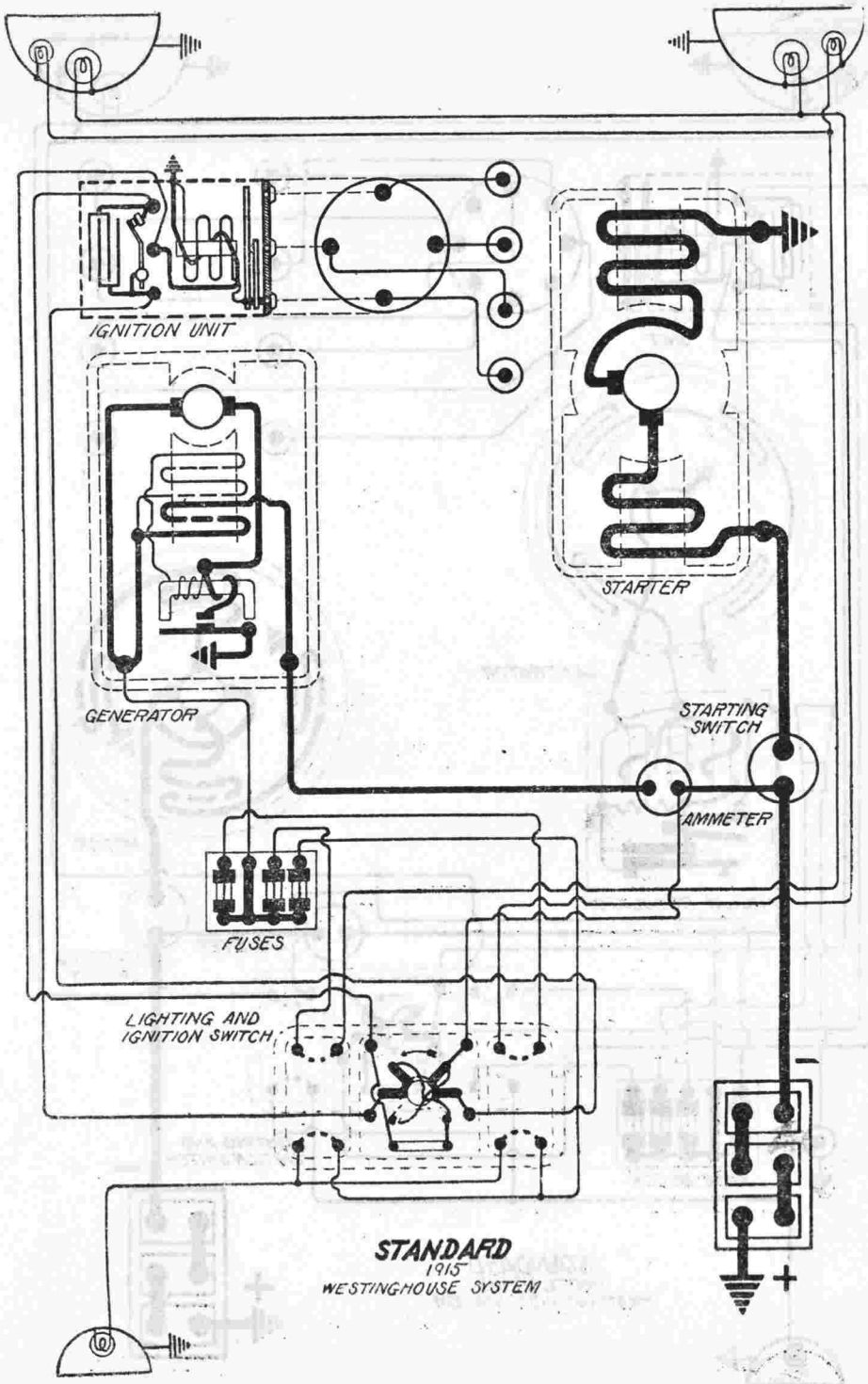
Oiling.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 500-550 R.P.M. of armature, and opens at 6-8 miles per hour, or 450-500 R.P.M. of armature. Charging current is 1 to 2 amperes at closing, and the discharge current 0 to 2 amperes at opening of relay. Air gap between relay armature (moving member) and coil core is .031 inch, contacts separated. Contacts separate .013 to .018 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Generator field fuse is 5 ampere.





Standard

1915 (4 Cylinder Model)
Westinghouse Starting and Lighting System
Westinghouse Ignition

Battery.—Battery is 6 volt, 85 ampere-hour. The positive (+) terminal is grounded.

Ignition.—The timer, ignition coil and distributor are all contained in one unit. Contacts should separate .006 in .008 inch. Should they be burned or pitted, resurface them with a very fine, flat jeweler's file. There is a ballast resistor on the ignition switch. If it is necessary to operate car with ballast resistor defective, a 5 ampere fuse may be substituted temporarily. The ballast must be replaced as soon as possible, as operation of the car without it will cause the contacts to corrode.

Oiling.—Put several drops of light engine oil in the oiler at the side of ignitor every month. If car is driven more than 1000 miles a month, the oiling must be done every 1000 miles.

Timing.—Breaker contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position. The contacts are ready to separate when the mark on the distributor rotor is directly opposite the V notch on the rim of the case.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gap.—Spark plug gap should be about .025 inch.

Starter.—Starter is connected to the engine by a magnetically shifted pinion. This device is fully described on Page 201.

STARTER DATA (FRAME No. 310)

Torque	R. P. M.	Amperes
0.5 ft. lb	4500	80
1. ft. lb	3200	120
2. ft. lb	2000	175
2.5 ft. lb	1700	200
3. ft. lb	1400	220
3.5 ft. lb	1200	240
4. ft. lb	800	255
5. ft. lb	400	290
5.8 ft. lb	Lock	320

Care.—Contacts of main switch should be separated 1/8 inch when switch is in the "Off" position. If contacts are burned or pitted, they may be resurfaced with a piece of fine emery cloth.

Oiling.—Put 4 or 5 drops of light engine oil in each of the motor oilers every month.

Generator.—Generator charging current regulation is by reverse series field.

Output.—Current taken by the lamps does not flow through series field so generator output is greater when lamps are burning than when only charging current is being supplied, as shown in table below.

TABLE OF GENERATOR OUTPUT (FRAME No. 203)

Speed R. P. M.	Total Output Amperes.	Charging Rate, No Lamps Amperes
400	2-0	1.0-1.5
500	5-6	2.0-5.3
750	10-0	6.0-6.5
1000	13-0	8.5-9.0
1250	15-16	9.5-10.0
1500	16-17	10.5-11.0
2000	18-0	11.0-12.0
2500	18-19	12.0
3000	19-0	12.0

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 20 cp. Dimmer lamps are 6-8 volts, 5 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.

Fuses.—Lighting fuses are 20 ampere.

STANDARD
MODEL 8 (1915-16), E (1916-17)
WESTINGHOUSE STARTING AND LIGHTING SYSTEM
WESTINGHOUSE IGNITION

BATTERY.—Battery is 6 volt, 85 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .008 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper. Adjust the distributor brush springs so that the brushes extend ¼ inch from their holders when the distributor cap is removed, retaining them, however, so that they do not fall out. Brushes must move freely in their holders. See that the brushes on the top and bottom of the rotor are in place when installing the rotor.

Oiling.—Put 2 or 3 drops of light engine oil in the oiler at the side of the ignition unit every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Timing.—Breaker contacts begin to separate when the top dead center mark on the flywheel is two inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Ballast Resistor.—There is a ballast resistor in the ignition switch. In case it is necessary to operate the car with the ballast defective, a 5 ampere fuse may be used temporarily, but the ballast must be replaced as soon as possible, as continued operation without it will result in serious burning of the timer contacts.

Firing Order.—The firing order is 1R, 1L, 3R, 3L, 4R, 4L, 2R, 2L.

Spark Plug Gaps.—Spark plug gaps are .023 inch.

STARTER.—Frame 700. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes	Volts
2.5 lb. ft.	1250	130	——
12.5 lb. ft.	Lock	400	4

Brush tension is 1 to 1.5 pounds.

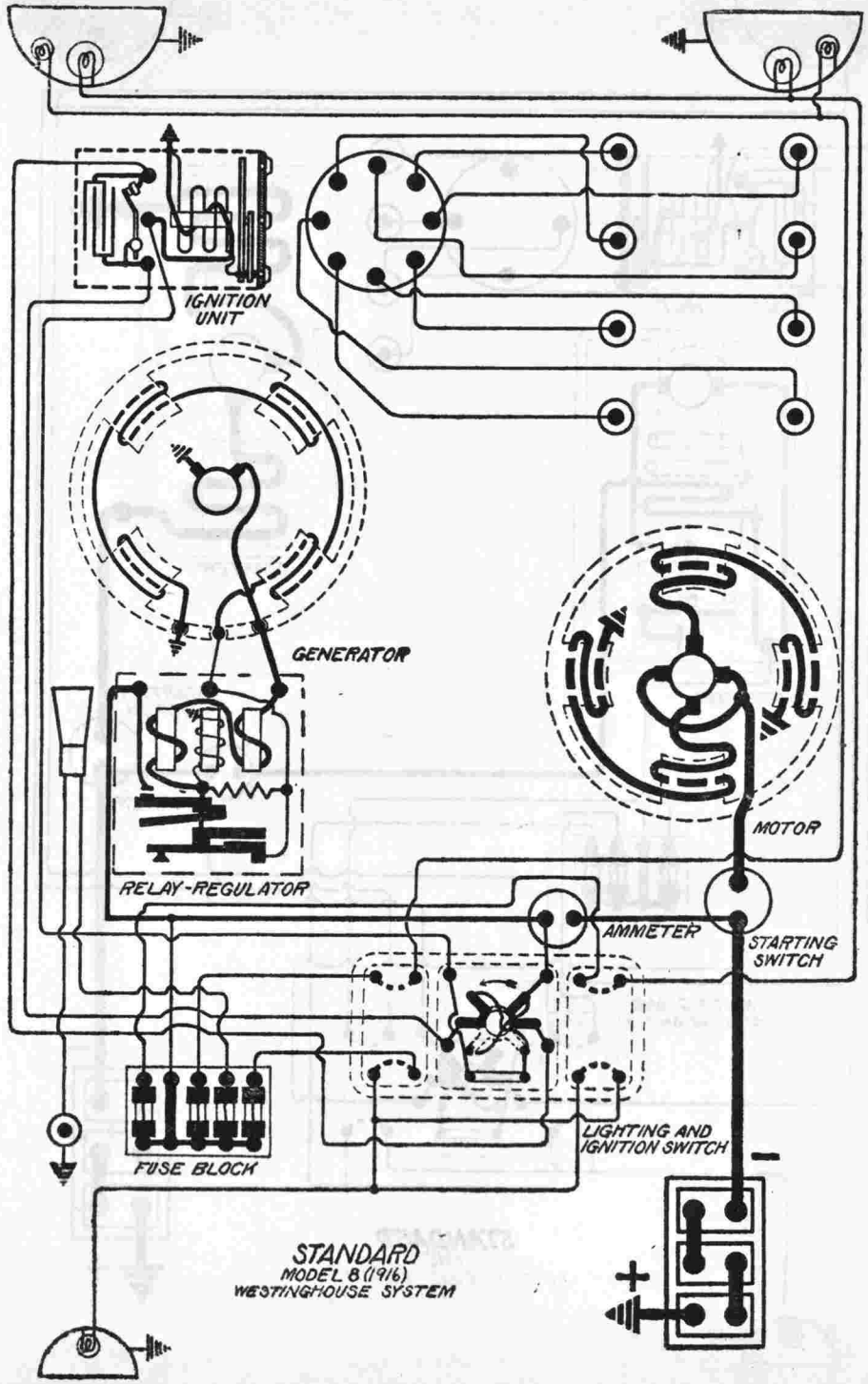
Oiling.—Put 4 or 5 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Frame 400. Generator voltage regulation is by a vibrating regulator. Relay is combined with the regulator. The charging current is 1 to 1.5 amperes at closing and the discharge current is .75 to 1.25 amperes at opening of the relay contacts. The air gap between the relay armature (moving member) and the coil core is .027 to .030 inch. Contacts separate .013 inch. Adjust by bending brass prongs. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface the tungsten contacts on an oil stone, and the silver contacts with a scraper. Generator should deliver 15 amperes at 6.8 volts, which is reached at 1200 R.P.M. of the generator armature.

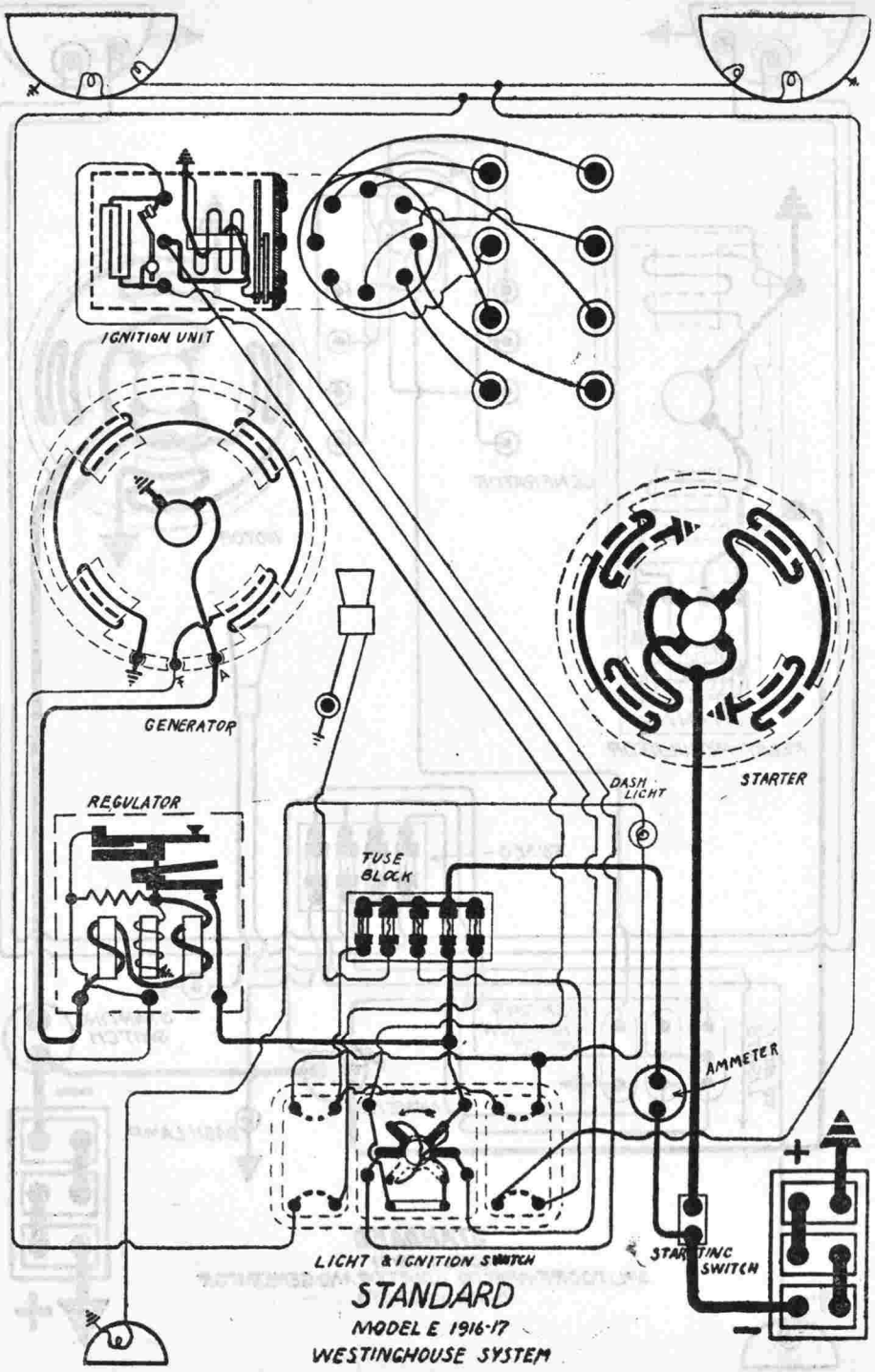
Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

LAMPS.—Head lamps are 6-8 volts, 20 cp. Dimmer lamps are 6-8 volts, 5 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.

FUSES.—Fuses are 20 ampere.



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STANDARD

MODEL E (1917), SERIAL NOS. C-600 UP
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WESTINGHOUSE IGNITION

Battery.—Battery is 6 volt, 85 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should separate .020 inch to .025 inch. Should they become badly burned or pitted, affecting the ignition, resurface them with a fine, flat jeweler's file or a strip of worn No. 00 sand paper.

Timing.—Contacts should begin to separate when the top dead center mark on the flywheel is 2 inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1R, 1L, 3R, 3L, 4R, 4L, 2R, 2L.

Spark Plug Gaps.—Spark plug gaps should be .025 inch to .030 inch.

Oiling.—Put 2 or 3 drops of light engine oil in each of the magneto oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Starter.—Starter is connected to the engine through a Bendix drive. It should run at 1200 R. P. M., when delivering 2.5 pound-feet torque. It should develop 12.5 pound-feet lock torque, taking about 400 amperes. Low speed and high current indicates damp, grounded, or short circuited motor windings or commutator bars.

Oiling.—Put 4 or 5 drops of light engine oil in each of the starter oilers every month.

Generator.—Generator voltage regulation is by a vibrating regulator. Relay is combined with the regulator. The charging current should be about 1 to 1.5 amperes at closing and the discharge current 1.25 amperes at opening of relay contacts. The air gap between relay armature (moving member) and coil core should be .027 inch to .030 inch. Contacts should separate .013 inch to .017 inch. Adjust by bending the brass prongs. Clean relay and regulator contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface them with a piece of well worn No. 00 sand paper, drawing a piece of unglazed paper between them, to remove all grit, before again putting into service. Generator should deliver 15-17 amperes at 7.2 volts.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps—Head lamps are 6-8 volts, 20 cp. Dimmer lamps are 6-8 volts, 5 cp. Dash and tail lamps are in series. They are each 3-4 volts, 2 cp.

Fuses.—Fuses are 20 ampere.

Standard

Model F (1917)

Splitdorf-Apelco Starting and Lighting System
Splitdorf Magneto Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts should open .020 inch to .025 inch. Clean them with gasoline whenever necessary. Should they be burned or pitted, affecting the ignition, resurface with a fine, flat jeweler's file on a strip of worn No. 00 sand paper.

Timing.—Contacts should begin to separate when the top dead center mark on the flywheel is two inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1R, 1L, 3R, 3L, 4R, 4L, 2R, 2L.

Spark Plug Gaps.—Spark plug gaps should be .027 inch to .030 inch.

Oiling.—Put several drops of light machine oil in each of the magneto oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Starter—Starter is connected to the engine through a Bendix drive.

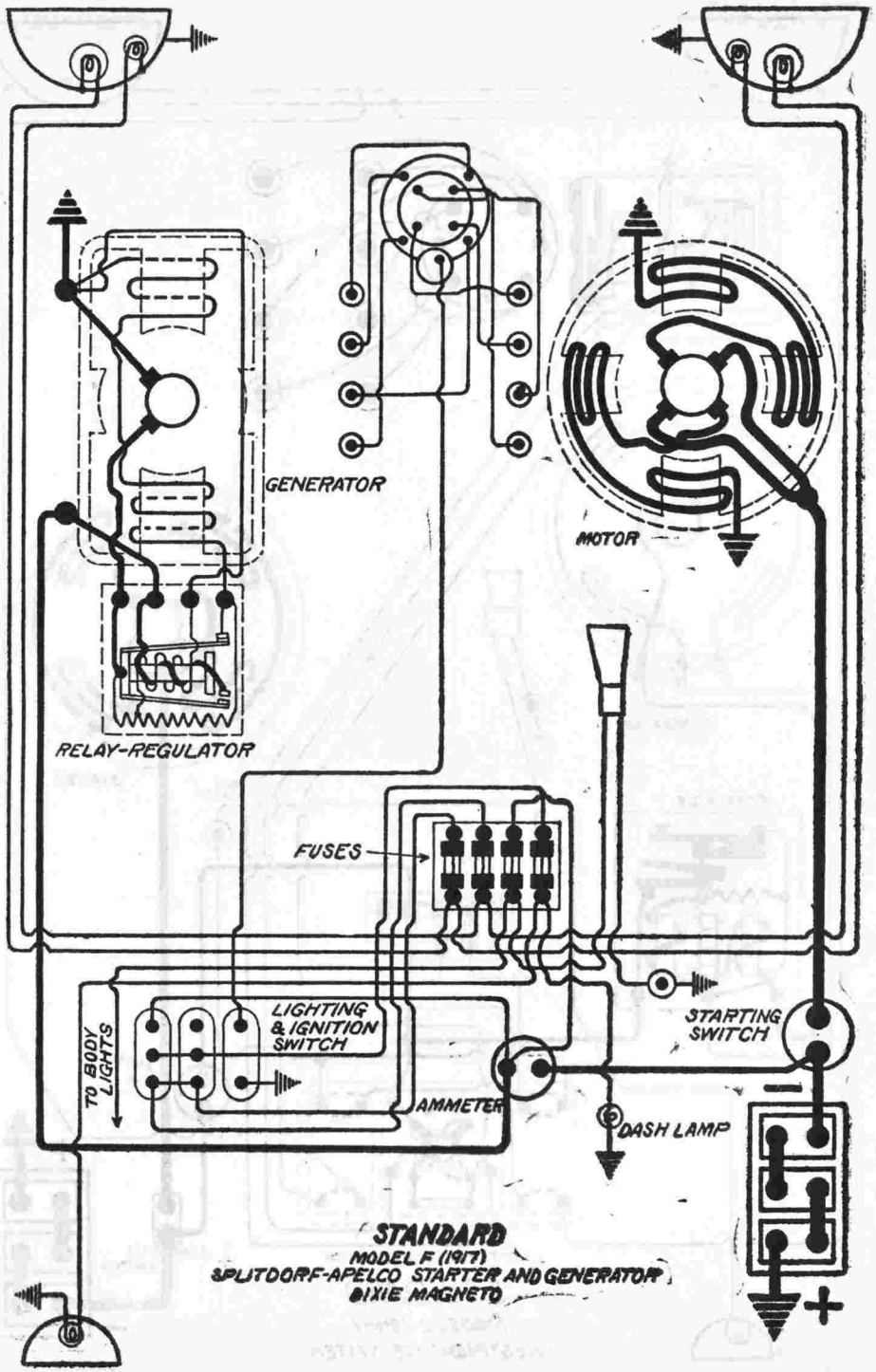
Oiling.—Put 5 or 6 drops of light engine oil in each of the motor oilers every two weeks. Do not oil the Bendix drive. Should the pinion stick, clean shaft with gasoline.

Generator.—Generator voltage regulation is by a vibrating-type regulator mounted on the generator. Relay is combined with regulator. Relay contacts should close at about 8 miles per hour. The maximum generator voltage should be reached at 12-14 miles per hour. Clean relay and regulator contacts by drawing a piece of soft paper between them. Should they be burned or pitted, resurface them with a piece of worn No. 00 sand paper. Increasing the spring tension on regulator armature (moving member) will increase the output. Decreasing the spring tension will decrease the output. The generator pressure should not exceed 7½ volts. Should the voltage continue to rise after the desired rate is reached, regulator contacts are probably sticking.

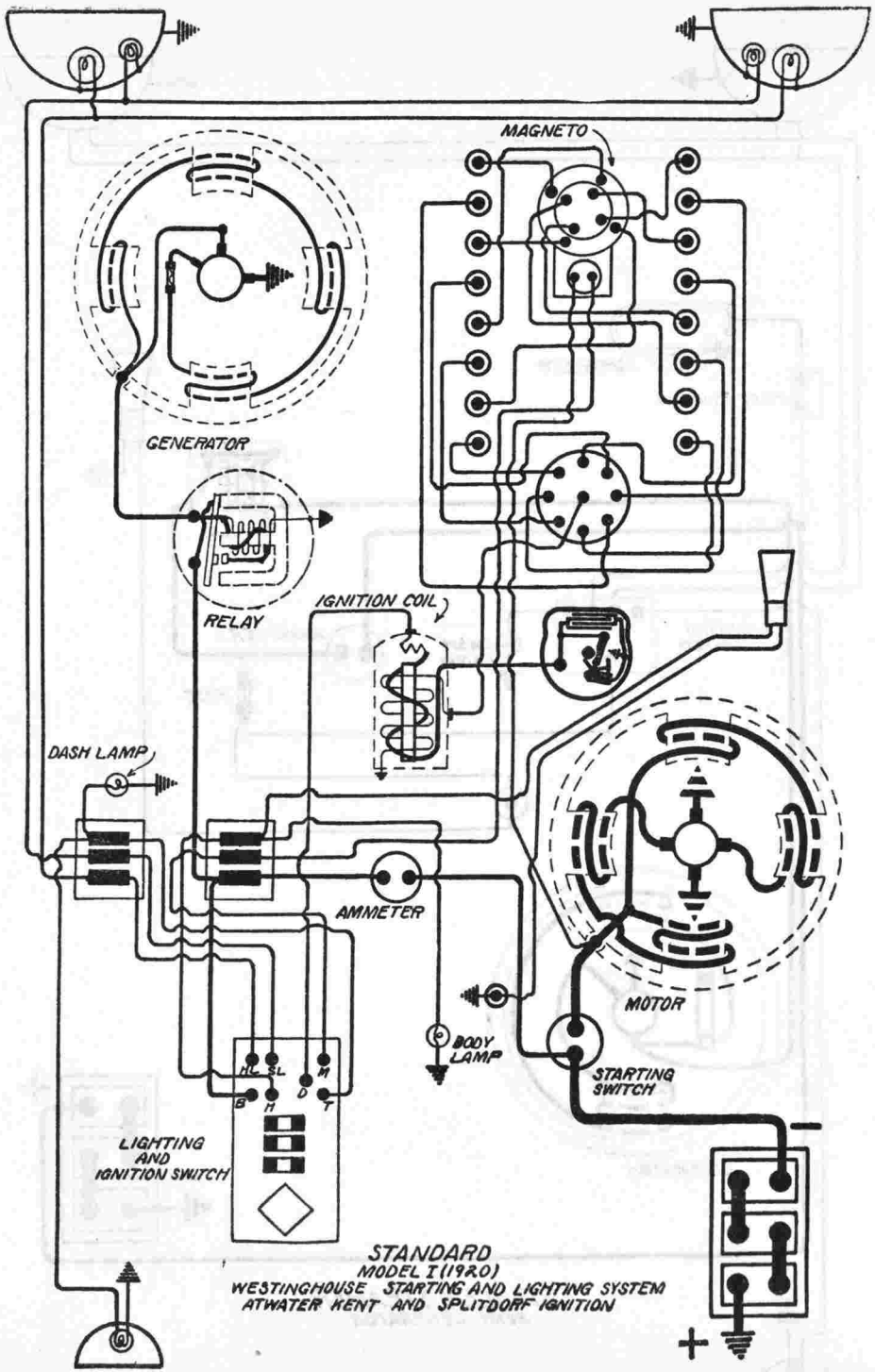
Oiling.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 18 cp. Dimmer lamps are 6-8 volts, 4 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp.

Fuses.—Lighting fuses are 20 ampere.



WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT AND SPLITDORF IGNITION



BATTERY.—Willard, Type SJR-6, 6 volt, 160 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Aero Magneto, Type 849, and Atwater Kent, Type CC. Magneto breaker contacts separate .020 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper. Battery breaker contacts separate .006 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Magneto.—Put 4 drops of light engine oil in the oil cup above the distributor shaft and 2 drops in the oil cup at the drive end every month. Apply one drop of light engine oil to the bearing of the breaker bar. If the car is driven more than 1000 miles in a month, these attentions must be given every 1000 miles.

OILING.—Battery Distributor.—Remove the distributor cap every two weeks and put 4 or 5 drops of light engine oil in the oil hole exposed. Put a small amount of vaseline on the cam, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Battery breaker contacts begin to separate when the top dead center mark on the flywheel is at the indicator. and magneto breaker contacts begin to separate when the top dead center mark is one inch past the indicator for 1919 and 1920 cars assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1R, 1L, 3R, 3L, 4R, 4L, 2R, 2L.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Frame 751. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes
2.5 lb. ft.	1450	140
10.0 lb. ft.	750	340
15.0 lb. ft.	560	460
21.0 lb. ft.	Lock	650

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Frame 760. Generator current regulation is by third brush system. Maximum current output is 11-15 amperes, reached at 1250 R.P.M. of the armature, or 20-25 miles per hour.

Generator Data

Cold Test Amperes	Cold Test R.P.M.	Hot Test Amperes	Hot Test R.P.M.
0	450	0	500
8	675	6	725
12	840	9	850
15	1050-1350	11	1050-1350
12	1750	8	1750

Field current is 2.8 to 3.25 amperes at 6 volts. Operating freely as a motor, generator takes 3.5 to 5 amperes at 6 to 6.6 volts. To increase charging rate move the third brush in a counter-clockwise direction (looking at commutator end), and in a clockwise direction to decrease the charging rate.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour, or 450-550 R.P.M. of the armature and opens at 6-8 miles per hour, or 400-450 R.P.M. of the armature. Charging current is 1 to 2 amperes at closing and the discharge current 0 to 2 amperes at the opening of relay contacts. Air gap between relay armature and coil core is .031 inch, contacts open. Contacts separate .013 to .016 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 6 cp. Dash and tail lamps are 6-8 volt, 2 cp. Body lamp is 6-8 volt, 4 cp.

On 1918 cars, head lamps are 6-8 volt, 18 cp. Dimmer are 6-8 volt, 4 cp.

FUSES:— Fuses are 15 ampere.

Note:—On 1918 and 1919 cars only the magneto ignition was used.

STANLEY STEAMER

MODEL 735 (1918-19-20-21-22)

REMY GENERATING SYSTEM

BATTERY.—Willard, Type SJRN-3, 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

GENERATOR.—Model No. 239-A. Generator current regulation is by the third brush system. A thermostat, located in the brush rigging of the generator, cuts a resistance into the field circuit when the temperature of the generator reaches 175° F., reducing the maximum charging rate 6 amperes. The thermostat is intended to change the charging rate as demands of the seasons or car operation requires. Never touch the thermostat points. The maximum current output is 19-20 amperes, reached at 1680 R.P.M. of the armature or 20-25 miles per hour.

Generator Data

Amperes	R.P.M.	Volts
0	525	6.4
7	780	7.1-7.2
14	1100	7.8
19.5-20.5	1680	7.8
19.0-20.0	2000	8.6
13.0-15.0	3000	8.0

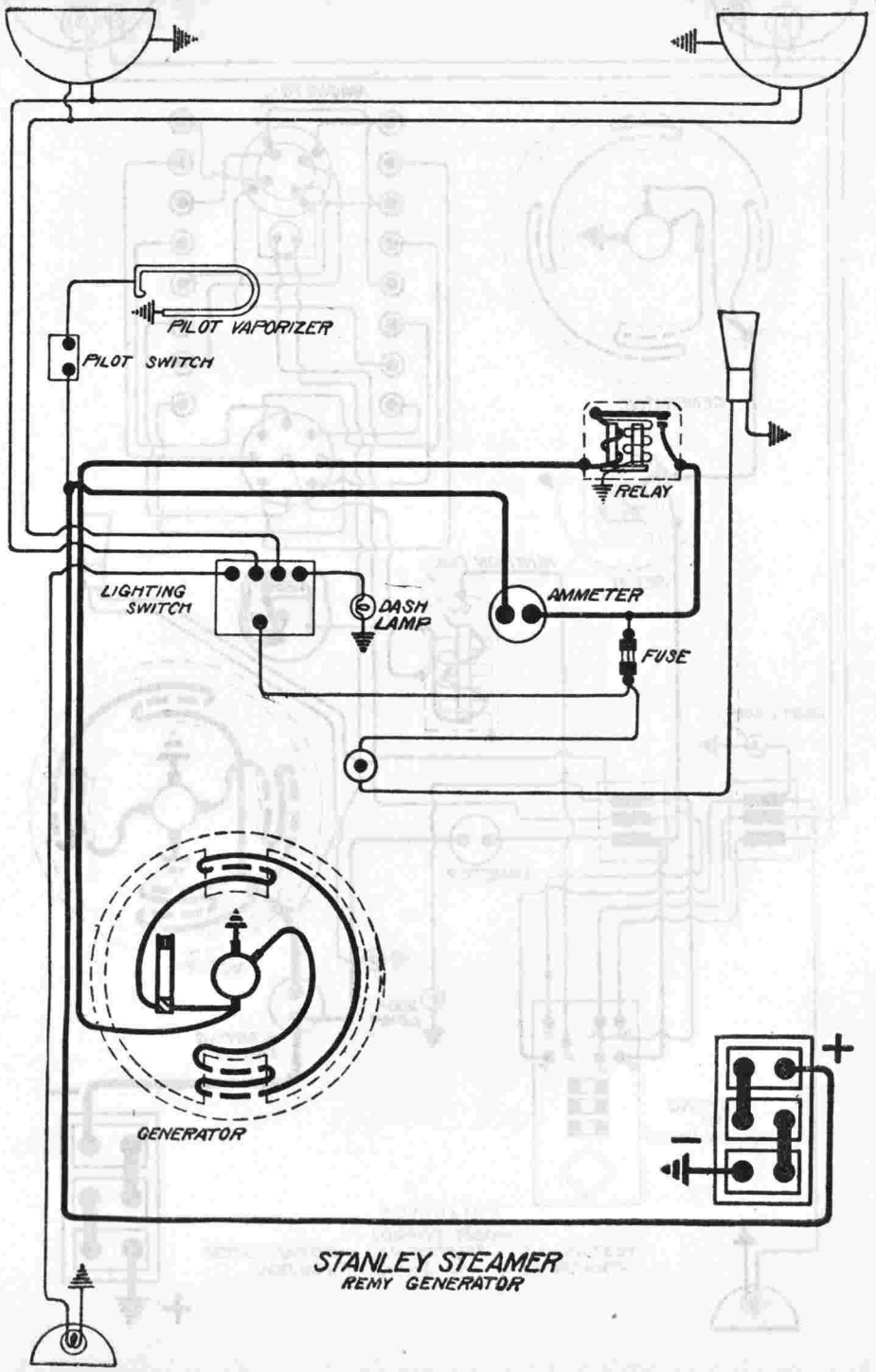
Above tests are made with the relay in the circuit and thermostat points closed. Shunt is 17-20 ounces. Pressure of the third brush is 13-17 ounces. Charging rate is varied field current is 5 amperes at 6.4 volts. Pressure of the main brushes on the commutator by adjusting the third brush setting. Third brush is moved by turning a screw, exposed in the commutator end plate. Turn the screw in a clockwise direction (looking at the commutator end) to increase the charging rate and in a counter-clockwise direction to decrease the charging rate.

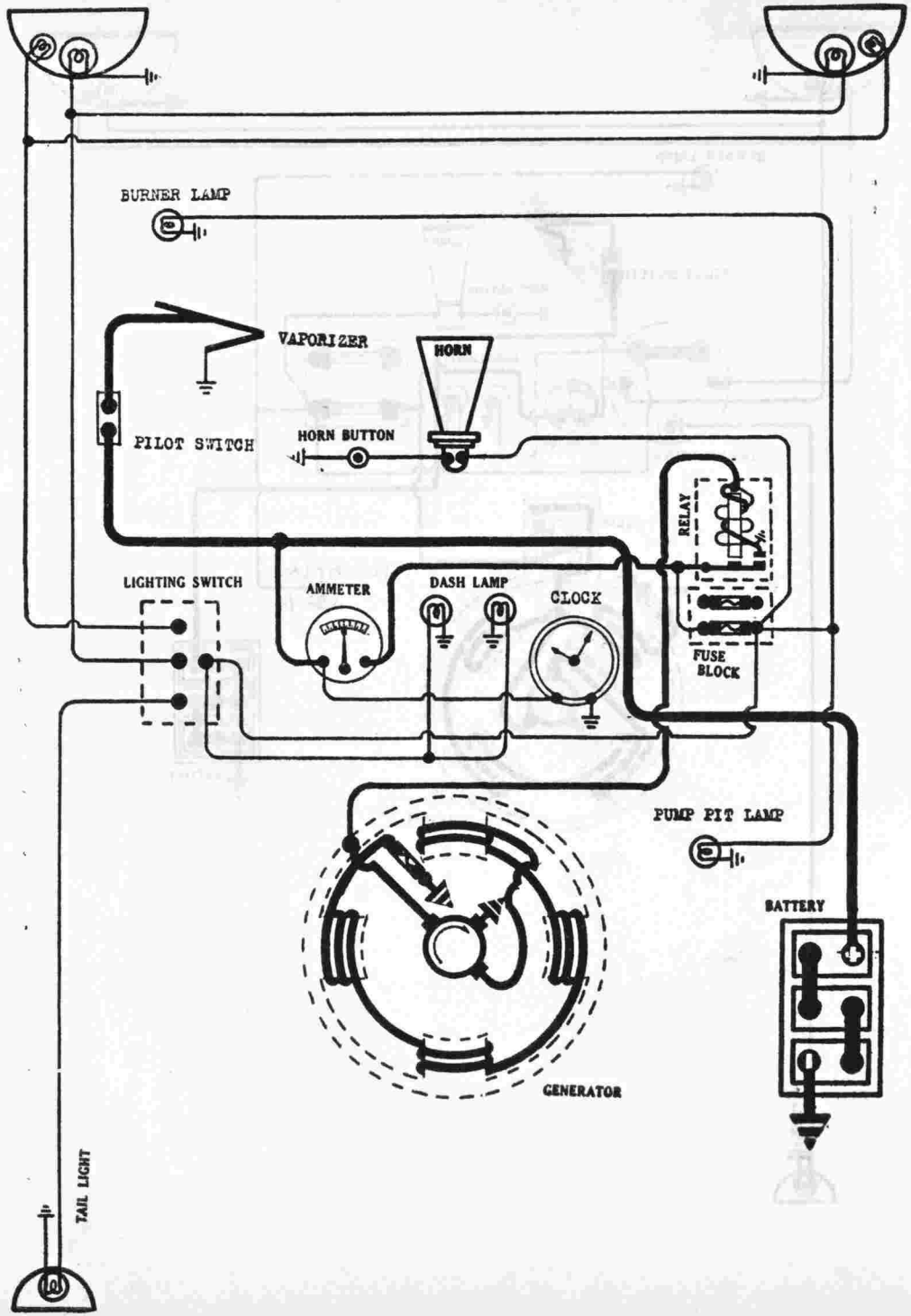
OILING.—Put 4 or 5 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 525-600 R.P.M. of the armature, and opens at 6-8 miles per hour or 450-525 R.P.M. of the armature. Relay contacts separate .012 to .015 inch. Air gap between relay armature (moving member) and coil core is .012 to .015 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again puttng into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash, tail and trouble lamps are 6-8 volt, 2 cp.

FUSES.—Fuse is 20 ampere.





STANLEY STEAMER

MODELS 740 (1923), 750 (1924-25)

BIJUR GENERATING AND LIGHTING SYSTEM.

BATTERY: — Westinghouse, Type 6-C-13. 6 volt, 105 ampere-hour. The lighting capacity is 5 amperes for 21 hours. The negative (-) terminal is grounded.

GENERATOR: — Model L-220, M-1802. The direction of rotation is clockwise, looking at the commutator end. The third brush system is used for current control. The maximum charging rate is 10-14 amperes, reached at 1200 R. P. M. of the generator armature.

Generator Data.

Hot Test (200°F)			Cold Test (70°F)		
Amperes	Volts	R. P. M.	Amperes	Volts	R. P. M.
0	7.5	500	0	7.5	400
6	8.1	725	6	8.1	625
10	8.3	1000	10	8.3	900
12	8.5	1200	12	8.5	1100
7	7.9	3300	7	7.9	3200

To adjust the generator output, remove the commutator cover band and loosen the third brush bracket slot screw. Then shift the bracket in a clockwise direction to increase the charging rate and in opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. Motoring freely, the generator revolves at 380 R. P. M. taking 5-6 amperes at 6.1 volts. The shunt field draws 5 amperes at 6.1 volts. The pressure of each of the generator brushes on the commutator should be 20 ounces.

RELAY: — Model 27. Relay contacts close when the voltage of the generator reaches 6.75 volts and open with a discharge current of 2 to 3.2 amperes. The contacts separate .020 inch. The air gap between the relay armature and the coil core should be .015 inch.

LIGHTING: — Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash tail, side and dome lamps are each 6-8 volt, 4 cp.

STANLEY STEAMER

MODELS 252 (1925) 262 (1926-27)

AMERICAN BOSCH GENERATING AND LIGHTING SYSTEM

BATTERY:—(1925) Prest-O-Lite, Type 611-SHK, 6 volt. **(1926-27) Exide, Type 3-XC-13-1,** 6 volt. The negative (—) terminal is grounded. Battery is mounted under the rear seat.

GENERATOR:—Model 1272. The direction of rotation is clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, on early generators loosen the nut on generator end plate holding third brush mounting plate and shift third brush. Shifting the third brush in a clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. Tighten the nut after making the adjustment. On later model generators shift the third brush by inserting a special Bosch key in the hole provided on the end plate and turning the key. The third brush may be shifted by hand if the key is not available by first removing the commutator band. The third brush mounting plate is held in any desired position by friction clamp washers. The maximum charging rate is 17-19 amperes reached at 1100-1300 R.P.M. or 30 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
3	6.75	600	3	6.5	725
7	7.1	700	8	7.5	900
13	7.6	900	10	7.8	1000
17	8.0	1200	13	8.0	1350
13	8.0	1950	11	7.8	2000

Running as a motor, generator draws 6 amperes at 6 volts. Shunt field current is 6.6 amperes at 6 volts. Generator brush spring tension is 1½-1¾ pounds each.

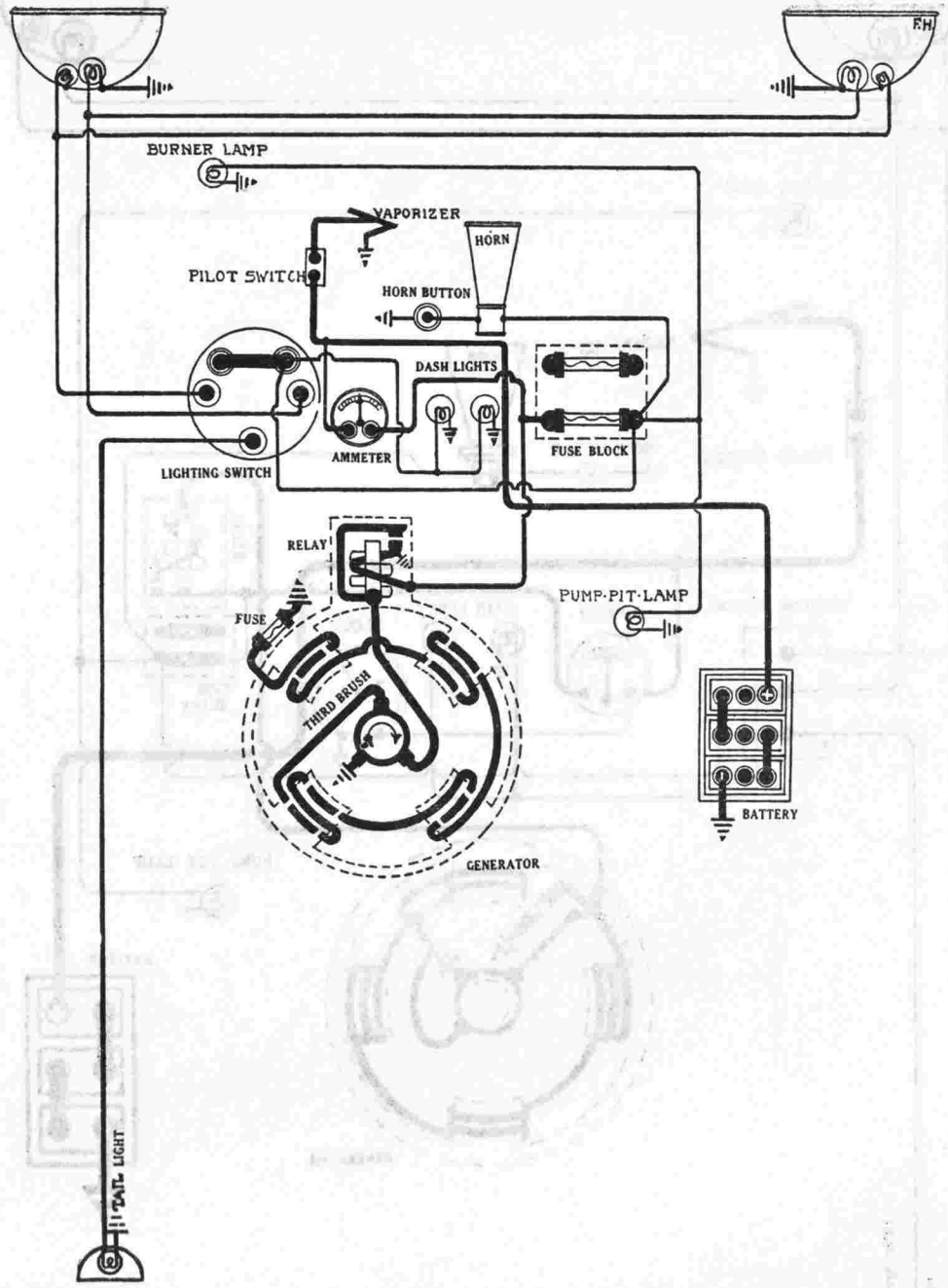
Mounting:—Generator is mounted in pump pit. To remove generator, disconnect lead and loosen mounting strap. Then lift generator from place. The relay is mounted on the dash.

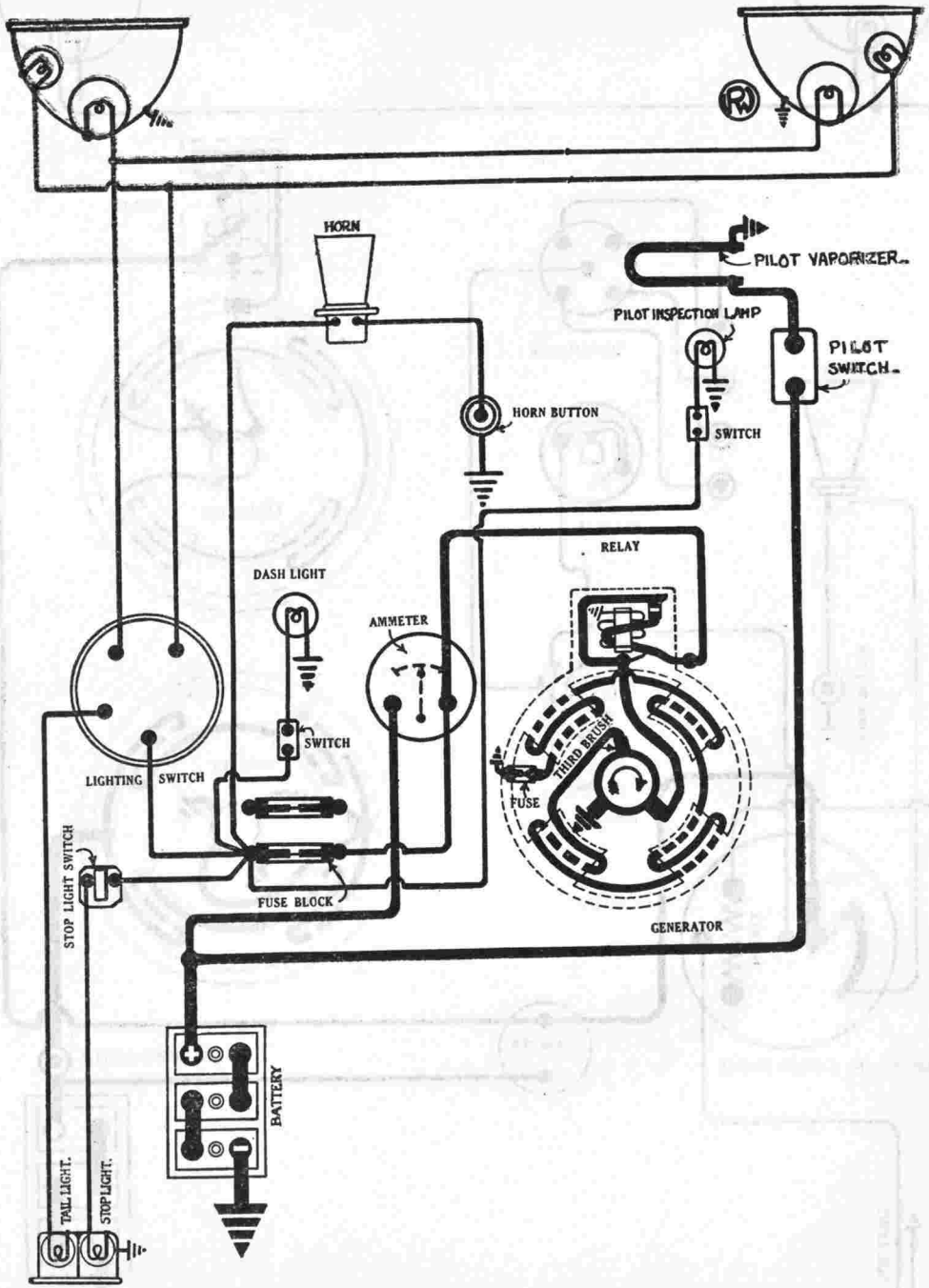
Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Relay closes at 550-600 R.P.M. or 6-8 M.P.H. when the voltage of the generator reaches 6.5-7.5 volts and opens at 450-500 R.P.M. with a discharge current of 1-3 amperes. Charging current at closing of contacts must not exceed 3 amperes. Relay contacts separate .015-.030 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING:—Clum Switch Model 10073. Head lamps are 6-8 volt, 21 cp. S.C. Dimmer lamps are 6-8 volt, 4 cp. S.C. Dash and tail lamps are each 6-8 volt, 4 cp. Dome and stop lamps are each 6-8 volt, 4 cp.

FUSES:—Generator field fuse is 7.5 amperes. Lighting fuse on switch is 10 amperes.





STANLEY

MODEL 770 (1928)
SERIAL NO. 28001 UP
AMERICAN BOSCH GENERATING AND LIGHTING SYSTEM

BATTERY:—Exide, Type 3-XC-13-1, 6 volt. The negative (—) terminal is grounded. Battery is mounted under the rear seat.

GENERATOR:—Model 1272. The direction of rotation is clockwise, looking at the commmutator end. Generator current regulation is by third brush shunt field. To adjust generator output, on early generators loosen the nut on generator end plate holding third brush mounting plate and shift third brush. Shifting the third brush in a clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. Tighten the nut after making the adjustment. On later model generators, shift the third brush by inserting a special Bosch key in the hole provided on the end plate and turning the key. The third brush may be shifted by hand if the key is not available by first removing the commutator cover band. The third brush mounting plate is held in any desired position by friction clamp washers. The maximum charging rate is 17-19 amperes reached at 1100-1300 R.P.M. or 30 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
3	6.75	600	3	6.5	725
7	7.1	700	8	7.5	900
13	7.6	900	10	7.8	1000
17	8.0	1200	13	8.0	1350
13	8.0	1950	11	7.8	2000

Running as a motor, generator draws 6.6 amperes at 6 volts. Shunt field current is 6 amperes at 6 volts. Generator brush spring tension is 1½-1¾ pounds each.

Mounting:—Generator is mounted in pump pit. To remove generator, disconnect lead and loosen mounting strap. Then lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Relay closes at 480 R.P.M. or 15 M.P.H. when the voltage of the generator reaches 6.5-7.5 volts and opens at 350 R.P.M. or 10 M.P.H. with a discharge current of 1-3 amperes. Charging current at closing of contacts must not exceed 3 amperes. Relay contacts separate .015-.030 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING:—Clum Switch Model 10073. Mounted on the instrument board. Head lights are 6-8 volt, 21 cp. S.C. Mazda No. 1129. Auxiliary lights are 6-8 volt, 6 cp. S.C. Mazda No. 81. Side, dash and dome lights are 6-8 volt, 6 cp. S.C. Mazda No. 81. Stop and tail lights are 6-8 volt, 6 cp. S.C. Mazda No. 81.

FUSES:—Generator field fuse is 7.5 amperes. Lighting fuse on switch is 10 amperes.

STAR

MODEL F (1922-23-24-25)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY.—U. S. L., Type CDN-311, 6 volt, 84 ampere-hours capacity. Starting capacity—96 amperes for 20 minutes. Lighting capacity—5 amperes for 17 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model IG-4041. ..Distributor Model IG-4030-A. Breaker contacts separate .020-.024 inch. They are made of tungsten. When the condition of the contacts affects the ignition remove and resurface on a medium hard oilstone. The condenser is now mounted in the distributor housing.

Oiling.—Fill grease cup under the breaker head with soft cup grease and turn down once every two weeks. Put 4 or 5 drops of light engine oil on the wick oiler every two weeks. If car is driven over 500 miles in two weeks, this care must be given every 500 miles.

Timing.—Breaker contacts begin to separate when No. 1 piston is at top dead center, on compression stroke, spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark plugs: — Spark plug diameters are 7/8 inch. Gaps are .025 to .027 inch.

STARTER:—Model MG-4004. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data

Torque	R.P.M.	Volts	Amperes
1 lb. ft.	2300	5.5	100
3 "	1200	5	200
5.9 "	650	4.5	300
8.7 "	150	4	400
18 "	Lock	5	650

Oiling.—Put 5 or 6 drops of light engine oil into starter oilers every two weeks. If car is driven over 500 miles in two weeks, this attention must be given every 500 miles.

GENERATOR:—Model GJ-4014. Direction of rotation is counter-clockwise. The third brush system is used for current regulation. Motoring freely, generator takes 4-5 amperes, 6 volts. Field test, 2.2 amperes, 6 volts, each coil separately 8.8 amperes, 6 volts.

Generator Data

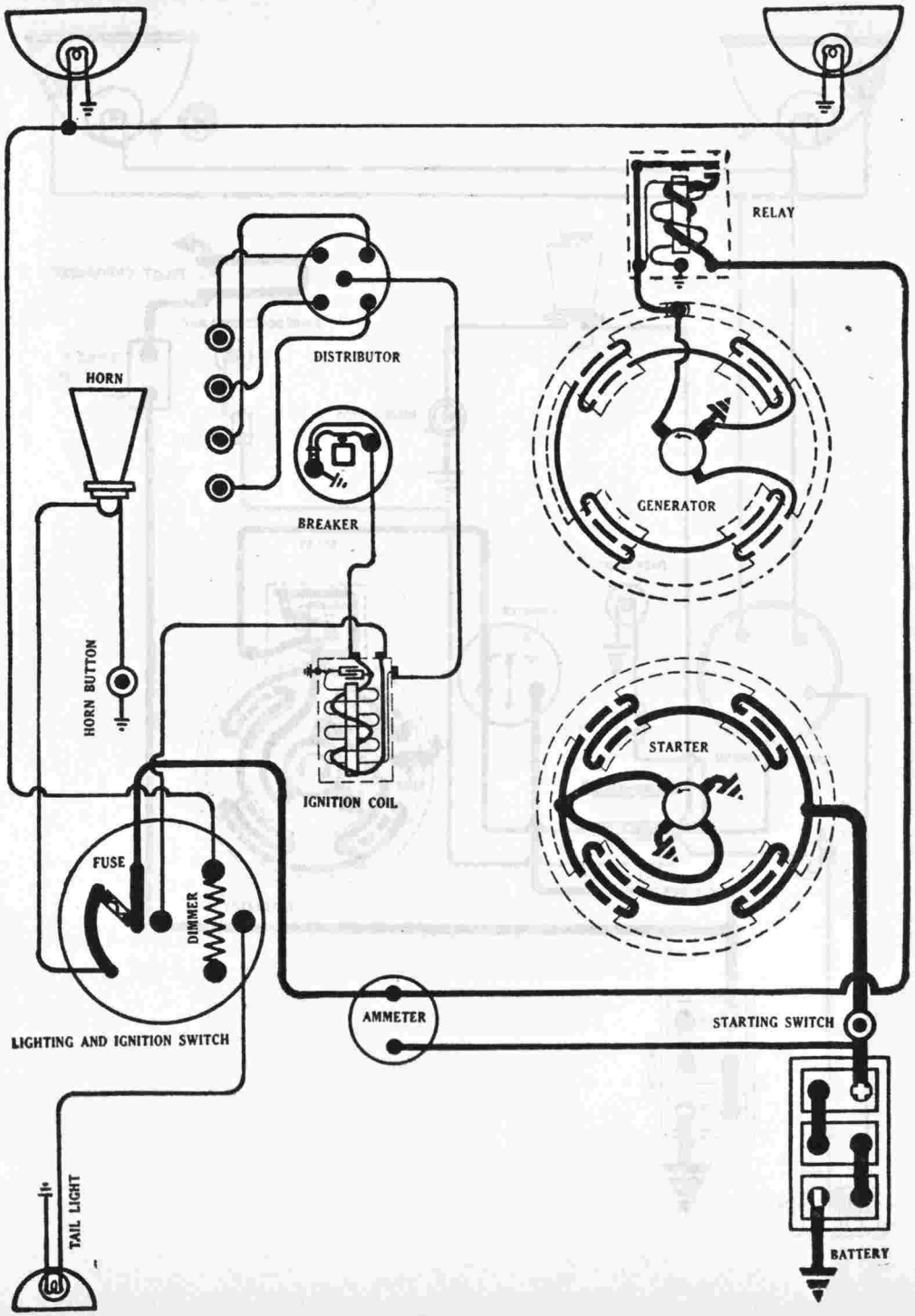
Cold Test. (25°C)			Hot Test (75°C)		
2	6.25	575	2	6.95	700
6	6.4	700	6	7.1	875
10	6.55	900	10	7.25	1200
14	6.7	1250	12	7.35	1650
15.5	6.8	1700	12	7.35	1850

Oiling.—Put 4 or 5 drops of light engine oil into generator oiler every two weeks. If car is driven over 500 miles in two weeks, this care must be given to every 500 miles.

RELAY.—Relay closes at 500-550 R.P.M. of armature, or 7-9 M.P.H., and opens at 450-500 R.P.M., 5-7 miles per hour. Relay contact gap separates .025-.035 inch. Air gap between relay armature and coil separates .010-.015 inch.

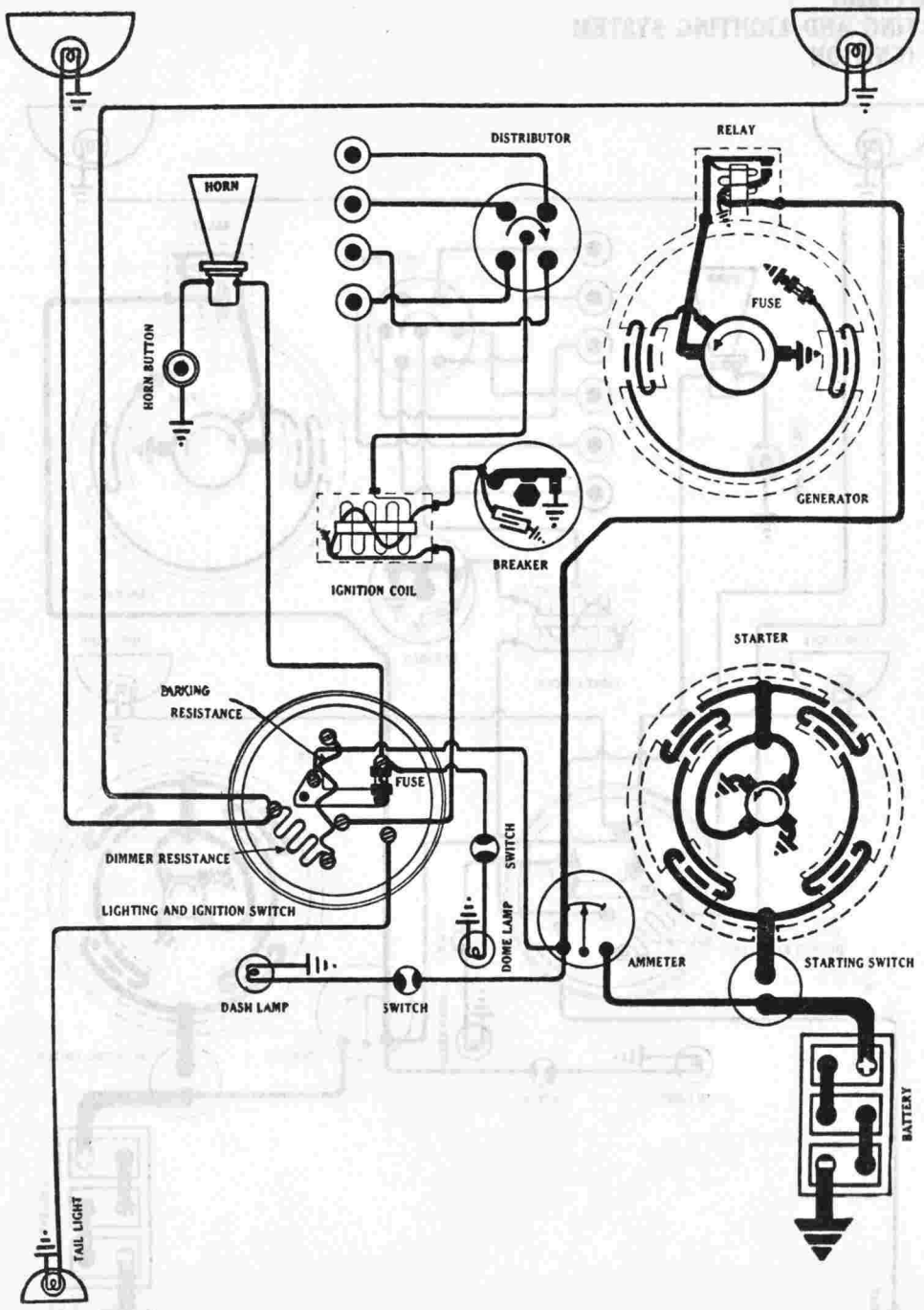
LIGHTING.—Head lights are 6-8 volts, 21 cp., S.C. Dimmer and tail lights are 6-8 volts, 4 cp., S.C. Dash light, 6-8 volts, 2 cp., S.C.

FUSES:—20 amperes.



STAR

MODEL F-25, M (1925)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION



BATTERY:—U.S.L. 3 CVG-5X. 6 volt, 84 ampere hour. Starting capacity is 96 amperes for 20 minutes. Lighting capacity is 5 amperes for 16.2 hours. The negative (—) terminal is grounded

IGNITION.—Coil Model No. 1 G-4063. Distributor Model 1G-4035D. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone after which the points should be thoroughly wiped with a clean rag. Points can be cleaned also with a "Tungsten point file."

Oiling:—Put 4 or 5 drops of light oil in the distributor wick oiler every two weeks or 200 miles.

Timing:—Breaker contacts begin to separate when piston No. 1 on the compression stroke is at top dead center with spark control lever and breaker assembly in the fully retarded position. Maximum spark advance 25°.

Firing Order:—The firing order is 1-3-4-2.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 to 030 inch.

STARTER:—Model No. MO-4102. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The starter cranks the engine at 220 R.P.M. taking 180 amperes at 5.2 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
2 lb. ft.	1700	5.1	180
5 "	700	4.4	315
7 "	230	4.0	395
10 "	Lock	3.6	490

Oiling:—Self-oiling graphite bronze bearing used on commutator end. Put 8 to 10 drops of oil in oiler on drive end head every 1000 miles.

GENERATOR:—Model GT-4001A. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To increase the charging rate shift the third brush in the direction of armature rotation (counter-clockwise) and in the opposite direction to decrease the charging rate. The maximum charging rate of 14 amperes is reached at 1450 R.P.M. of the generator armature or 25 M.P.H. car speed in high gear.

Generator Data

Cold Test (77°F.)			Hot Test (230°F.)		
Amperes	Volts	R.P. M.	Amperes	Volts	R.P. M.
0	6.5	510	0	7	600
4	6.9	680	4	7.1	820
10	7.5	960	10	7.5	1400
14	8.2	1450	12.5	8.0	2000

Oiling:—Put 4 or 5 drops of light engine oil in the oil cup on the commutator end of the generator every two weeks or each 500 miles. The drive end of the generator is oiled by the splash from the gears.

RELAY:—Model CB-4007. The relay closes at 550 R.P.M. of the generator when the voltage reaches 7 to 7.5 volts and opens with a discharge current of 0 to 2 amperes. Relay contacts separate .020 inch. The air gap between the relay armature and coil core is .010 inch, contacts closed.

LIGHTING.—Headlamps are 6-8 volt 21 cp. S.C. Tail lamp is 6-8 volt 2 cp. S.C. Interior lamp 6-8 volt 4 cp. S.C. Instrument board lamp 6-8 volt 2 cp. D.C.

FUSES:—Lighting fuse is 20 amperes. 5 ampere fuse used in the generator.

STAR

MODEL R (1926)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

BATTERY:—U.S.L. 3 CVG-5X. 6 volt, 84 ampere hour. Starting capacity is 96 amperes for 20 minutes. Lighting capacity is 5 amperes for 16.2 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. 1G-4063. Distributor Model 1G-4067-A. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone after which the points should be thoroughly wiped with a clean rag. Points can be cleaned also with a "Tungston point file."

Oiling:—Put 4 or 5 drops of light oil in the distributor wick oiler every two weeks or 200 miles.

Timing:—Breaker contacts begin to separate when piston No. 1 on the compression stroke is at top dead center with spark control lever and breaker assembly in the fully retarded position. Max. spark advance 25°.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8. Gaps are .025 to .030 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1 3/8 inches; stem diameter, .3714 inch; stem length, 4 31/32 inches. Tappet clearance is .006 inch (cold). Spring pressure is 77.5 pounds. Inlet valves open at 4 degrees after top dead center and close at 46 degrees after lower dead center.
EXHAUST VALVES:—Head diameter, 1 1/4 inches; stem length, .3714 inch; stem length, 4 31/32 inches. Tappet clearance is .006 inch (cold). Spring pressure is 77.5 pounds. Exhaust valves open 41 degrees before lower dead center and close 1 degree after top dead center.

STARTER:—Model MO-4102. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The starter cranks the engine at 200 R.P.M. taking 180 amperes at 5.1 volts. Starter switch is Model SW-4001.

Starter Data

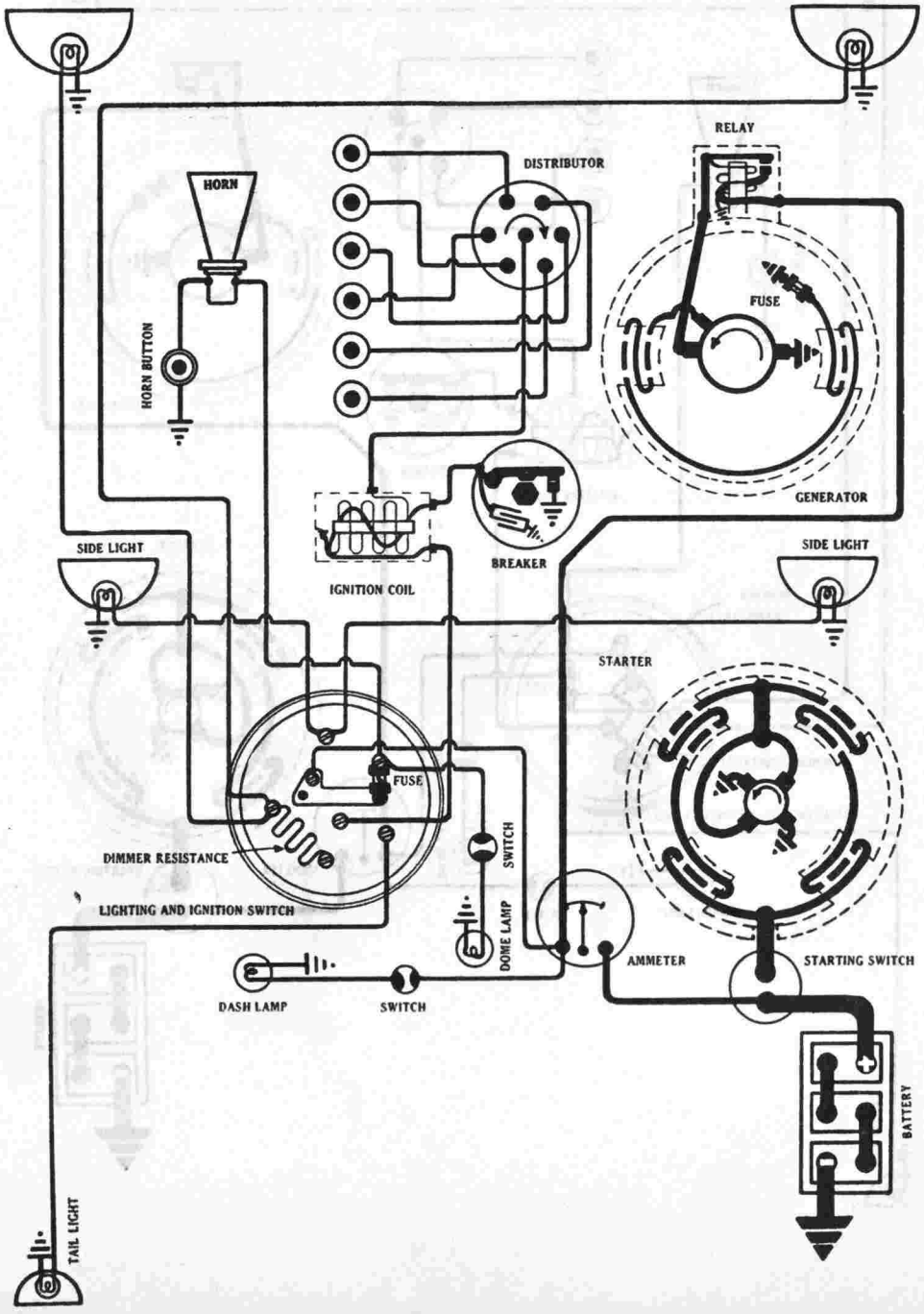
Torque	R.P.M.	Volts	Amperes
2 lb. ft.	1700	5.1	180
5 "	700	4.4	315
7 "	230	4.0	395
10 "	Lock	3.6	490

Oiling:—Self oiling graphite bronze bearing used on commutator end. Put 8 to 10 drops of oil in oiler on drive end head every 1000 miles.

GENERATOR:—Model GT-4001-A. The direction of rotation is counter-clockwise looking at the commutator end. The third brush system is used for current regulation. To increase the charging rate shift the third brush in the direction of armature rotation (counter-clockwise), and in the opposite direction to decrease the charging rate. The maximum charging rate of 14 amperes is reached at 1450 R.P.M. of the generator armature or 25 M.P.H. car speed in high gear.

Generator Data

Cold Test (77°F.)			Hot Test (230°F)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	510	0	7	600
4	6.9	680	4	7.1	820
10	7.5	960	10	7.5	1400
14	8.2	1450	12.5	8.0	2000



STAR

MODEL R (1926)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

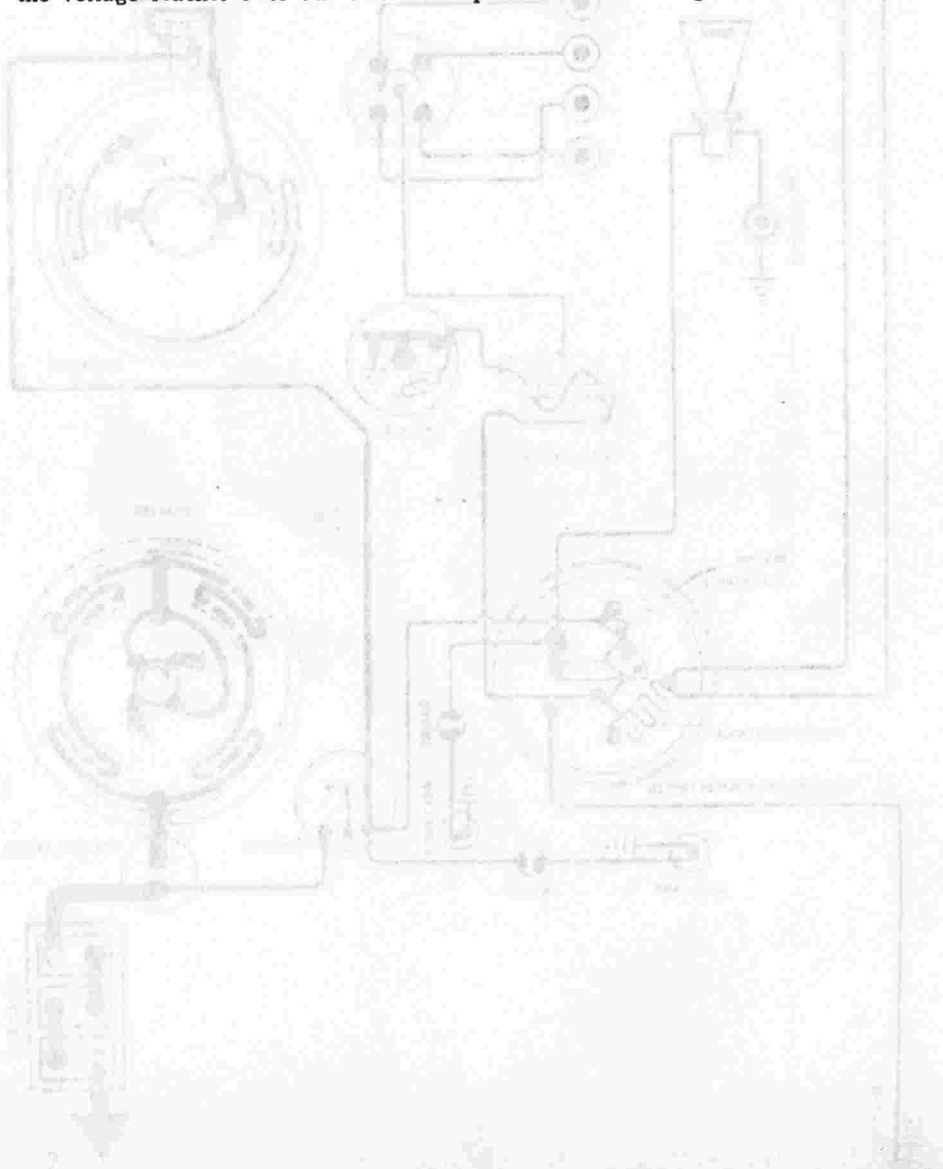
AUTO-LITE IGNITION

Oiling:—Put 4 or 5 drops of light engine oil in the oil cup on the commutator end of the generator every two weeks or each 500 miles. The drive end of the generator is oiled by the splash from the gears.

RELAY:—Model CB-4007. The relay closes at 550 R.P.M. of the generator when the voltage reaches 7 to 7.5 volts and opens with a discharge current of 0 to 2 amperes. Relay contacts separate .020 inch. The air gap between the relay armature and coil core is .010 inch, contacts closed.

LIGHTING.—Headlamps are 6-8 volt 21 cp. S.C. Tail lamp is 6-8 volt 2 cp. S.C. Interior lamp is 6-8 volt 4 cp. S.C. Instrument board lamp is 6-8 volt 4 cp. S.C.

FUSES:—Lighting fuse is 20 amperes. 5 ampere fuse used in the generator.



STAR

MODEL M (1926-27)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

BATTERY.—U. S. L. 3 CVG-5X. 6 volt, 84 ampere hour. Starting capacity is 96 amperes for 20 minutes. Lighting capacity is 5 amperes for 16.2 hours. The negative terminal is grounded.

IGNITION:—Coil Model IG-4063. Distributor Model IG-4036D. Breaker contacts separate .020-.024 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone. Points can also be cleaned with a "Tungsten Point File." Thoroughly wipe off points with a clean rag after resurfacing. Distributor is of the manual type. Manual advance is 50° (measured on flywheel) or 25° of the distributor. Ignition current is 1-3 amperes with engine running and 3.4-5 amperes with engine stopped.

Mounting:—Ignition coil is mounted on the generator. Distributor is mounted on right hand side of motor, on generator. To remove distributor, loosen mounting clamp screw and remove spark plug wires from spark plugs.

Oiling.—Put 4 or 5 drops of light oil in the distributor wick oiler every two weeks or 200 miles.

Timing.—Breaker contacts begin to separate when piston No. 1 on the compression stroke is at top dead center with spark control lever and breaker assembly in the fully retarded position.

Valve Timing:—INLET VALVES:—Head diameter, 1.5 inches; stem diameter, 3/8 inch; stem length, 5 1/4 inches; tappet clearance .006 inch (cold motor); spring pressure 78 1/2 pounds opened, 51 pounds closed. Valve lift, 5/16 inch; intake opens 4° past top dead center and closes 46° past lower dead center.
EXHAUST VALVES:—Head diameter, 1.5 inches; stem diameter, 3/8 inch; stem length, 5 1/4 inches; tappet clearance, .008 inch (cold motor); spring pressure, 78 1/2 pounds opened, 51 pounds closed. Valve lift, 5/16 inch; exhaust opens at 41° before lower dead center and closes 1° past top dead center. Stem guides are removable. No oversize valve stems are made.

Firing Order.—The firing order is 1-3-4-2.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .025 to .030 inch.

STARTER.—Model No. MO-4102. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The starter cranks the engine at 220 R.P.M. taking 180 amperes at 5.2 volts.

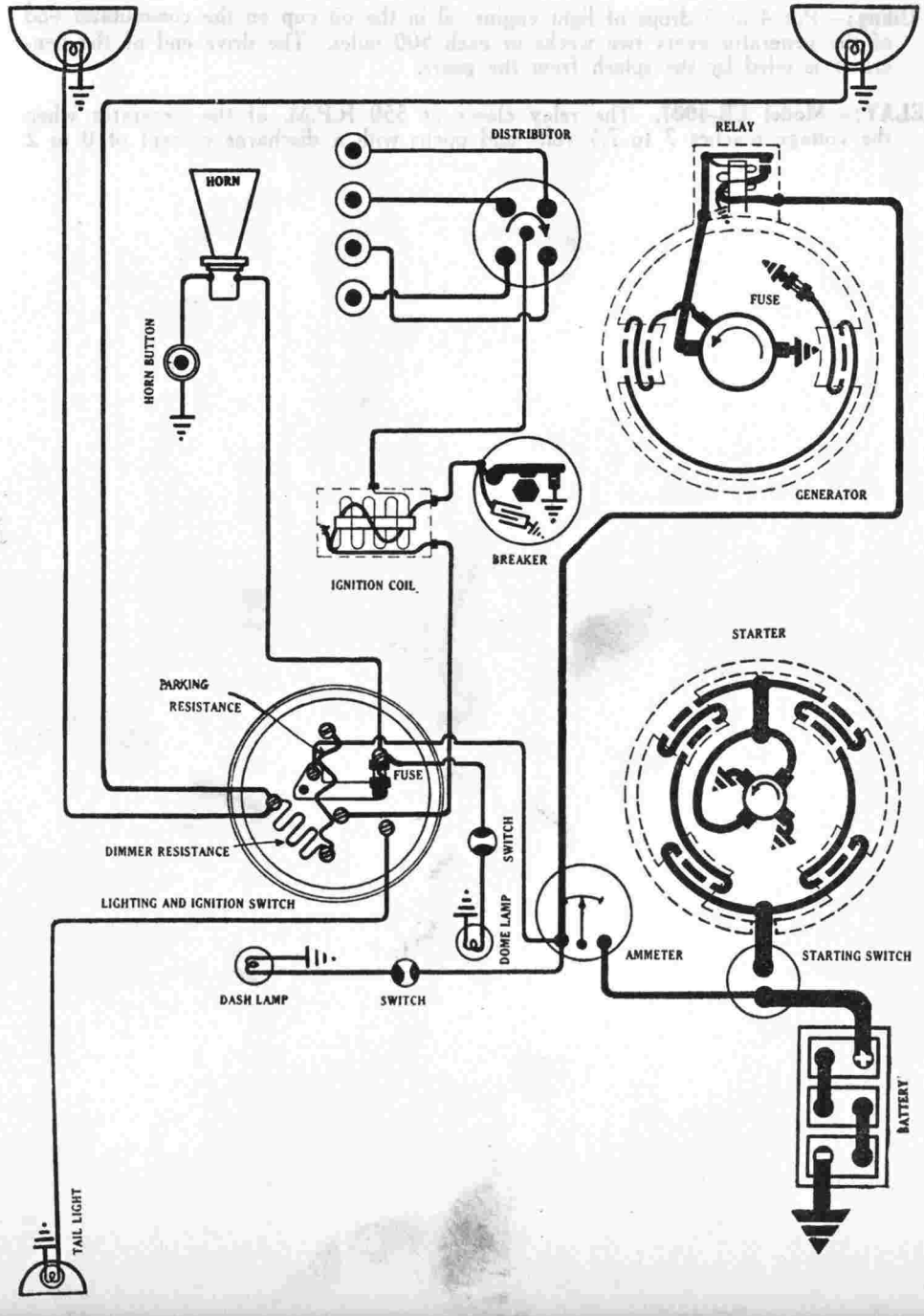
Starter Data

Torque	R.P.M.	Volts	Amperes
2 lbs. ft.	1700	5.1	180
5 lbs. ft.	700	4.4	315
7 lbs. ft.	230	4.0	395
10 lbs. ft.	Lock	3.6	490

Mounting:—Starter is mounted on right hand side of motor attached by a clamping strap. To remove starter, first remove clamping bolt.

Oiling.—Self-oiling graphite bronze bearing used on commutator end. Put 8 to 10 drops of oil in oiler on drive end head every 1000 miles.

GENERATOR.—Model GT-4001A. The direction of rotation is counter-clockwise looking at the commutator end. The third brush system is used for current regulation. To increase the charging rate shift the third brush in the direction of armature



STAR

MODEL M (1926-27)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

rotation (counter-clockwise) and in the opposite direction to decrease the charging rate. The maximum charging rate of 14 amperes is reached at 1450 R.P.M. of the generator armature of 25 M.P.H. car speed in high gear.

Generator Data

Cold Test (77°F.)			Hot Test (230°F.)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	510	0	7	600
4	6.9	680	4	7.1	820
10	7.5	960	10	7.5	1400
14	8.2	1450	12.5	8.0	2000

Running freely as a motor, generator draws 5 amperes at 6 volts. Shuntfield current is 3.2 amperes at 6.2 volts. Generator brush spring tension is 1¼-1½ pounds each. A five ampere fuse is located in the shuntfield circuit.

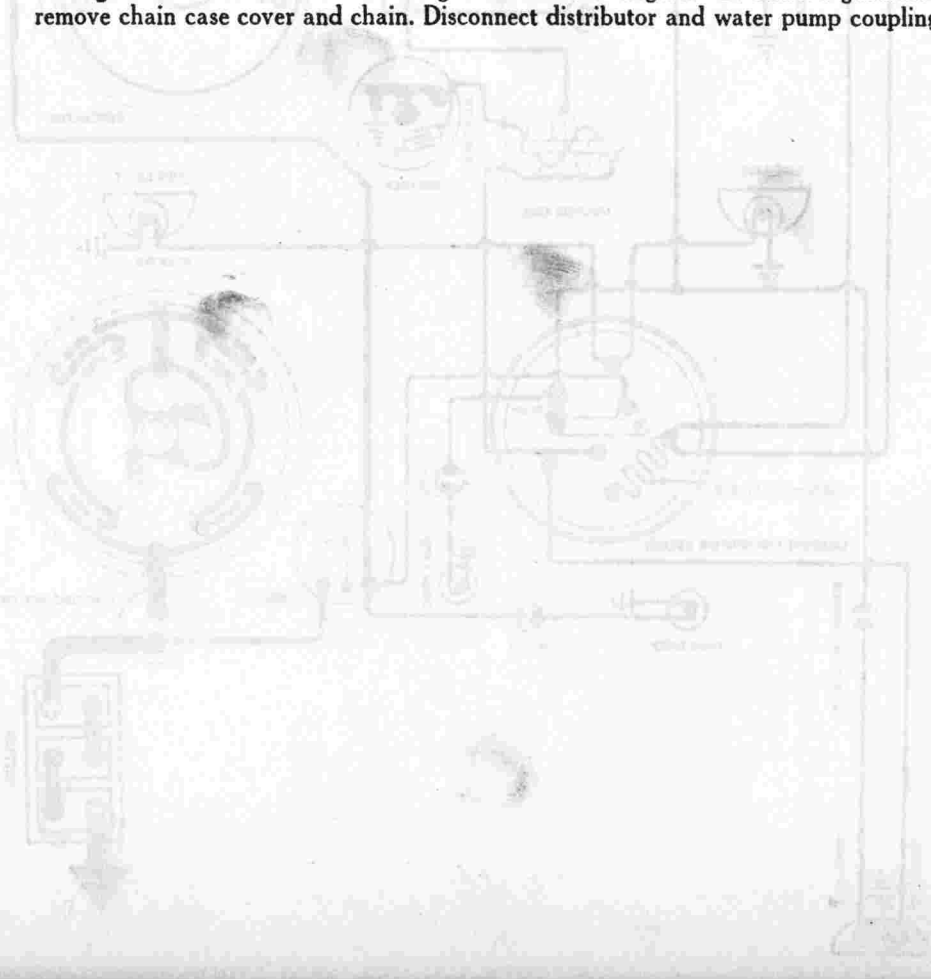
Mounting:—Generator is mounted on right hand side of engine. To remove generator remove chain case cover and chain. Disconnect distributor and water pump coupling hose. Remove clamping strap screw and chain case stud nuts holding generator, and lift generator from place.

Oiling.—Put 4 or 5 drops of light engine oil in the oil cup on the commutator end of the generator every two weeks or each 500 miles. The drive end of the generator is oiled by the splash from the gears.

RELAY.—Model CB-4007. The relay closes at 550 R.P.M. of the generator when the voltage reaches 7 to 7.5 volts and opens with a discharge current of 0 to 2 amperes. Relay contacts separate .020 inch. The air gap between the relay armature and coil core is .010 inch contacts closed.

LIGHTING:—Clum Switch Model 10491. Head lamps are 6-8 volt, 21 cp. S.C. Dash, dome and tail lamps are each 6-8 volt, 2 cp. S.C.

FUSES:—Lighting fuse on back of switch is 20 amperes. Generator field fuse is 5 amperes.



STAR

MODEL R (1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

BATTERY.—U.S.L. 3 CVG-5X. 6 volt 84 ampere hour. Starting capacity is 96 amperes for 20 minutes. Lighting capacity is 5 amperes for 16.2 hours. The negative terminal is grounded.

IGNITION:— Coil Model IG-4063. Distributor Model IG-4067A. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone after which the points should be thoroughly wiped with a clean rag. Points can be cleaned also with a "Tungsten point file."

Oiling.—Put 4 or 5 drops of light oil in the distributor wick oiler every two weeks or 200 miles.

Timing.—Breaker contacts begin to separate when piston No. 1 on the compression stroke is at top dead center with spark control lever and breaker assembly in the fully retarded position. Max. spark advance 25°.

Valve Timing:—INLET VALVES:—Head diameter, 1⅜ inches; stem diameter, ⅜ inch; stem length, 5 19/32 inches; tappet clearance, .006 inch (hot motor); spring pressure, 46½ pounds closed, 77½ pounds opened; valve lift 5/16 inch; intake opens at 4° past top dead center and closes at 46° past lower dead center.

EXHAUST VALVES:—Head diameter, 1¼ inches; stem diameter, ⅜ inch; stem length, 5 19/32 inches; tappet clearance, .006 inch (hot motor); spring pressure, 46½ pounds closed, 77½ pounds opened; valve lift, 5/16 inch. Exhaust opens at 41° before lower dead center and closes at 1° past top dead center. Stem guides are removable. No oversize valve stems are made.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are ⅞. Gaps are .025 to .030 inch.

STARTER.—Model MO-4102. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The starter cranks the engine at 200 R.P.M. taking 180° amperes at 5.1 volts. Starter switch is Model SW-4001.

Starter Data

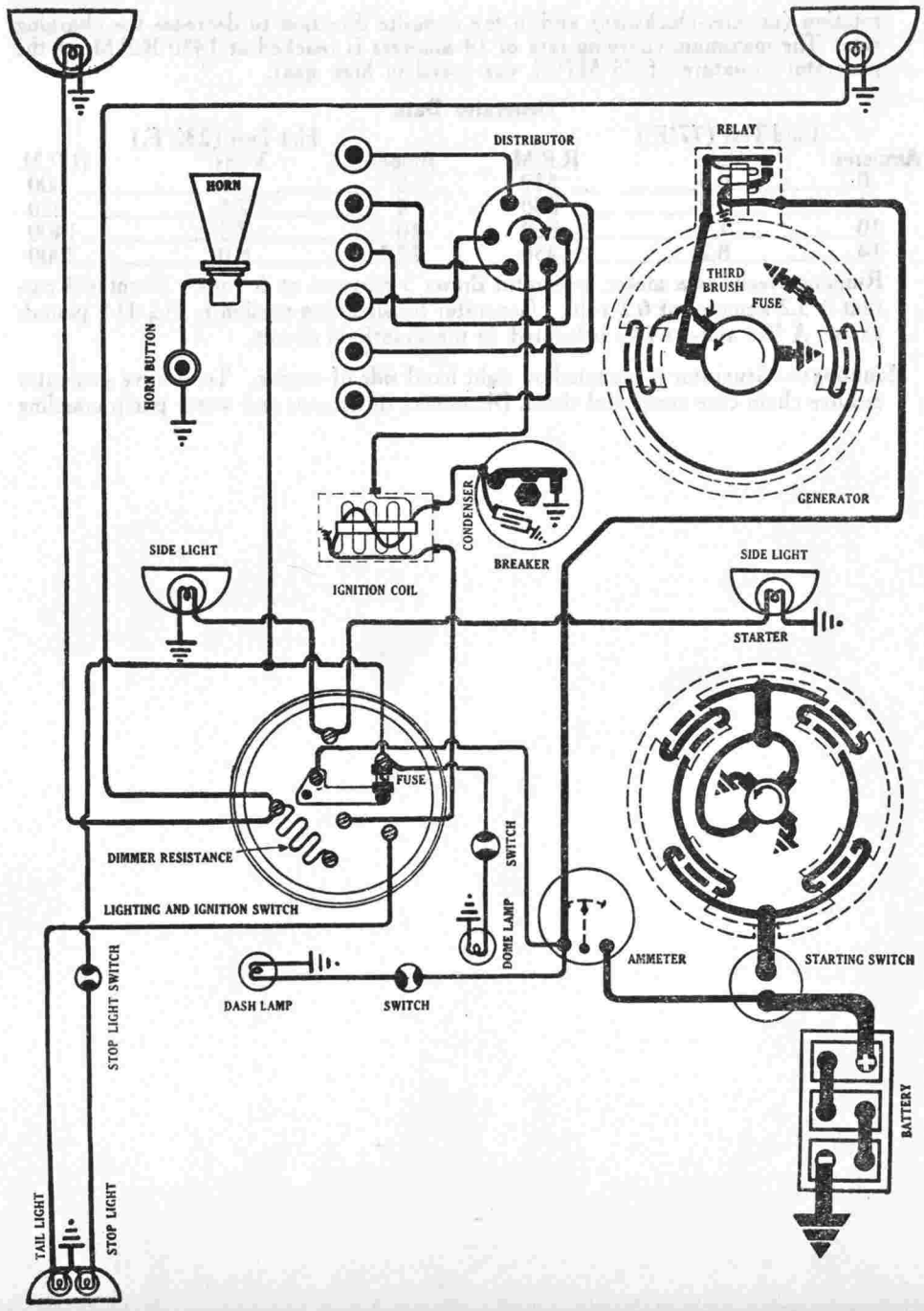
Torque	R.P.M.	Volts	Amperes
2 lbs. ft.	1700	5.1	180
5 lbs. ft.	700	4.4	315
7 lbs. ft.	230	4.0	395
10 lbs. ft.	Lock	3.6	490

Oiling.—Self oiling graphite bronze bearing used on commutator end. Put 8 to 10 drops of oil in oiler on drive end head every 1000 miles.

GENERATOR.—Model GT-4001A. The direction of rotation is counter-clockwise looking at the commutator end. The third brush system is used for current regulation. To increase the charging rate shift the third brush in the direction of armature rotation (counter-clockwise), and in the opposite direction to decrease the charging rate. The maximum charging rate of 14 amperes is reached at 1450 R.P.M. of the generator armature or 25 M.P.H. car speed in high gear.

Generator Data

Cold Test (77°F.)			(Hot Test (230°F.)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	510	0	7	600
4	6.9	680	4	7.1	820
10	7.5	960	10	7.5	1400
14	8.2	1450	12.5	8.0	2000



STAR

MODEL R (1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

Oiling.—Put 4 or 5 drops of light engine oil in the oil cup on the commutator end of the generator every two weeks or each 500 miles. The drive end of the generator is oiled by the splash from the gears.

RELAY.—Model CB-4007. The relay closes at 550 R.P.M. of the generator when the voltage reaches 7 to 7.5 volts and opens with a discharge current of 0 to 2 amperes. Relay contacts separate .020 inch. The air gap between the relay armature and coil core is .010 inch, contacts closed.

LIGHTING:—Clum Switch Model 10555. Head and stop lamps are each 6-8 volt, 21 cp. S.C. Side, dash, dome and tail lamps are each 6-8 volt, 2 cp. S.C.

FUSES.—No fuse used on the lighting circuit. 5 ampere fuse used in the generator.



Stearns

Light 4 (1915). (Serial Nos. L-1 to L-703)
Gray and Davis Starting and Lighting System
Bosch Magneto Ignition

Battery.—Battery is 12 volt, 64 ampere-hour. The positive terminal of one set of 3 cells is grounded through the ammeter.

Ignition.—Magneto is Type NU4. Breaker contacts should separate .014 inch to .016 inch. Should they become badly burned or pitted, affecting the ignition, resurface them with a fine, flat jeweler's file or a piece of well worn No. 00 sandpaper.

Timing.—Magneto breaker contacts should begin to separate when engine is turned 1½ inches past upper dead center, measured on flywheel, with spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—The spark plug gaps should be .018 to .02′ inch.

Oiling.—Put 3 or 4 drops of light machine oil in each of the magneto oilers every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Starter.—Starter is Type T. It is connected to the engine through a set of reduction gears and a pinion shifted by the operator. An overrunning clutch prevents the engine from driving the motor at an excessive speed. The starting switch connects the two halves of the battery in series for starting, applying 12 volts pressure to the motor. Cold engine, heavy oil, tight bearings or other obstructions, or damp, grounded or short circuited windings will cause high current and low speed during the cranking operation. Discharged, dry or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current.

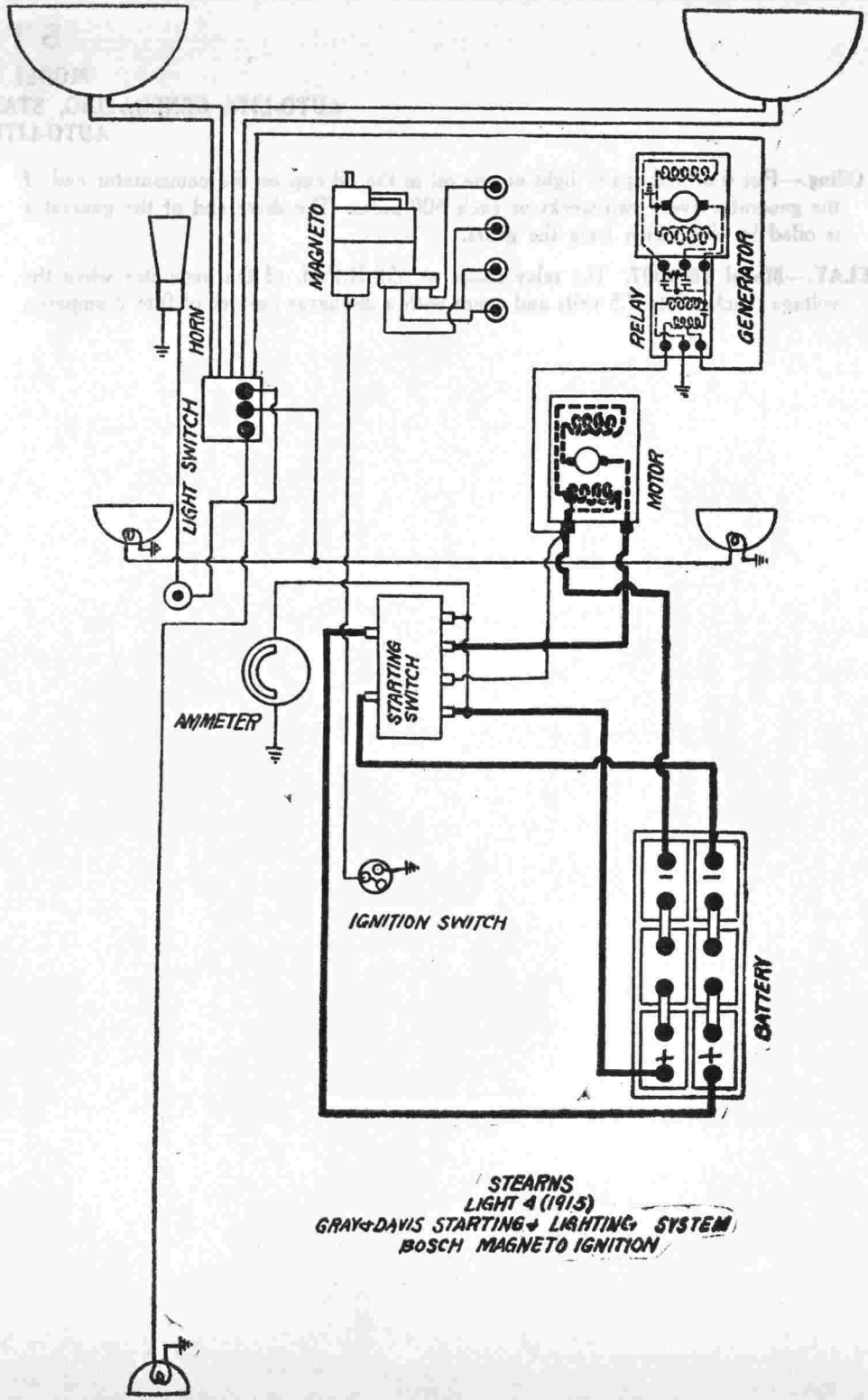
Oiling.—Every two weeks put 4 or 5 drops of light oil in the commutator end oiler and oilers at each end of intermediate shaft. Every three months remove plug in starter gear case and put in one tablespoonful of heavy engine oil. The sliding surfaces of the starting mechanism must be lubricated once a week.

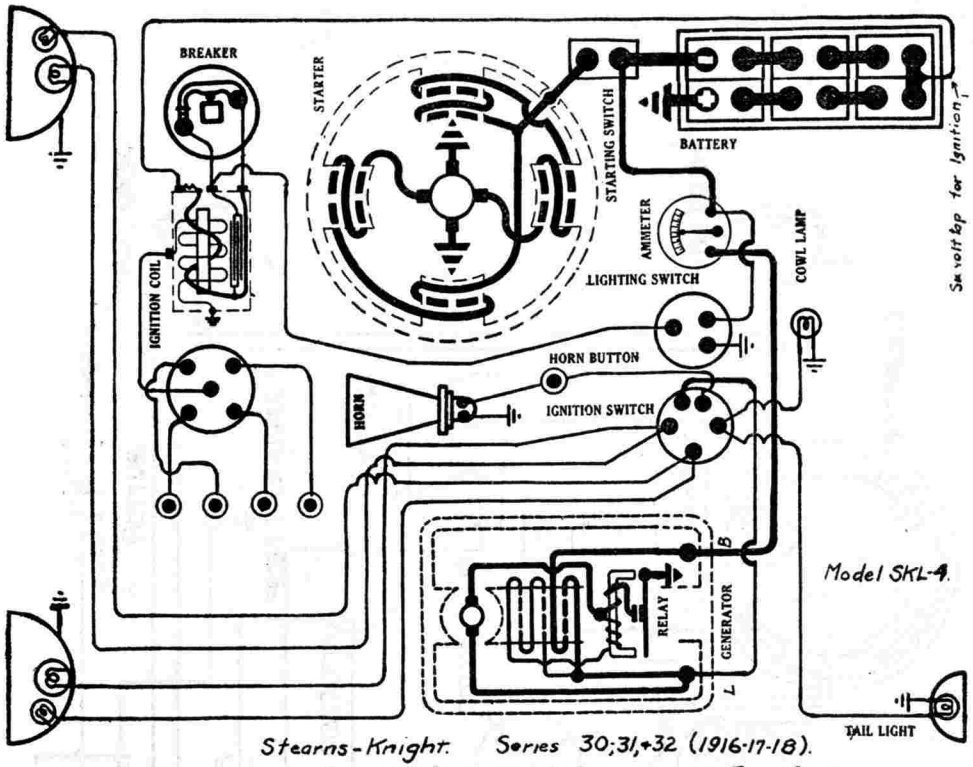
Generator.—Generator output regulation is by vibrating regulator. The two halves of the battery are connected in parallel for charging. Generator should deliver 10 amperes at 6½ volts when driven 1000 R. P. M., which corresponds to a car speed of 10 miles per hour. Output will vary slightly with battery condition. When running at 12 miles per hour or over, ammeter should indicate 6 to 10 amperes "Charge", with lamps off, and ½ to 2½ amperes with lamps on.

Oiling.—Put 8 to 10 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay-Regulator—Relay is combined with regulator. Relay should close when generator pressure reaches 6 to 6½ volts, and open when discharge current from battery reaches ½ to 2 amperes. It should close at 10 miles per hour, and open at 8 miles per hour. Clean relay-regulator contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a strip of well worn No. 00 sandpaper, and then draw a piece of unglazed paper between them to remove all grit. Adjust before again putting into service. To adjust regulator, hold one set of contacts apart and adjust the other set until the desired output is obtained. Then hold the first set apart and adjust the other set in the same way. Then allow both sets to operate together. Increasing spring tension will increase output, and decreasing spring tension will decrease output. Do not increase maximum output above 11 amperes. Generator armature should be driven at 1750 R. P. M., while regulator is being adjusted.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Tail and dash lamps are 6-8 volt, 2 cp.

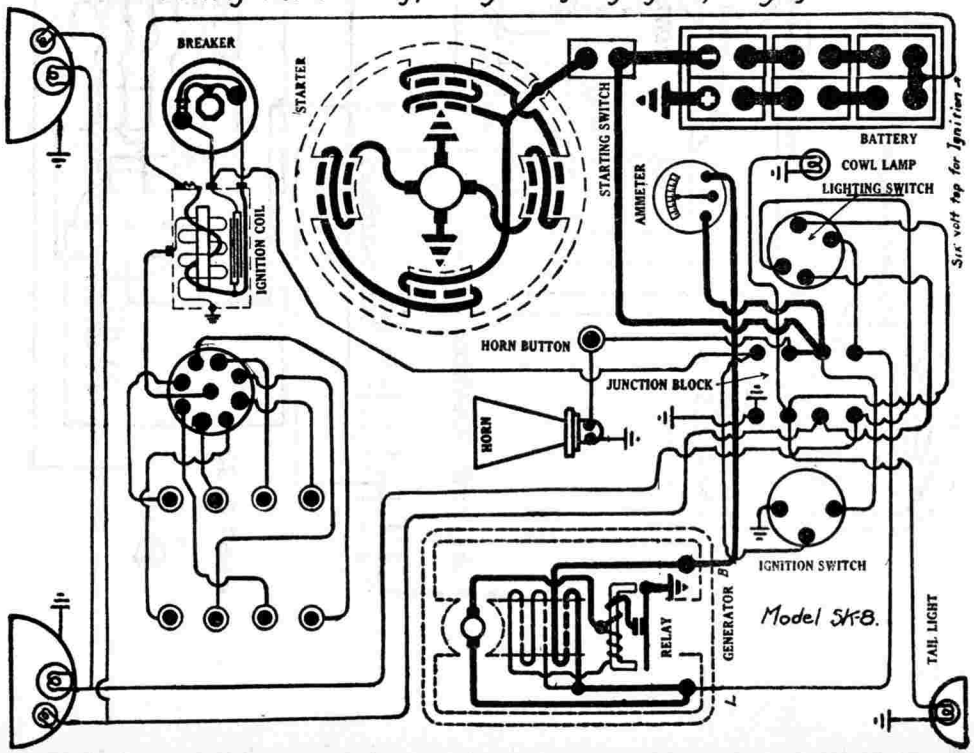




Model SKL-4.

Stearns-Knight. Series 30;31,+32 (1916-17-18).

Westinghouse Generating, Starting and Lighting System, Remy Ignition.



Model SK-8.

STEARNS-KNIGHT

MODELS SKL-4 AND SK-8, SERIES 30, 31 AND 32 (1916-17-18)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Willard, SJW-27, 12 volt, 65-80 ampere-hour. Starting capacity is 75 amperes for 20 minutes. Lighting capacity is 5 amperes for 14 hours. The positive (+) terminal is grounded. A 6 volt tap supplies current for ignition.

IGNITION.—SKL-4: Coil Model 175. Distributor Model 207. SK-8: Coil Model 176, Distributor Model 203. Breaker contacts separate .020 to .025 inch. They are made of tungsten. The contact surface of the points should be flat and smooth. When the condition of the points affects the ignition resurface them with a fine, flat jeweler's file.

Oiling.—Refill the cup under the distributor head with medium soft cup grease and turn down 2 or 3 turns every two weeks. If the grease cup is fitted with a wick, use pure vaseline instead of cup grease. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1½ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order of the SKL-4 is 1, 2, 4, 3. The firing order of the SK-8 is 1R, 4L, 3R, 2L, 4R, 1L, 2R, 3L.

Spark Plug Gaps.—Spark plug diameters are ⅞ inch. Gaps are .025 to .030 inch.

STARTER.—SKL-4: Frame No. 755, Style No. 234536. SK-8: Frame No. 755, Style No. 234537. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 1850 R.P.M., taking 154 amperes at 10.5 amperes.

Starter Data.

Torque	Amperes	Volts	R.P.M.
0.0 lb. ft.	50-70	5.5	3000-4500
3.5 lb. ft.	154	10.5	1850
20 lb. ft.	500	5.5	Lock

When the motor is running free, the maximum voltage should never be more than 6 volts. The brush pressure should be from 2 to 3 lbs. Keep the commutator clean and free from dirt, wiping it off occasionally with a clean, smooth cloth.

Oiling.—Put 4 or 5 drops of light engine oil in each starter oiler every 1000 miles or each month.

GENERATOR.—Frame No. 208, Style No. 231799. Generator current regulation is by reverse series field. The current for the lights does not pass through the reverse series field, so when the lights are turned on the generator output is automatically increased, keeping the charging rate practically constant. No means of increasing the generator output is provided. However, for winter driving terminals B and L may be shorted by means of a jumper (or switch when provided). The generator must not be operated in this condition at any other time or when driving at a high rate of speed. Maximum charging rate of generator is 8-10 amperes, reached at 25 miles per hour.

Generator Data

Cold Test			Hot Test		
Amperes	R.P.M.	Volts	Amperes	R.P.M.	Volts
0	410	12.5			
4	600	12.5	7-8	1500	12.5-13.5
8-9	1500	12.5-13.5			

Oiling.—Put 4 or 5 drops of light engine oil in each generator oiler every two weeks or each 500 miles.

RELAY.—The relay is mounted on the rear bracket of the generator. The relay closes at 8-10 M.P.H. or 14-14.3 volts and opens at 7-9 M.P.H. or a discharge current of 0-1.5 amperes. The relay contacts separate .012-.016 inch. Clean the relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 12-16 volts, 16-30 cp. Dimmer lamps are 12-16 volts, 6 cp. Dash and tail lamps are 12-16 volts, 3 cp.

FUSES.—Fuses are 20 amperes.

STEARNS KNIGHT

MODEL SKL-4 (1918-19)

REMY GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY.—Willard, 12 volt, 65 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .020 to .022 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper. Ignition current is 3.5 amperes, engine idle, breaker contacts and ignition switch closed.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions should be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1¼ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model No. 309-A. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 250 R.P.M., current 345 amperes at 8.5 volts. Operating freely armature revolves at 2900 R.P.M., current 70 amperes. Lock torque is 42 pound-feet, current 540 amperes at 6 volts. Tension of brushes on commutator is 20-24 ounces.

Starter Data

Test made with 6 volt battery

Torque	R.P.M.	Amperes	Volts
2 lb. ft.	1050	72- 82	5.60-5.75
4 lb. ft.	750	115-119	5.55-5.65
6 lb. ft.	575	143-150	5.35-5.45
8 lb. ft.	470	172-179	5.15-5.25
10 lb. ft.	365	198-205	5.05-5.15
12 lb. ft.	300	220-230	4.94-5.05
20 lb. ft.	Lock	375-400	3.80-4.20

OILING.—Put 4 or 5 drops of light engine oil in each of starter bearing oilers every month.

GENERATOR.—Model 238-A. Generator current regulation is by multiblade thermostat.

Generator Data

(Operating as a straight shunt generator, without regulator)

Amperes	R.P.M.	Volts
0	440	12.8
7	550	14.0
14	670	15.1
18	765	15.7

Generator brushes are set ½ to 2/3 of a commutator bar from the neutral position in the direction of rotation. Maximum charging rate is reached at 20 miles per hour.

OILING.—Put 4 or 5 drops of light engine oil in each of generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

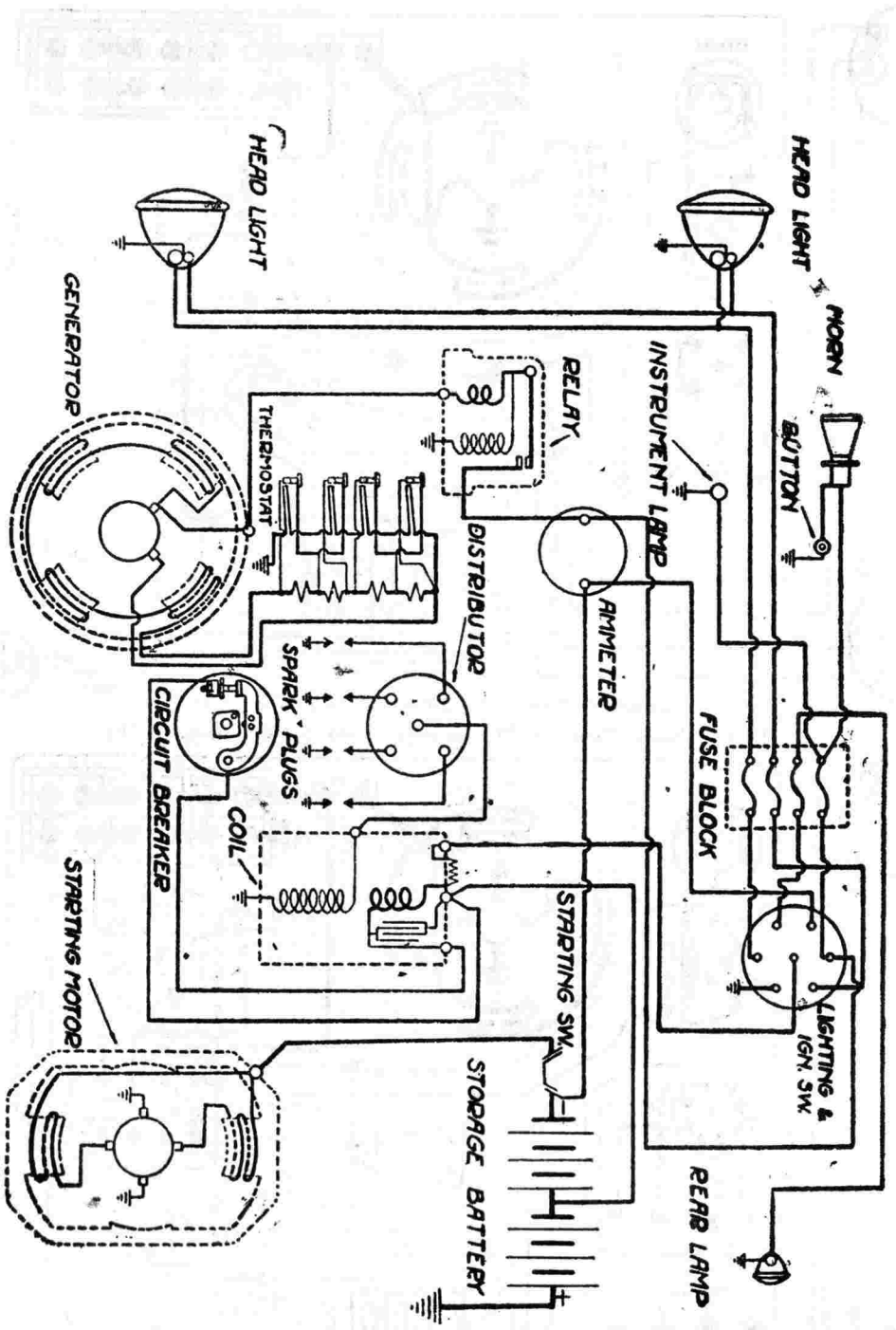
RELAY.—Relay closes at 440-500 R.P.M. of armature or 9-10 miles per hour, and opens at 400-440 R.P.M. of armature, or 7-8 miles per hour. Relay contacts separate .020 inch. Air gap between relay armature (moving member) and coil core is .020 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

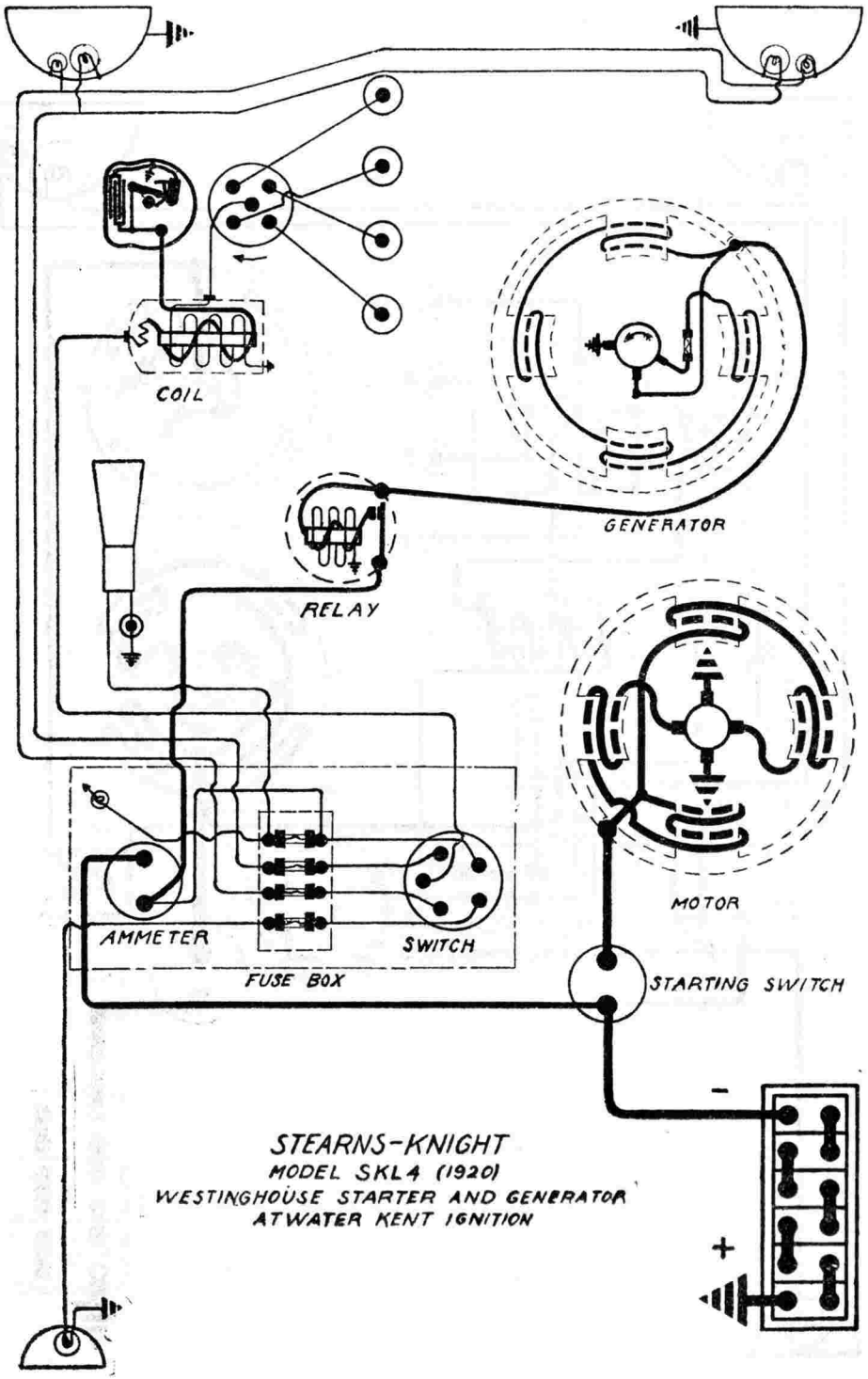
REGULATOR TEST.—Operate generator with 25 ampere output, 16-17 volts. Current should decrease to 15 amperes in 3 minutes. Speed generator up to 1600 R.P.M. for 5 minutes. Current should decrease to 8-12 amperes at the end of the run.

CARE OF REGULATOR.—Inspect the four sets of contact points of the multiple-thermostat every month. Clean contacts by drawing thin, worn No. 00 sandpaper between them. The contacts must not be separated more than is necessary to insert the sandpaper. Remove all grit by drawing thin, unglazed paper between them.

LAMPS.—Head lamps are 12-16 volt, 15-24 cp. Dimmer lamps are 12-16 volt, 4 cp. Dash and tail lamps are 12-16 volt, 2 cp.

FUSES.—Four on 10 amperes





STEARNS-KNIGHT
MODEL SKL4 (1920)
WESTINGHOUSE STARTER AND GENERATOR
ATWATER KENT IGNITION

STEARNS-KNIGHT

MODEL SKL-4 (1919-20-21)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTM

ATWATER KENT IGNITION

BATTERY.—Willard, 12 volt, 61.5 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type CC. Breaker contacts separate .006 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Remove the distributor head and put 4 or 5 drops of light engine oil in the exposed oil hole every two weeks. Put a small amount of vaseline on the cam, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 2 to 2½ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUGS. Diameter, ⅞ inch. Spark gaps are .025 inch.

STARTER.—Frame No. 755. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 125 R.P.M., taking 100 amperes.

Starter Data

Torque	R.P.M.	Amperes	Volts
0 lb. ft.	3000-4500	50-70	5.5
3.5 lb. ft.	1250	154	10.5
20 lb. ft.	Lock	500	5.5

Use a 6 volt battery when making the no-load test. Pressure of brushes on the commutator is 2 to 3 pounds.

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR.—Frame No. 765. Generator current regulation is by the third brush system. Maximum current output is 9-11 amperes, reached at 1000 R.P.M. of the armature or 16-20 miles per hour. Two generators have been used, one with high resistance field coils and one with lower resistance field coils.

Generator Data.—Frame No. 765

With Low Resistance Field		With High Resistance Field	
Amperes	R.P.M.	Amperes	R.P.M.
0	390	0	420
5	560	6	660
4- 7	2000	5.0- 9	2000
9-10	750-950	10.5-11	1000-1400

Field Test

Amperes	Volts	Amperes	Volts
4.5-5.25	12-13	1.75-2.25	12-13

Charging rate is varied by adjustment of the third brush setting. Shift the third brush in the direction of armature rotation to increase the charging rate and in the opposite direction to decrease the charging rate. The field fuse, mounted on the end of the generator, is 5 ampere for the machine with high resistance field coils and 10 ampere for the machine with low resistance field coils.

OILING.—Put 5 or 6 drops of light engine oil in the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 400-450 R.P.M. of the armature or 6-7 miles per hour and opens at 350-400 R.P.M. of the armature or 5-6 miles per hour. Adjust relay spring tension so that contacts open with a discharge current of 0-3 amperes from the battery. Adjust the armature stop (which determines the air gap between the armature and coil core) so that the contacts close when the voltage of the generator reaches 12.4 to 13 volts. Contacts separate .030 to .035 inch. Air gap between relay armature and coil core is .005 inch, contacts closed. Resistance of the shunt coil is 274 ohms. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 12-16 volt, 21 cp. Dimmer lamps are 12-16 volt, 4 cp. Dash and tail lamps are 12-16 volt, 2 cp.

FUSES.—Fuses are 20 ampere.

STEARNS KNIGHT

MODEL B (1922-23-24)

WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WESTINGHOUSE IGNITION

BATTERY:—Willard, Type SJR-27. 12 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 87 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 14 hours.

IGNITION:—Coil No. 288762, 395113. Distributor No. 382426, 382410, 366197. Breaker contacts separate .012-.016 inch. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 20-25 ounces.

Oiling:—Put 5 or 6 drops of light oil in the oiler on the side of the distributor housing every two weeks or each 500 miles.

Timing:—Breaker contacts begin to separate when piston No. 1 is past top dead center entering power with flywheel mark 2-2½ inches past the indicator on the flywheel housing. The spark control lever and breaker assembly must be in the fully retarded position.

Firing Order:—The firing order is 1-3-4-2.

Spark Plugs:—Spark plugs are S.A.E. ⅞-18. Gaps are .025 inch.

STARTER:—Frame No. 755. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 125 R.P.M. drawing 100 amperes at 5 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3800-5500	5.5	38-52
3.5 "	2400	10.5	200
21 "	Lock	4.8	650

These motors must not be run on more than six volts in making a no-load test. Brush spring tension is 2½-3 pounds each.

Oiling:—Put 5 or 6 drops of light oil in each of the starter bearing oilers every month or each 1000 miles.

GENERATOR:—Frame No. 57-GT. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and loosen the two screws on the third brush mounting bracket. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screws after making the adjustment. The maximum charging rate is 10 amperes reached at 1050 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	13	475	0	13	500
6	15	650	6	15	800
9-10	15	750-1050			
6	15	2000			

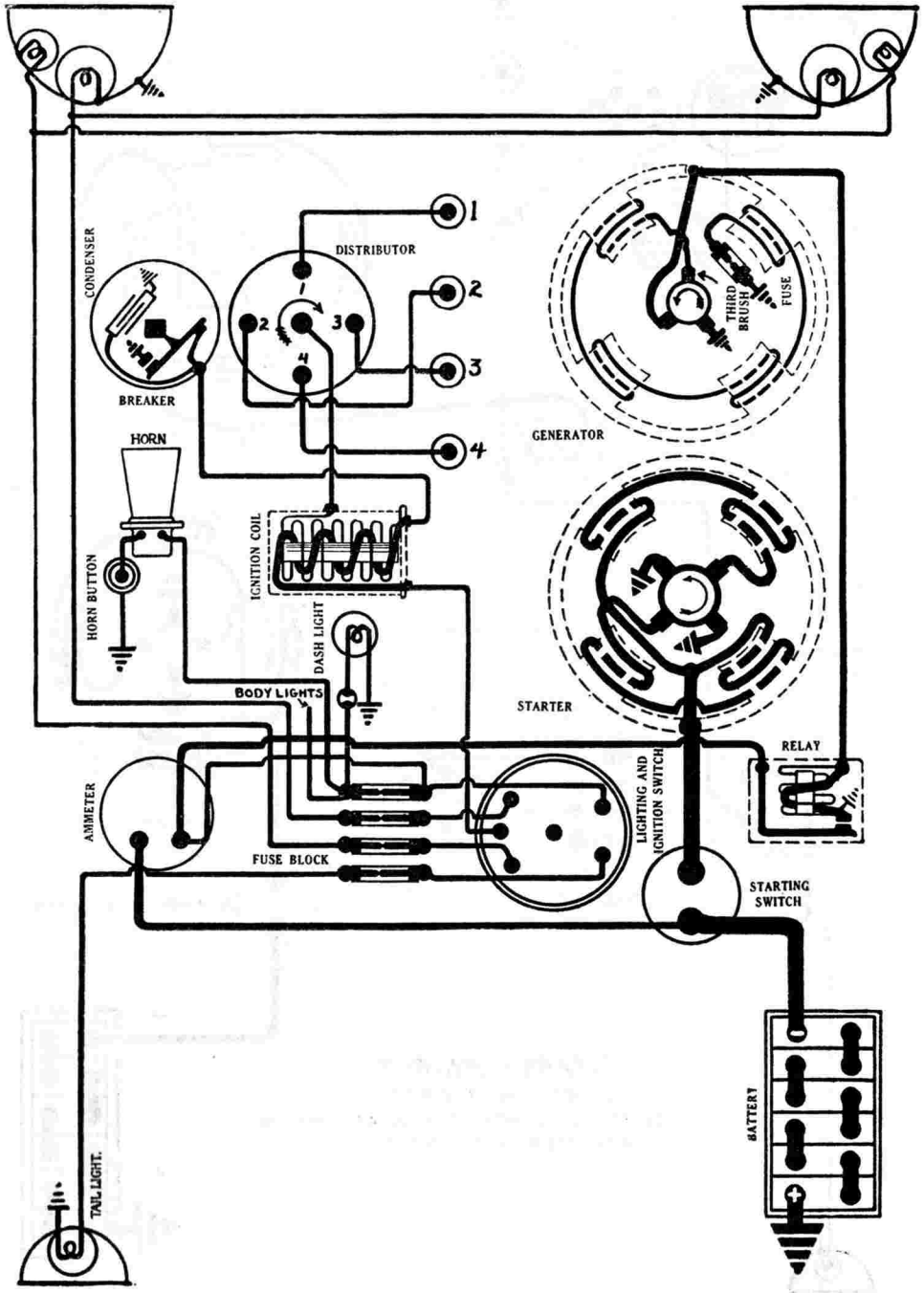
Shunt field current is 3.5 amperes at 12 volts. Brush spring tension should be 1-1½ pounds each.

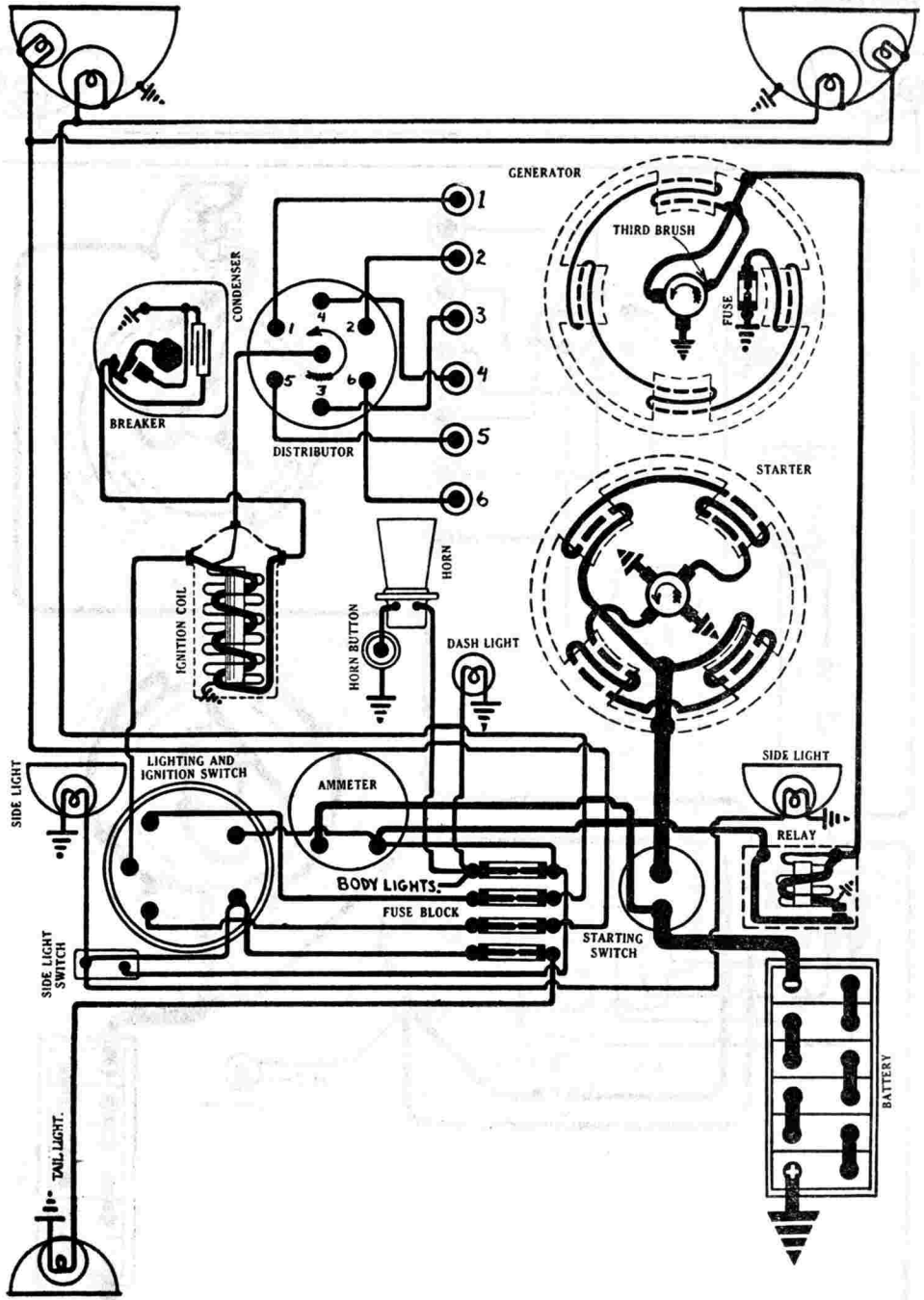
Oiling:—Put 5 or 6 drops of light oil in the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Type No. 331224. Relay is mounted on the dash. Relay closes at 475 R.P.M. or 7 M.P.H. when the generator voltage reaches 13 volts and opens at 400 R.P.M. or 6 M.P.H. with a discharge current of 0-2 amperes. Relay contacts separate .025-.035 inch. Air gap is .005 inch, with contacts closed.

LIGHTING:—Briggs and Stratton Switch, Model 2071. Head lights are 12-16 volt, 21 cp. S.C. Dimmer lights are 12-16 volt, 4 cp. S.C. Dash and tail lights are each 12-16 volt, 2 cp. S.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuses are 20 amperes.





STEARNS KNIGHT

MODEL S (1922-23-24)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY:—Exide, Type 6-XC-13-1. 12 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours.

IGNITION:—Breaker contacts separate .006-.008 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel finishing on a hard oilstone.

Oiling:—Remove the distributor head and put 4 or 5 drops of light oil in the oil hole exposed every two weeks or each 500 miles. Put a small amount of vaseline on the face of the breaker cam every month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are S.A.E. 7/8-18. Gaps are .025 inch.

STARTER:—Frame No. 755. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data

Torque	R.P.M.	Volts	Amperes
.0 lb. ft.	3800-5500	5.5	38-52
3.5 "	2400	10.5	200
21 "	Lock	4.8	650

These motors must not be run on more than 6 volts in making a no-load test. Brush spring tension is 2½-3 pounds each.

Oiling:—Put 5 or 6 drops of light oil in the starter bearing oilers every month or each 1000 miles.

GENERATOR:—Frame No. 57-GT. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and loosen the two nuts on the third brush mounting bracket. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the nuts after making the adjustment. The maximum charging rate is 10 amperes reached at 1050 R.P.M.

Generator Data

	Cold Test			Hot Test	
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	13	475	0	13	500
6	15	650	6	15	800
9-10	15	750-1050			
6	15	2000			

Shunt field current is 3.5 amperes at 12 volts. Brush spring tension is 1-1½ pounds each.

Oiling:—Put 5 or 6 drops of light oil in the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Type No. 331224. Relay is mounted on the dash. Relay contacts close at 475 R.P.M. or 7 M.P.H. when the generator voltage reaches 13 volts and open at 400 R.P.M. or 6 M.P.H. with a discharge current of 0-2 amperes. Relay contacts separate .025-.035 inch. Air gap is .005 inch with contacts closed.

LIGHTING:—Head lights are 12-16 volt, 21 cp. S.C. Dimmer, side, dash and tail lights are each 12-16 volt, 3 cp. S.C.

FUSES:—Lighting fuse on switch is 20 amperes. Generator field fuse is 5 amperes.

STEARNS KNIGHT

MODELS S, B AND C (1925-26)
DE JON GENERATING, STARTING AND LIGHTING SYSTEM
DE JON IGNITION

BATTERY.—Exide, Type 6-XC-13-1. 12 volt. The starting capacity is 98 amperes for 20 minutes. Lighting capacity is 5 amperes for 16.8 hours. The positive (+) terminal is grounded.

IGNITION:—(Four) Coil Model C. A. 4005. Distributor Model 1A-4003. (Six) Coil Model C. A. 4003. Distributor Model I. A. 4004. Breaker contacts separate .018-.020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file or on a medium hard oilstone. The coil draws 4.75-5 amperes with the resistance cold, decreasing to 2-2.1 amperes within 30 seconds. The six cylinder distributor is of the manual type. The four cylinder distributor is of the semiautomatic type, the automatic advance beginning at 100 R.P.M. and reaching a maximum of 15° at 1500 distributor R.P.M.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every 500 miles or each two weeks. Put a small bit of vaseline on the surface of the breaker cam under the fibre bumper every month.

Timing.—Breaker contacts begin to separate when piston entering power stroke is 1" after top dead center (measured on the flywheel) with the spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order of the four cylinder cars is 1-3-4-2. The firing order of the S and C models is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Models S. B. 4002 (Four) and S. B. 4003 (Six). Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data.

Torque.	R.P.M.	Volts.	Amperes.
0 lb. ft.	Free.	5.	40
1 lb. ft.	3400	11.	100
3.6 lb. ft.	2250	10.	200
6.6 lb. ft.	1700	9.	300
10.2 lb. ft.	1250	8.	400
29.0 lb. ft.	Lock.	4.	880

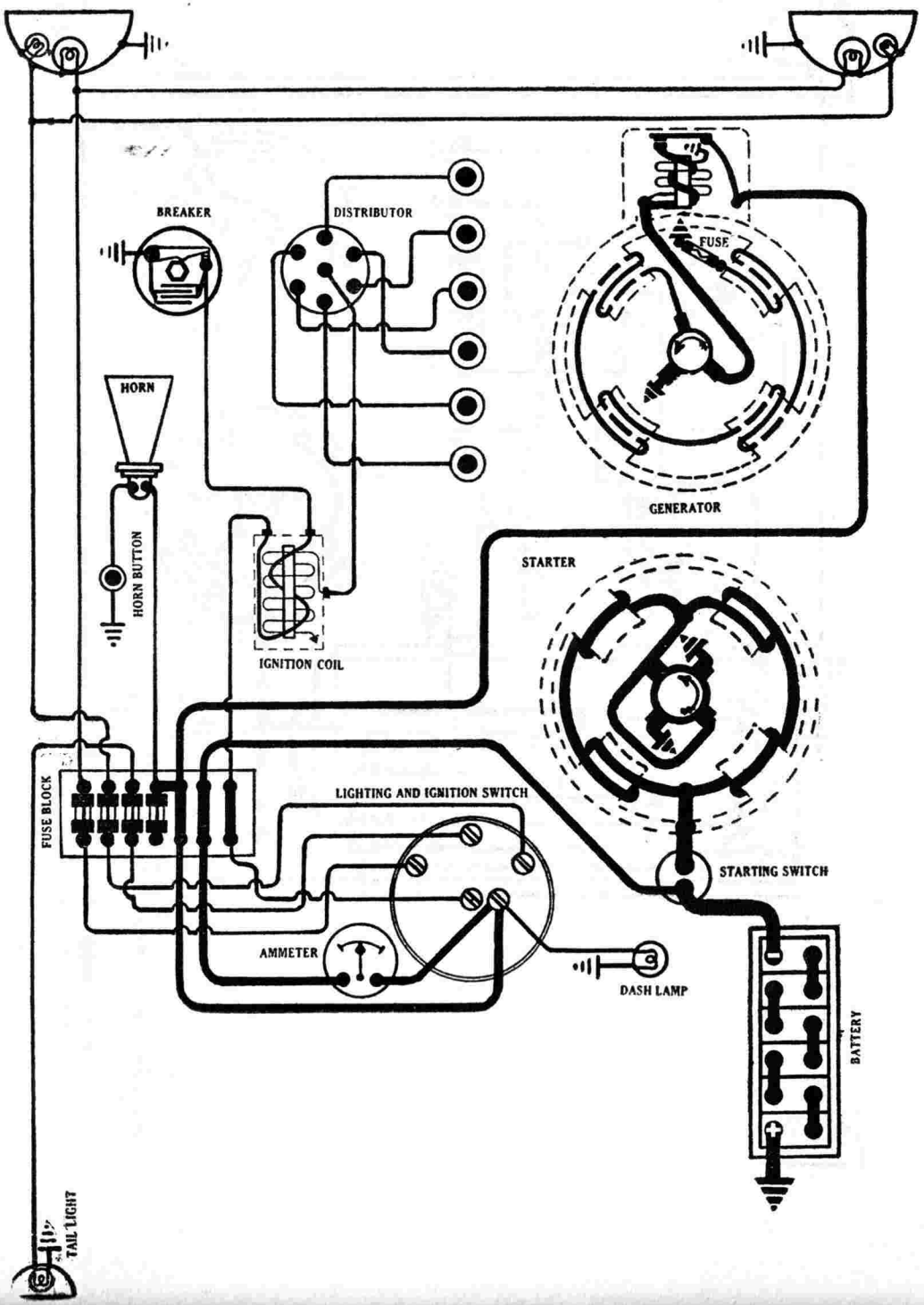
Oiling:—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every 1000 miles or each month.

GENERATOR:—Model D. C. 4001. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the charging rate, insert a screwdriver in the slotted head of the third brush shifting shaft located in the generator end plate just above the bearing retainer and turn the shaft in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate.

Generator Data

Cold Test.		Hot Test.	
Amperes.	R.P.M.	Amperes	R.P.M.
0	500	0	600
4	600	5	800
8	800	8	1000
11	1000	11	1600
14	1600	9	2000
12	2000	7	2800
10	2800		

The shunt field current is 1.6 to 1.8 amperes at 12 volts.



STEARNS KNIGHT

MODELS S, B AND C (1925-26)
DEJON GENERATING, STARTING AND LIGHTING SYSTEM
DEJON IGNITION

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every 1000 miles or each month.

RELAY:—Model R. A. 4002. Relay is mounted on the generator. Relay closes at 500 to 575 R.P.M. of the generator armature with a voltage of 13.5-14.5 volts and opens with a discharge current of ½ to 2 amperes. Charging current is approximately 1 ampere at closing of contacts. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .015 inch, contacts closed.

LIGHTING.—Head, stop and backing lamps are each 12-14 volts, 21 cp. S.C. Dimmer lamps are 12-14 volt, 4 cp. S.C. Dome and tonneau lamps are each 12-14 volt, 4 cp. S.C. Side, dash and tail lamps are each 12-14 volt, 2 cp. S.C.

FUSES.—Generator field fuse is 5 amperes. Lighting fuses are 25 amperes.

STEARNS KNIGHT

MODEL F-6-85 (1927) AFTER DECEMBER 16, 1926
DE JON GENERATING, STARTING AND LIGHTING SYSTEM
DE JON IGNITION

BATTERY:—U.S.L. Type 6-HVX-5X, 12 volt. Starting capacity is 96 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The positive (+) terminal is grounded. Battery is mounted in special compartment in splasher assembly on right side.

IGNITION:—Coil Model CA-4003. Distributor Model IA-4004. Breaker contacts separate .018-.020 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is of the manual type. Breaker arm spring tension is 20 ounces. Ignition current is 4.75-5 amperes at 12 volts with ballast resistor cold decreasing to 2-2.1 amperes within 30 seconds.

Mounting:—Ignition coil is mounted on the dash. Distributor is mounted on the left side of the engine. To remove distributor, disconnect manual advance rod and primary lead and remove distributor head and rotor. Then remove set screw in base mounting flange and lift distributor from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles. Every month put a small amount of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position one inch after top dead center (measured on the flywheel) with the spark control lever in the fully retarded position. To check timing, crank engine until piston No. 1 reaches top dead center entering power stroke. Fully retard spark control lever and continue to crank engine over one inch measuring distance on flywheel by removing inspection hole cover. If breaker contacts do not separate at this point, loosen taper screw in center of breaker cam and rotate cam until contacts begin to separate. Tighten the screw. The cam is reversible and care must be taken to see that the arrow on top of the cam points in the direction of rotation (counter-clockwise).

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8 S.A.E. Standard. Gaps are .028 inch.

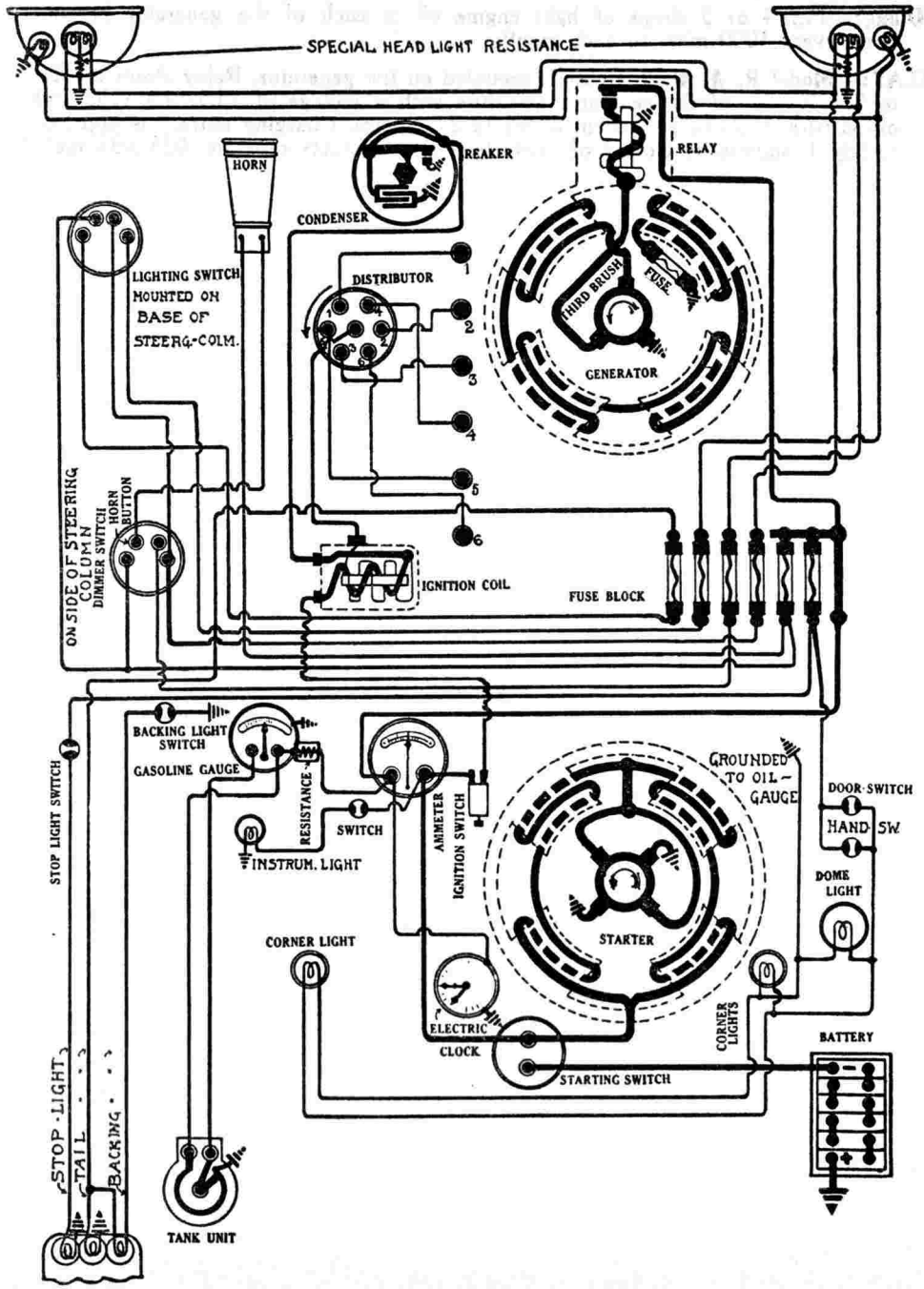
Valve Timing:—Crank engine until piston No. 1 reaches top dead center. Then turn eccentric shaft until exhaust port in outer sleeve of cylinder No. 1 has just closed when the upper edge of the port will pass the lower edge of the cylinder port with the outer sleeve moving downward. Assemble the timing chain, being careful not to disturb the relative position of the crankshaft and eccentric shaft.

STARTER:—Model SB-4003. Starter is connected to the engine through an inboard Bendix drive Type L-13-MX. The direction of rotation is counter-clockwise, looking at the commutator end. Starter switch is Model SW-4001. Starter cranks the engine at 150 R.P.M. drawing 30 amperes at 12 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	5	40
1 "	3400	11	100
3.6 "	2250	10	200
6.6 "	1700	9	300
10.2 "	1250	8	400
29.0 "	Lock	4	880

Mounting:—Starter is mounted at right of engine on forward side of the flywheel case. To remove starter, disconnect cable and remove three mounting bolts. Pull starter forward approximately 1/2 inch. Then pull starter toward car frame and forward until it is clear of flywheel housing.



STEARNS KNIGHT

MODEL F-6-85 (1927) AFTER DECEMBER 16, 1926
DE JON GENERATING, STARTING AND LIGHTING SYSTEM
DE JON IGNITION

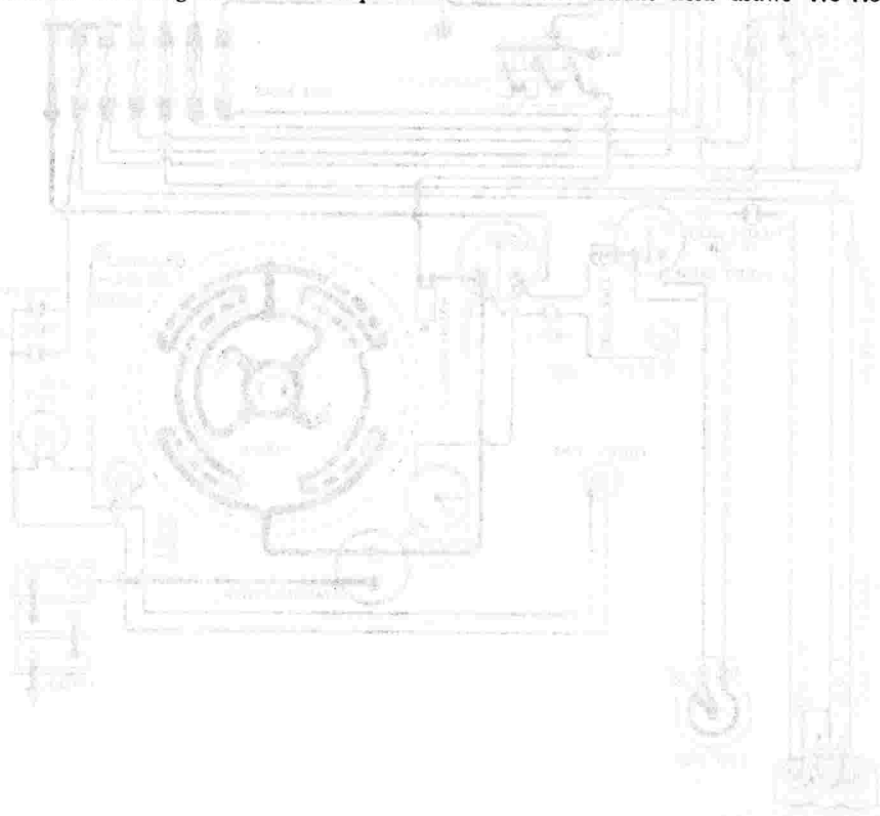
Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model DC-4001. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust charging rate, insert a screwdriver in the slotted head of the third brush shifting shaft located on the generator endplate just above the bearing retainer and turn the shaft in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The maximum charging rate of 11 amperes (hot) is reached at 1600 R.P.M. or approximately 25 M.P.H.

Generator Data

Cold Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
0	500	0	600
4	600	5	800
8	800	8	1000
11	1000	11	1600
14	1600	9	2000
12	2000	7	2800

Generator motoring draws 4.5 amperes at 12 volts. Shunt field draws 1.6-1.8 amperes at 12 volts. Brush spring tension is 1¼-1½ pounds each.



Mounting:—Generator is base mounted on right of engine. To remove generator, disconnect lead and remove two bolts from drive coupling. Then remove four base mounting screws and lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles.

RELAY:—Model RA-4002. Relay is mounted on the generator. Relay closes at 500-575 R.P.M. when the generator voltage reaches 7-8 volts and opens with a discharge current of .5-2.5 amperes. Charging current at closing of contacts must not exceed 5 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .015 inch, contacts closed.

LIGHTING:—Head lamps are 6-8 volt, 21 cp. double filament using the second 21 cp. filament insted of dimming. A resistance is mounted inside the head lights to allow these lamps to be used on the 12 volt line. Auxiliary head lamps are 12-14 volt, 4 cp. S.C. Stop and backing lamps are 12-14 volt, 4 cp. S.C. Tail lamp is 12-14 volt, 4 cp. S.C. Dash, tonneau, dome and corner lamps are each 12-14 volt, 2 cp. S.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuses are 10 amperes.

STEARNS KNIGHT

MODEL F-6-85 (1927-28)

DE JON GENERATING, STARTING AND LIGHTING SYSTEM

DE JON IGNITION

BATTERY:—U.S.L. Type 3-CVX-10X, 6 volt. Starting capacity is 190 amperes for 20 minutes. Lighting capacity is 5 amperes for 38.4 hours. The positive (+) terminal is grounded. Battery is mounted in a special compartment in right splasher assembly.

IGNITION:—Coil Model CA-4023. Distributor Model IAA-4003. Breaker contacts separate .018-.020 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 20° (engine). Automatic advance begins at 400 R.P.M. (engine) and reaches a maximum of 30° (engine) at 2800 R.P.M. Total advance is 50° (engine) or 25° on distributor. Breaker arm spring tension is 20 ounces. Ignition current is 6.5 amperes at 6 volts with ballast resistor cold decreasing to 4-4.5 amperes as resistor becomes heated. On bench test the maximum spark gap between needle points is .400 inch with primary voltage of 6 volts and distributor R.P.M. between 600 and 1600 R.P.M.

Mouting:—Ignition coil is mounted on the dash. Distributor is mounted on left side of engine by standard S.A.E. Type 'B' mounting. To remove distributor, disconnect primary lead and manual advance rod and remove distributor head and rotor. Then remove short bolt and nut in distributor arm and lift distributor from place.

Oiling:—Put 4 or 5 drops of light engine oil on the side of the distributor housing every two weeks or each 500 miles. Every month put a small amount of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with spark control lever in the fully retarded position. To set timing, crank engine until No. 1 piston enters compression stroke. This can be checked by removing spark plugs in other cylinders and cranking engine until compression is felt. Fully retard spark control lever and continue to crank engine until piston reaches top dead center when the dead center mark on the flywheel will be opposite the indicator in the clutch inspection hole. If breaker contacts are not separating, loosen taper screw in center of cam and rotate cam until contacts begin to separate. Tighten the screw.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8 S.A.E. Standard. Gaps are .028 inch.

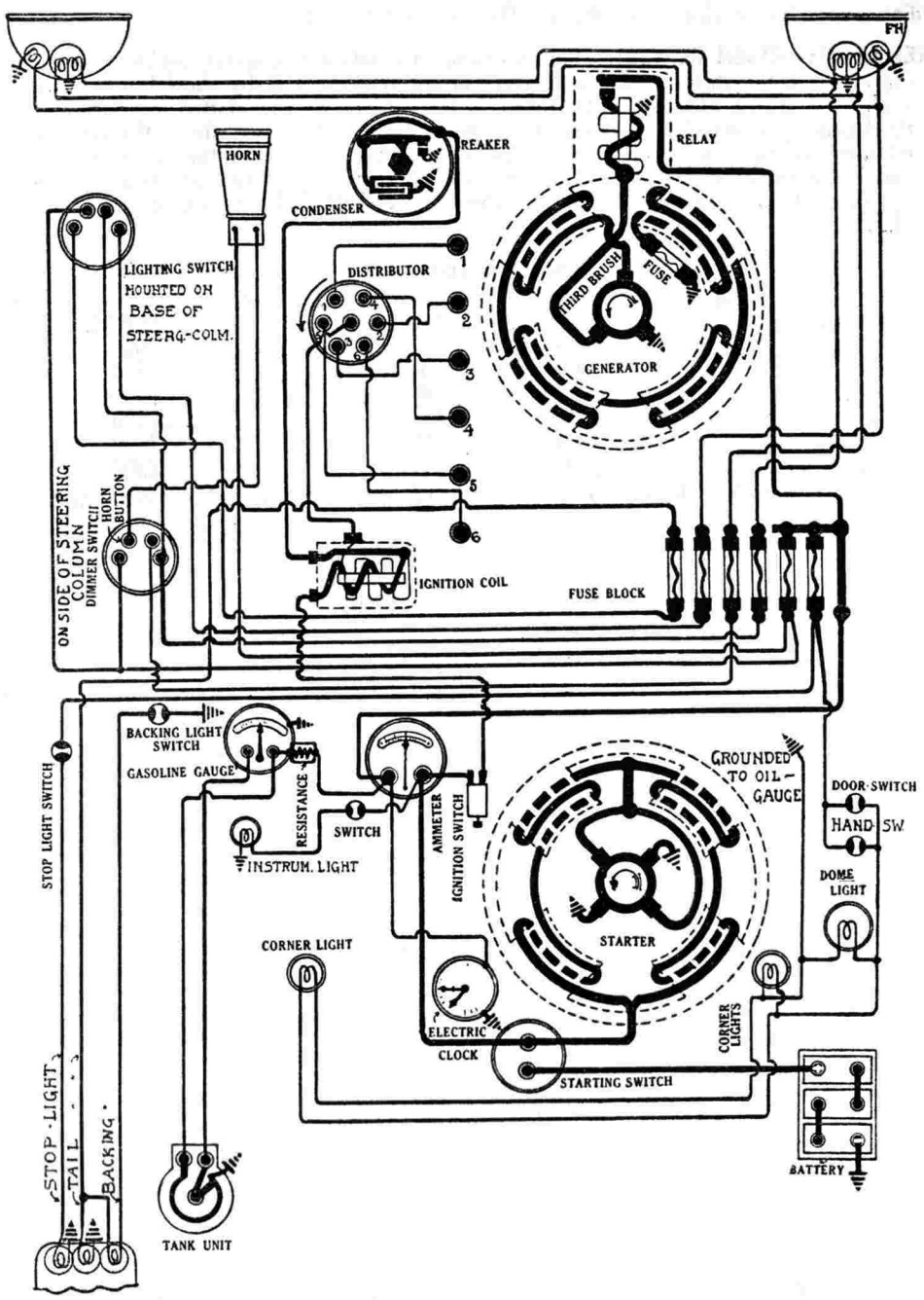
Valve Timing:—Crank engine until piston No. 1 reaches top dead center. Then turn eccentric shaft until exhaust port in cylinder No. 1 has just closed when the upper edge of the port in the outer sleeve will just pass the lower edge of the cylinder port with the outer sleeve moving downward. Then assemble timing chain, being careful not to disturb the relative position of the eccentric shaft and crankshaft.

STARTER:—Model SD-4101. Starter is connected to the engine through an inboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter switch is Model SW-4001. Brush spring tension is 2-3 pounds.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	75
24.2 "	Lock	3	620

Mounting:—Stater is mounted at right of engine on forward side of flywheel case. To remove starter, disconnect cable and remove three mounting bolts. Then pull starter forward approximately 1/2 inch. Pull starter toward car frame and forward until Bendix drive clears flywheel case and lift starter from place.



STEARNS KNIGHT

MODEL F-6-85 (1927-28)
DE JON GENERATING, STARTING AND LIGHTING SYSTEM
DE JON IGNITION

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model DA-4016. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust charging rate, insert a screwdriver in the slotted end of the third brush shifting shaft on the commutator endplate and turn the shaft in a counter-clockwise direction to increase charging rate and in the opposite direction to decrease the charging rate. With maximum setting generator output is 16 amperes at 6 volts. On the car the maximum charging rate of 11 amperes (hot) is reached at 1200 R.P.M. or approximately 25 M.P.H.

Generator Data

Cold Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
0	480	0	500
1	500	2	600
5.5	600	7	800
11	800	10	1000
15	1200	11	1200
12	2400	9	2400
10	3200	7	3200

Generator motoring draws 4.5 amperes at 6 volts. Shunt field current is 2.5 amperes at 6 volts. Brush spring tension is 1½-2 pounds. A five ampere field fuse is mounted on the endplate.

Mounting:—Generator is base mounted at right of engine. To remove generator, disconnect lead and remove two bolts from drive coupling. Then remove four base mounting screws and lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in the generator oilers every two weeks or each 500 miles.

RELAY:—Model RA-4001-A. Relay is mounted on the generator. Relay closes at 480-500 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of .5-2.5 amperes. Charging current must not exceed 2 amperes at closing of contacts. Relay contacts separate .025-.035 inch. Air gap is .010 inch, contacts closed.

LIGHTING:—Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Auxiliary head lamps are 6-8 volt, 3 cp. S.C. Backing and stop lamps are 6-8 volt, 15 cp. S.C. Dash, tail, dome and corner lamps are each 6-8 volt, 3 cp. S.C.

Switches:—Lighting switch is mounted at base of steering column and is controlled by lever on steering wheel. A dimmer switch is located on the side of the steering column.

FUSES:—Generator field fuse is 5 amperes. Lighting fuses are 10 amperes.

STEARNS KNIGHT

MODEL G-8-85 (1927-28). EIGHT CYLINDER MODEL
DE JON GENERATING, STARTING AND LIGHTING SYSTEM
DE JON IGNITION

BATTERY:—U.S.L. Type 3-CVX-10X, 6 volt. Starting capacity is 192 amperes for 20 minutes. Lighting capacity is 5 amperes for 38.4 hours. The negative (—) terminal is grounded. Battery is mounted in a special compartment in right splasher assembly.

IGNITION:—Coil Model CA-4023. Distributor Model IAA-4002. Breaker contacts separate .018-.020 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 30° (engine). Automatic advance begins at 400 R.P.M. Total advance is 50° (engine) or 25° on distributor. Breaker arm spring tension is 20 ounces. Ignition current is 6.5 amperes at 6 volts with ballast resistor cold decreasing to 4-4.5 amperes as resistor becomes heated. On bench test the maximum spark gap between needle points is .400 inch with primary voltage of 6 volts and distributor running between 600 and 1600 R.P.M.

Mounting:—Ignition coil is mounted on the dash. Distributor is mounted on left side of engine by standard S.A.E. Type 'B' mounting. To remove distributor, disconnect primary lead and manual advance rod and remove distributor head and rotor. Then remove short bolt and nut in distributor arm and lift distributor from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles. Every month put a small amount of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with spark control lever in the fully retarded position. To set timing, crank engine until No. 1 piston enters compression stroke. This can be checked by removing spark plugs in other cylinders and cranking engine until compression is felt. Fully retard spark control lever and continue to crank engine until piston reaches top dead center when the dead center mark on the flywheel will be opposite the indicator in the clutch inspection hole. If breaker contacts are not separating, loosen taper screw in center of cam and rotate cam until contacts begin to separate. Tighten the screw.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 7/8 S.A.E. Standard. Gaps are .028 inch.

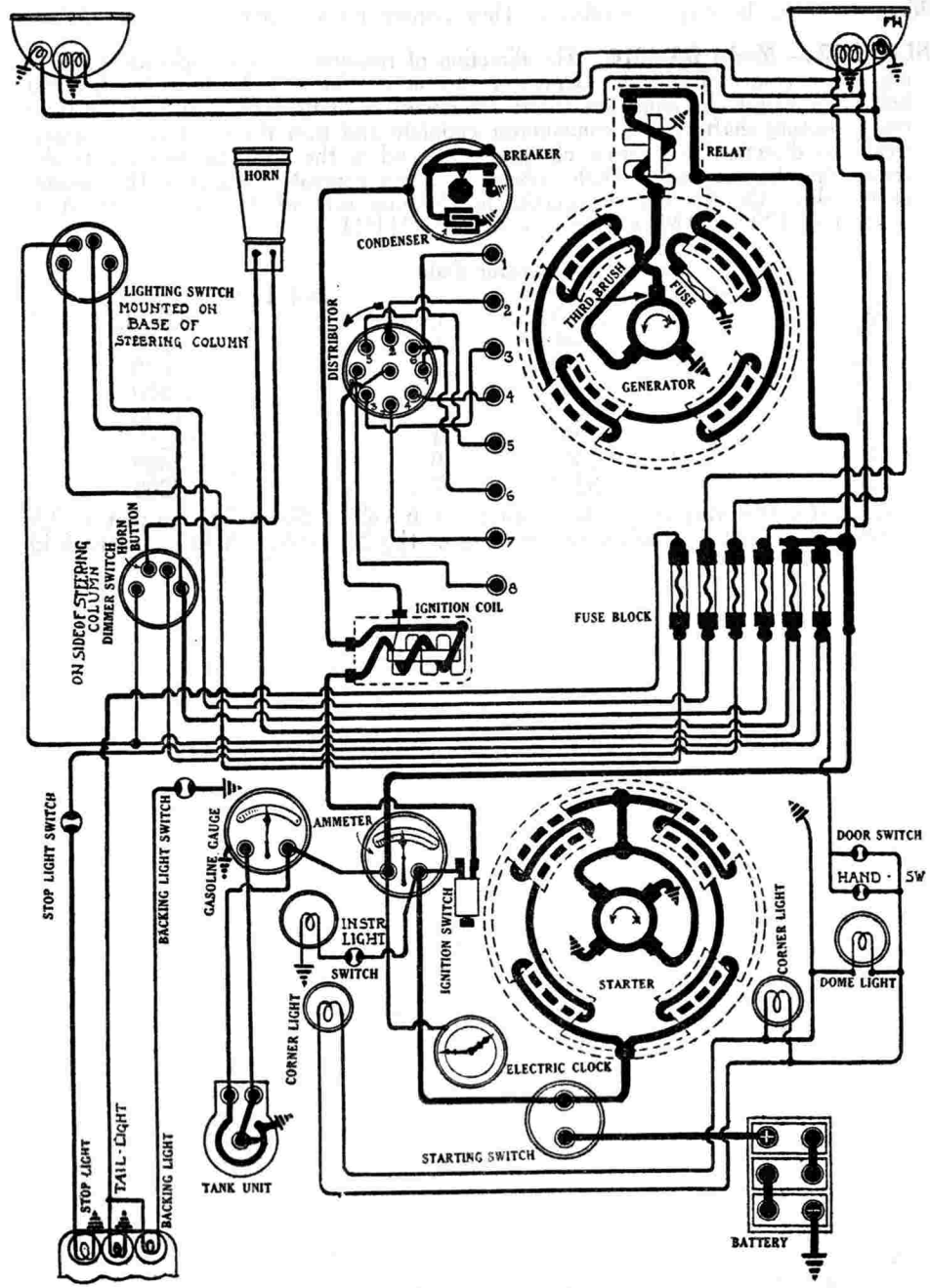
Valve Timing:—Crank engine until piston No. 1 reaches top dead center. Then turn eccentric shaft until exhaust port in cylinder No. 1 has just closed when the top of the port in the outer sleeve has closed over lower edge of cylinder port. Then assemble the front timing chain (the short one). With chain in place crank engine over until crankshaft reaches a position 4¾ inches past lower dead center (measured on the outside diameter of the flywheel). Then set inner sleeve so that lower edge of exhaust port has just closed on junk rings.

STARTER:—Model SD-4102. Starter is connected to the engine through an inboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Switch is Model 4001. Brush spring tension is 2-3 pounds.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	75
24.4 "	Lock	3	620

Mounting:—Starter is sleeve mounted at right of engine on forward side of flywheel case. To remove starter, first remove toeboard and remove black enameled cap at rear of flywheel housing in transmission case flange. This exposes Bendix drive.



STEARNS KNIGHT

MODEL G-8-85 (1927-28). EIGHT CYLINDER MODEL
DE JON GENERATING, STARTING AND LIGHTING SYSTEM
DE JON IGNITION

Remove Bendix drive. Then remove set screw in flywheel case directly above starter sleeve and disconnect starter cable. Pull starter forward and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model DJ-4016. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust charging rate, insert a screwdriver in the slotted end of the third brush shifting shaft on the commutator endplate and turn the shaft in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. With maximum setting generator output is 16 amperes at 6 volts. On the car the maximum charging rate of 11 amperes (hot) is reached at 1200 R.P.M. or approximately 25 M.P.H.

Generator Data

Cold Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
0	480	0	500
1	500	2	600
5.5	600	7	800
11	800	10	1000
15	1200	9	2400
12	2400	9	2400
10	3200	7	3200

Generator motoring draws 4.5 amperes at 6 volts. Shunt field current is 2.5 amperes at 6 volts. Brush spring tension is 1½-2 pounds. A five ampere field fuse is mounted on the endplate.

Mounting:—Generator is base mounted at right of engine. To remove generator, disconnect lead and remove two bolts from drive coupling. Then remove four base mounting screws and lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in the generator oilers every two weeks or each 500 miles.

RELAY:—Model RA-4001-A. Relay is mounted on the generator. Relay closes at 480-500 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of .5-2.5 amperes. Charging current must not exceed 2 amperes at closing of contacts. Relay contacts separate .025-.035 inch. Air gap is .010 inch, contacts closed.

LIGHTING:—Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Auxiliary head lamps are 6-8 volt, 3 cp. S.C. Backing and stop lamps are 6-8 volt, 15 cp. S.C. Dash, tail, dome and corner lamps are each 6-8 volt, 3 cp. S.C.

Switches:—Lighting switch is mounted at base of steering column and is controlled by lever on steering wheel. A dimmer switch is located on the side of the steering column.

FUSES:—Generator field fuse is 5 amperes. Lighting fuses are 10 amperes.

Stephens
Model 65 (1917)
Auto-Lite Starting and Lighting System
Connecticut Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts should separate .018 inch to .020 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism must be renewed as directed on Page 50. In an emergency, contacts may be resurfaced sufficiently to last 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing—Contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever one-third advanced. See that breaker assembly is fully retarded when spark control lever is in the fully retarded position.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—Spark plug gaps should be about .027 inch.

Oiling.—Refill the cup under breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Starter.—Starter is connected to engine through a Bendix drive. It should crank the engine at about 125 R. P. M., taking about 250 amperes. Cold engine, tight bearings, heavy oil or other obstructions will cause a greater current flow and reduce the speed. When running free, armature should turn at about 4200 R. P. M., taking 50-55 amperes. Much greater speed indicates grounded, short circuited or damp field windings. Greater current or vibrating of the ammeter needle indicates grounded or short circuited armature coils or commutator. Damp armature windings will cause high current or slow speed.

STARTER DATA, MODEL MC

Torque	R.P.M.	Amperes
1 lb. ft.	2650	100
2 lb. ft.	1900	145-150
3 lb. ft.	1600	185-190
4 lb. ft.	1400	225
5 lb. ft.	1250	250-255
6 lb. ft.	1000	290-300
16 lb. ft.	Lock torque	450-460

Brushes.—Use only the special copper-carbon composition type of brushes as furnished by the manufacturer, as ordinary carbon brushes will cause trouble and their use in either starter or generator forfeits the guarantee.

Oiling.—Clean and repack starter bearings with soft cup grease every six months. Put in one or two drops of oil every month to keep grease soft.

Generator.—Generator current regulation is by reverse series field. Relay should close at 8-10 miles per hour or 500-575 R. P. M., of armature. The charging current should be .6 to 1.5 amperes at closing. Relay contacts should separate when the discharge current reaches 0 to 1 ampere. Maximum generator output should be reached at 20-25 miles per hour.

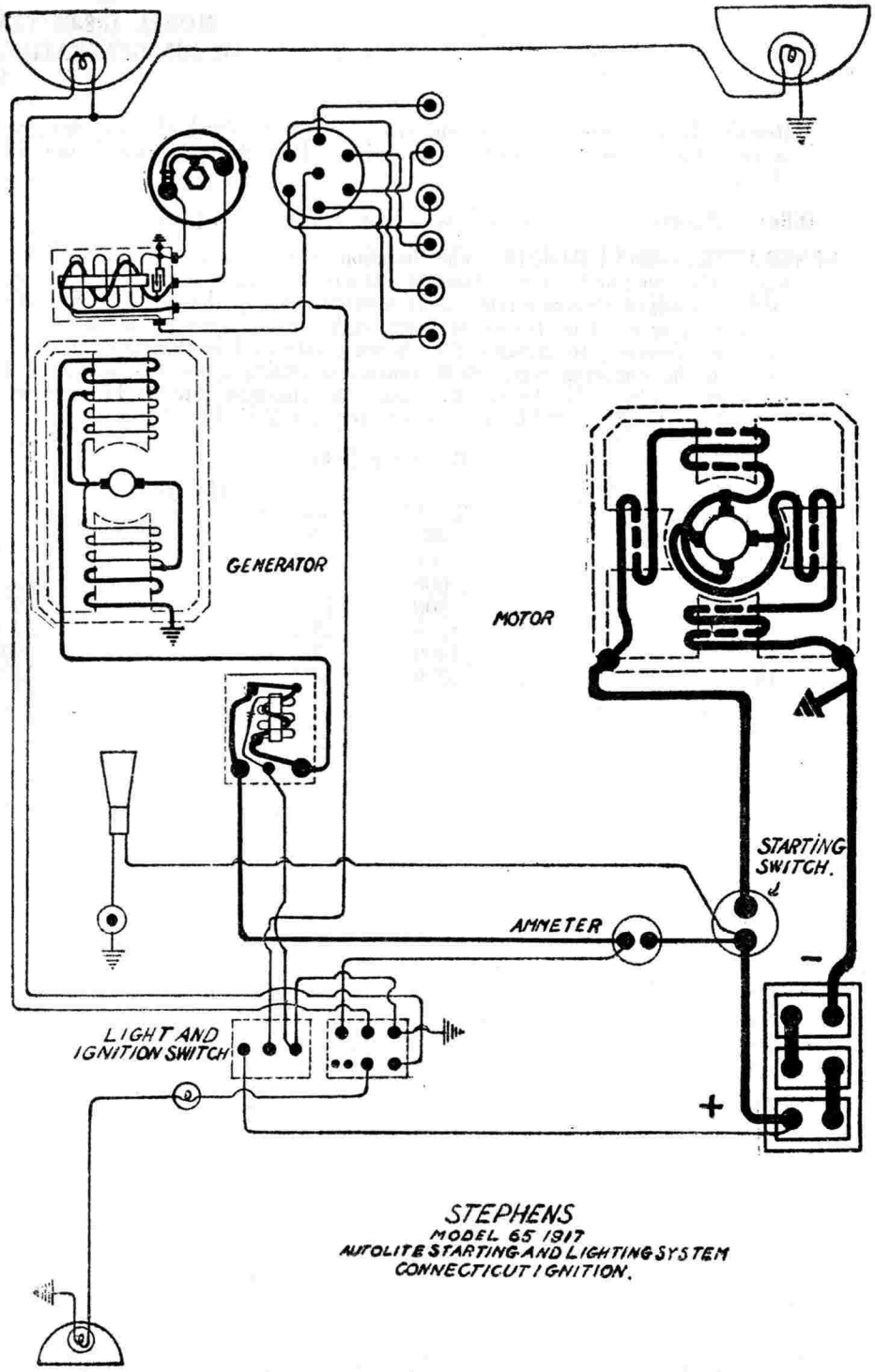
GENERATOR DATA, MODEL GG.

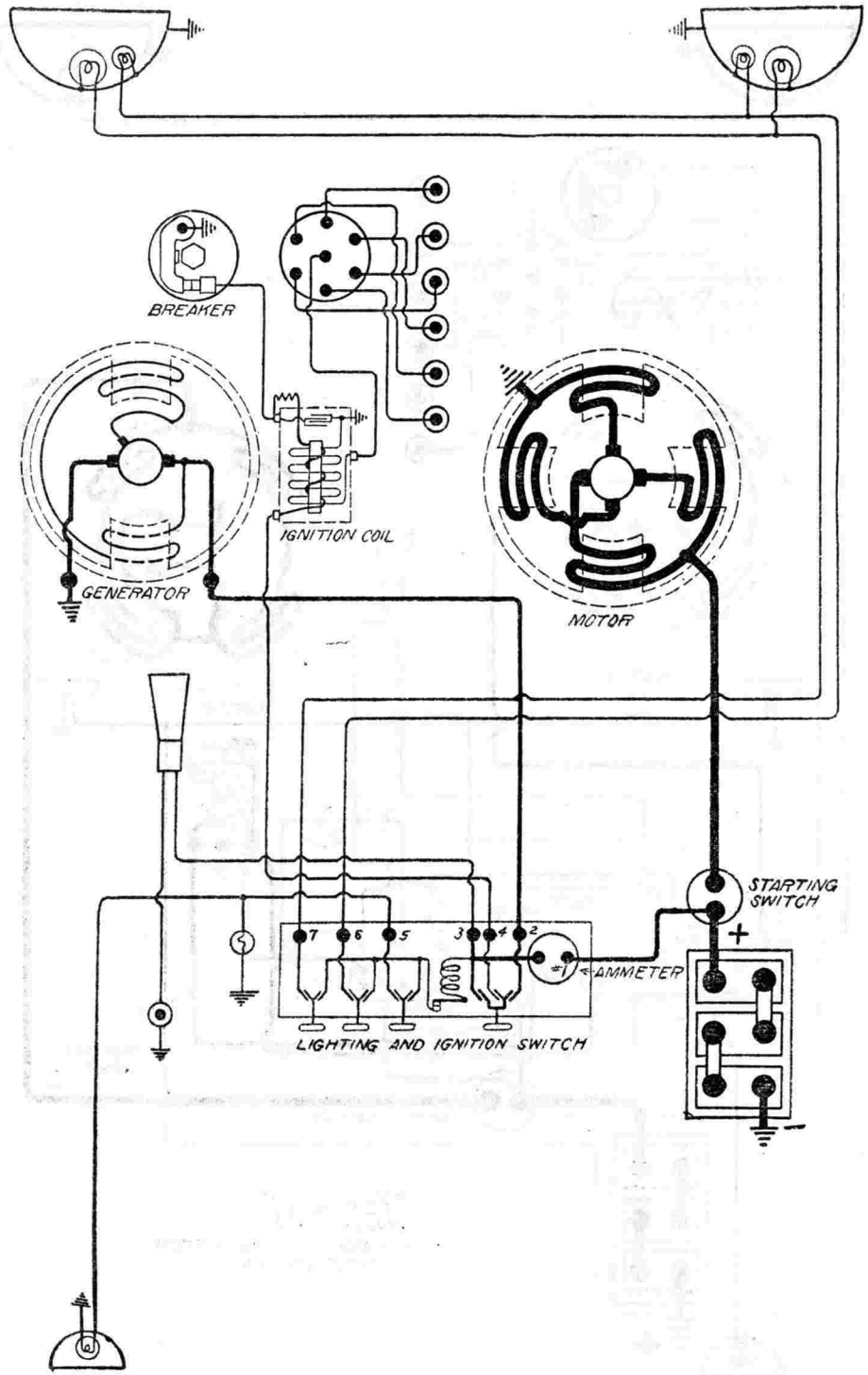
Amperes	R. P. M.
5	750-860
10	1225-1400
12.5	1600-1825
15	2175-2450
15-18	3200-3700

A variation of 1.5 amperes from these amounts is allowable. Output may be varied slightly by adjusting brush pressure on commutator. The pressure should be 1 to 1¼ pounds. Shunt field should take about 1.1 amperes. If operated freely as a motor, armature should revolve at 350 R. P. M., taking 2.8 amperes. Much higher speed indicates damp, grounded or short circuited field coils. Greater current or lower speed indicates tight bearings or damp, grounded or short circuited armature windings or commutator. Periodic swinging of ammeter needle indicates grounded or short circuited armature coils or commutator bars. Shunt field should take about 1.1 amperes.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 20 cp. Dash and tail lamps are in series. They are each 3-4





STEPHENS

MODELS 60, 65 (1916-17), 70, 74, 75, 78 (1918), 70, 75 (1919)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

Battery.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts separate .018 inch. They are made of tungsten. They will operate properly even though very irregular, due to the fact that the rough surfaces fit each other perfectly. Their natural color is dark gray, not silver. Should they become badly burned or pitted, affecting the ignition, remove and resurface them by drawing across a piece of fine emery cloth laid on a flat surface, as on the bed of a drill press, finishing on a very hard oil stone. Clean all oil from contacts before again putting into service.

Timing.—Breaker contacts should separate when piston entering power stroke is on top dead center, spark control lever one third advanced. (First see that breaker assembly is fully retarded when control lever is in the fully retarded position.)

Firing Order.—The firing order is 1, 4, 2, 6, 3. 5.

Spark Plug Gaps.—Spark plug gaps should be .028 to .030 inch.

Oiling.—Distributor shaft bearings are of the oilless type. If track of rotor button inside distributor head is not well polished, apply a small amount of vaseline with a soft cloth.

Starter.—Starting motor is Model No. 100. It is connected to the engine through a Bendix drive. Running freely, starter should draw 40 amperes. It should deliver 16 pound-feet lock torque.

Oiling.—Starter bearings are of the oilless type and require absolutely no lubrication.

Generator.—Generator current regulation is by third brush method.

GENERATOR DATA, MODEL 123

Cold—Amperes	R. P. M.	Warm—Amperes	R. P. M.
Neutral	500	Neutral	500
10.5-12.5	900	10-12	900
15.5-18	1400	14-16	1400
13.0-17	2400	11-13	2000

To adjust the charging rate, loosen the two screws on the movable arm holding the third brush. If it is desired to increase the charging rate, the arm should be lengthened, and shortened to decrease it.

Oiling.—Put 4 or 5 drops of light engine oil in the oil cup on commutator end every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch.

Lamps.—Head lamps are 6-8 volt, 20 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are 6-8 volt, 2 cp.

Circuit Breaker.—There is a vibrating circuit breaker in the lamp circuits to take the place of fuses. It requires a current of 25 amperes to start this device vibrating, but when vibrating a current of 3 to 5 amperes will cause it to continue.

Model Numbers.—Starter is No. 100. Generator is No. 123. Ignition coil is No. 2161. Combination switch is No. 1109. Starter switch is No. 1964.

STEPHENS

MODELS 82-86, SERIES 1, 2, 3, 4 (1919-20)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY.—U. S. L., 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .025 inch. When the condition of the contacts affects the ignition, renew the inner breaker mechanism. For temporary service, resurface with fine emery cloth.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .030 inch.

STARTER.—Model MH. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 150 R.P.M., taking 275 amperes. Lock torque is 17.5 pound-feet, current being 600 amperes at 5 volts.

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR.—Model GJ-1020. Generator current regulation is by the third brush system. Maximum current output is 12-16 amperes, reached at 1700 R.P.M. of the armature or 22 miles per hour.

Generator Data

Hot Test		Cold Test	
Amperes	R.P.M.	Amperes	R.P.M.
0	500	0	460
8	750	6	840
12	960	9	1050
16	1400	12	1360
16.5	1700	12.7	1700
12	3400	10	3400

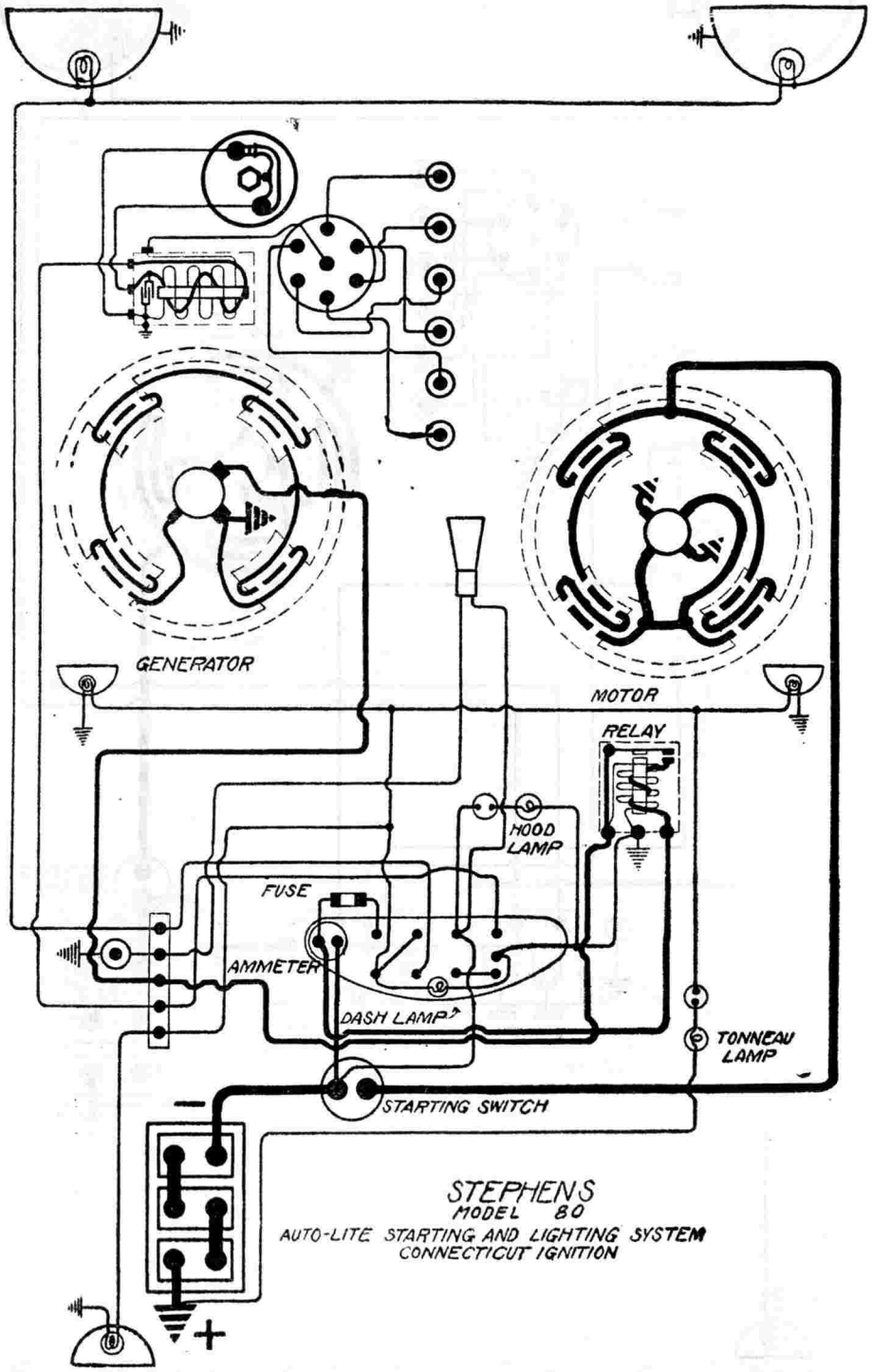
Above readings are obtained with generator charging a battery of 1.300 solution.

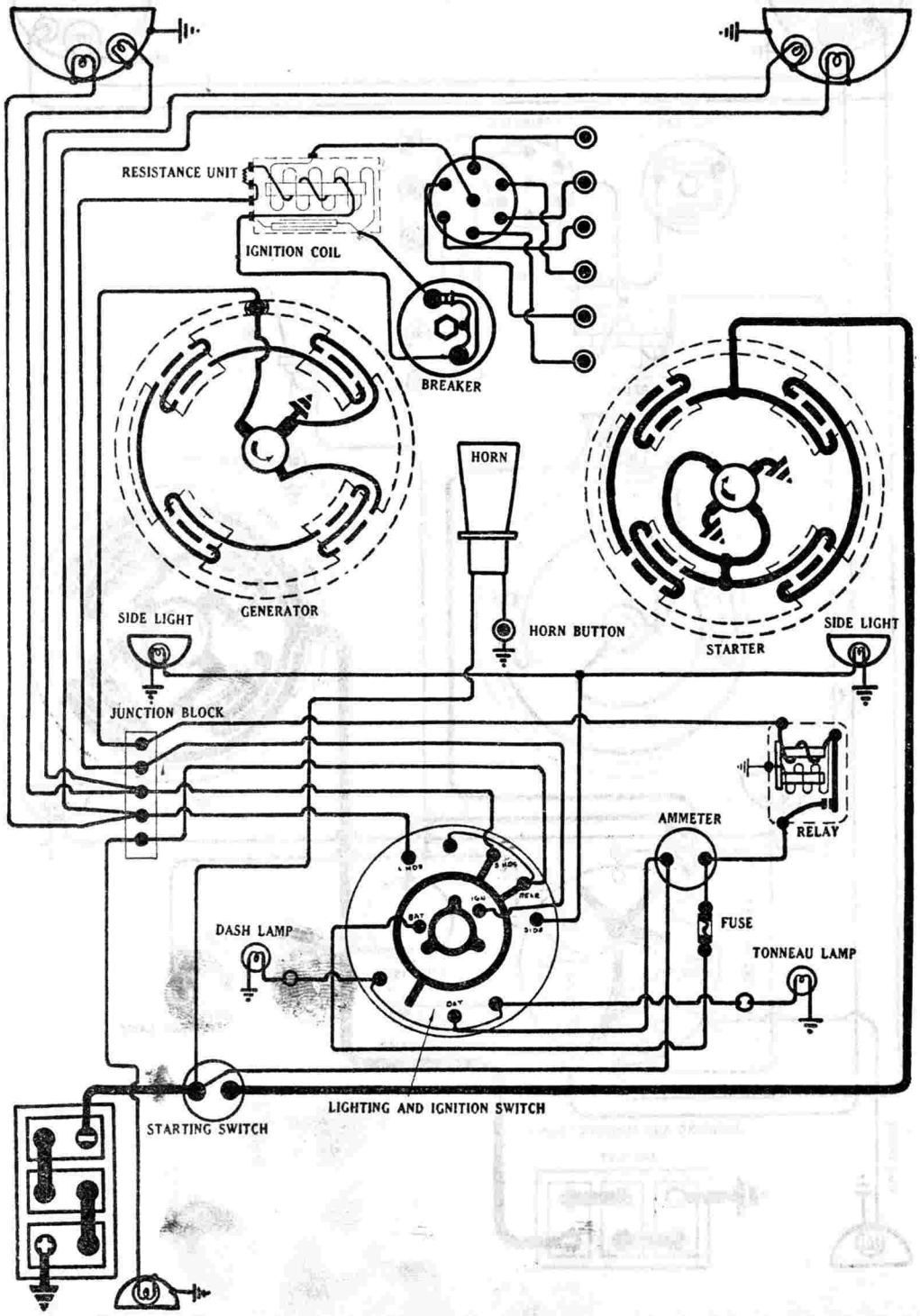
OILING.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 9 miles per hour or 580 R.P.M. of armature and opens at 7 miles per hour or 360 R.P.M. of armature. Relay contacts separate .030 to .045 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Side lamps are 6-8 volt, 2 cp. Dash and tail lamps are 6-8 volt 2 cp. Dimmer lamps are not used on 1919 cars.

FUSES.—Fuses are 20 ampere.





MODEL 90 (1921-1922)

AUTOLITE GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION WITH AUTOLITE COIL

BATTERY.—U. S. L., Type 313-C, 6 volt, 112 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model No. RG-101 (Autolite). Distributor Model 16-6 Cylinder. Breaker contacts separate .015 to .020 inch. When the condition of the contacts affects the ignition, renew the inner breaker mechanism. For temporary service, resurface with fine emery cloth.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Timing.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—Spark plug gaps are .025 to .030 inch.

STARTER.—Model No. M. G. 1020. Direction of rotation is clockwise, looking at the commutator end. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 165 R.P.M., taking 130 amperes.

Starter Data

Torque	R.P.M.	Volts	Amperes
1 lb. ft.	2200	5.5	100
3 lb. ft.	1250	5.1	185
5 lb. ft.	780	4.7	260
8 lb. ft.	110	4.2	365

Stalled Torque Data

Torque	Volts	Amperes
4.4 lb. ft.	2	240
11.8 lb. ft.	4	480
16.0 lb. ft.	5	600

The brush tension is 2 pounds.

Oiling.—Put 5 to 8 drops of light engine oil in the starter oilers every 1000 miles.

GENERATOR.—Model GJ-1020. Generator current regulation is by the third brush system. Maximum current output is 12-16 amperes, reached at 1700 R.P.M. of the armature or 22 miles per hour.

Generator Data

Amperes	Cold Test R.P.M.	Amperes	Hot Test R.P.M.
0	500	0	460
8	750	6	840
12	960	9	1050
16	1400	12	1360
16.5	1700	12.7	1700
12	3400	10	3400

The above readings are obtained with the generator charging a battery of 1.300 solution.

The tension of all the brushes is 1¼ pounds.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Model C-13-1072. Relay closes at 7 miles per hour or 500 R.P.M. of the armature, and opens at 6 miles per hour or 450 R.P.M. of the armature. Relay contacts separate .020 inch. The air gap between the coil core and the relay armature is .010 to .025 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Side lamps are 6-8 volt, 2 cp. Dash, tail, tonneau and dimmer lamps are 6-8 volt, 2 cp.

FUSES.—Fuse is 20 amperes.

STEPHENS

MODEL 10-20 (1923-24)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—U. S. L., 313-X, 6 volt, 116 ampere-hour capacity. The positive (+) terminal is grounded.

IGNITION.—Coil Model No. 2178. Distributor Model No. 5257. The contact points are made of tungsten. If condition of contacts affects ignition, remove and resurface on a medium hard oilstone. Breaker contacts separate .020 to .027 inch.

Oiling.—Put 4 or 5 drops of light engine oil into distributor oiler once every two weeks. If car is driven over 500 miles in two weeks, this attention must be given every 500 miles.

Timing.—Breaker contacts separate when piston entering power stroke is at top dead center.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—The spark plug gaps are .025 inch.

STARTER.—Model No. 262. The direction of rotation, looking at commutator end is counter-clockwise. Brush tension is 2¼ to 2¾ pounds. Stall torque is 10 pounds, taking 450 amperes at 2.3 volts. Starter running free takes 50 amperes at 6 volts. Connection to the engine is through a Bendix drive.

Oiling.—Put 4 or 5 drops of light engine oil into starter oilers every two weeks. If car is driven over 500 miles in two weeks, this care must be given each 500 miles.

GENERATOR.—Model No. 258. The direction of rotation is counter-clockwise. The third brush system is employed for current output regulation. The maximum charging rate is 18 amperes, reached at 1600 R.P.M. of armature.

Generator Test Data

Amperes	Hot Test	R.P.M.	Amperes	Cold Test	R.P.M.
4		800	4		800
8		1000	9		1000
14-16		1600	15-18		1600
15		2000	17		2000

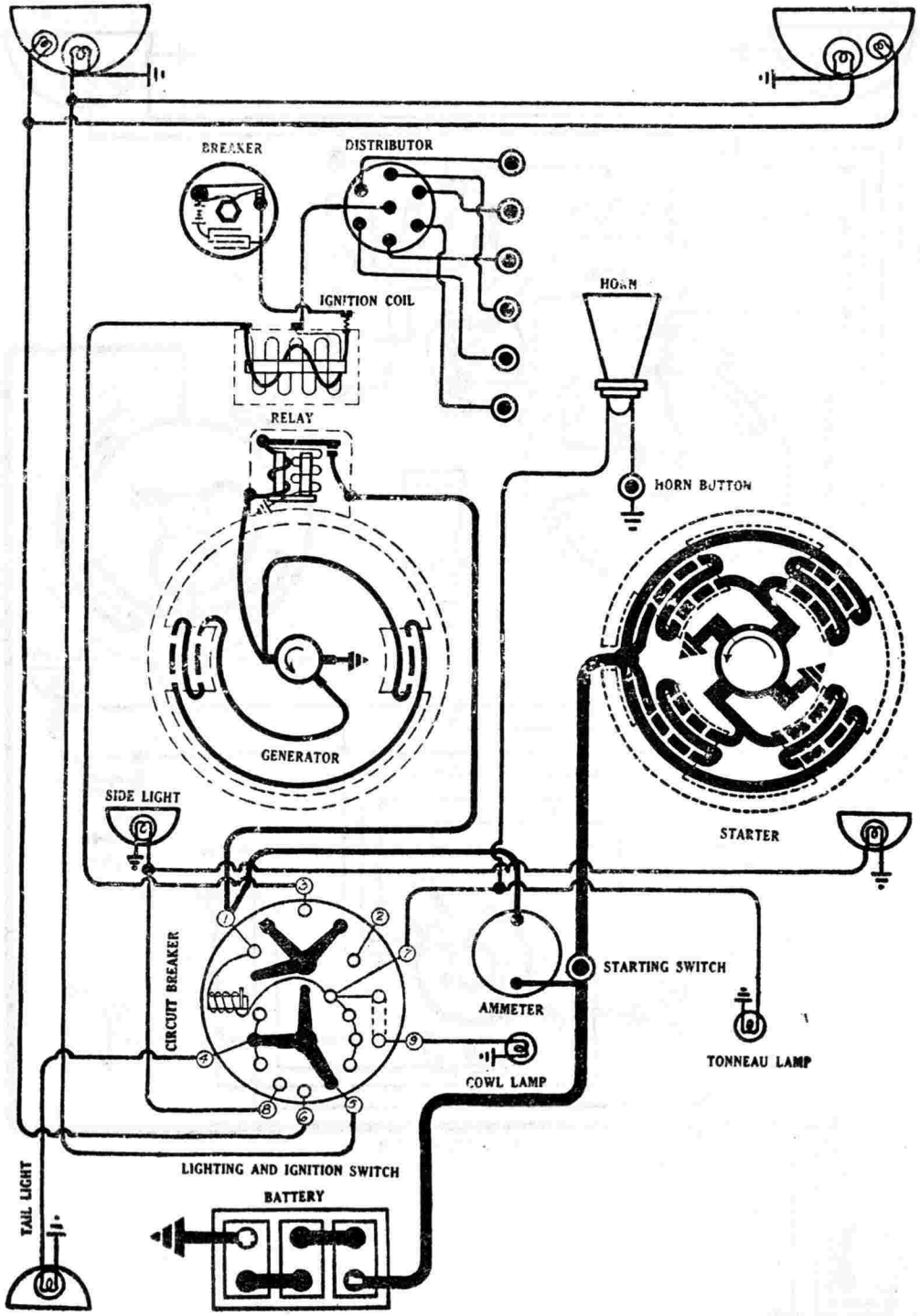
To adjust the charging rate loosen the generator cover band and shift the third brush mounting plate by means of the handle. Moving the brush in the direction of rotation (counter-clockwise) increases the charging rate and in the opposite (clockwise) direction decreases the charging rate. The brush tension of all the generator brushes should be 1¼ to 1¾ pounds each.

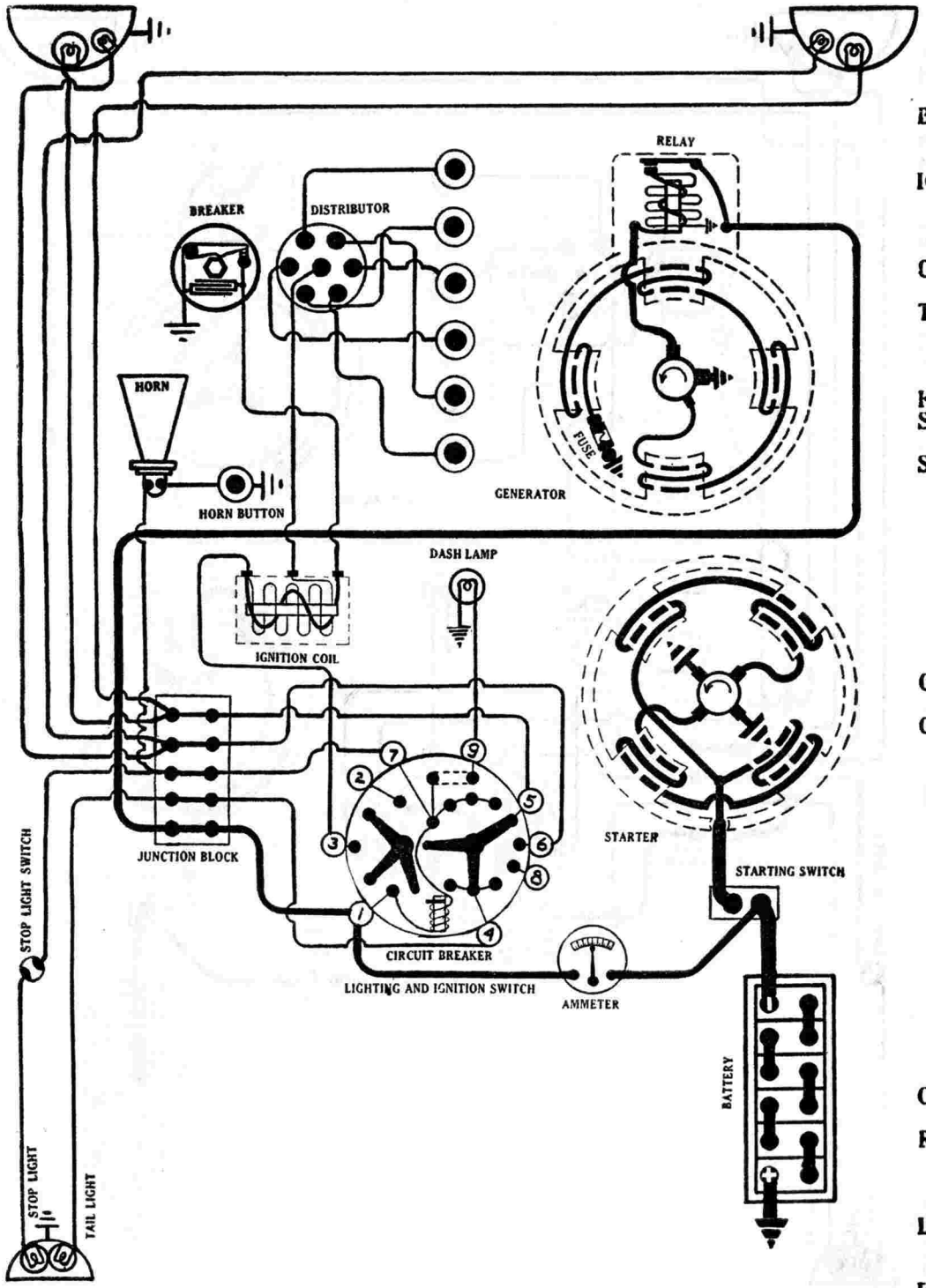
OILING.—Put 4 or 5 drops of light engine oil in each of the starter-generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be given once every 500 miles.

RELAY.—Model No. 5754. Relay closes at 6.75 to 7.5 volts and opens at 3 amperes discharge. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volts, 21 cp. Auxiliary lamps are 6 volts, 6 cp. Dash, tail, tonneau and side lamps are 6 volts, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires a current of 25 amperes to start this device vibrating. While vibrating, the current is 3-5 amperes. Vibration continues to function with a current flow not exceeding 15 amperes.





STERLING-KNIGHT

MODEL B-6 (1924-25), SERIAL NOS. 101 UP
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WESTINGHOUSE IGNITION.

BATTERY: — Exide, Type 6-XC-11-1, 12 volt, 75 ampere hour. The starting capacity is 81.5 amperes for 20 minutes. The lighting capacity is 5 amperes for 13.4 hours. The positive (+) terminal is grounded.

IGNITION: — Coil Model No. 395113. Distributor Model JN. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine flat jeweler's file or on medium hard oilstone.

OILING: — Put 4 or 5 drops of light engine oil in the oilcup at the bottom of the distributor housing every week or each 250 miles.

TIMING: — Breaker contacts begin separate when piston entering power stroke is on top dead center on compression stroke with the spark control lever and breaker assembly in the fully retarded position. At this point the dead center mark on the flywheel will be opposite the indicator mark on the flywheel housing.

FIRING ORDER: — The firing order is 1-5-3-6-2-4.

SPARK PLUGS: — The spark plug diameters are 7/8 inch. Gaps should be .022 to .025 inch.

STARTER: — Frame No. 755 The starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. On test, the starter should never be run free with more than six volts.

Starter Data.

Torque.	R. P. M.	Volts.	Amperes.
0 lb. ft.	3500-5500	5.5	35-55
3.5	2200	10.5	195
20.0	Lock.	5.5	575

The pressure of each of the starter brushes on the commutator should be 2½ to 3 pounds.

OILING: — Fill the oiler on either end of the starter with light engine oil every 500 miles or each two weeks.

GENERATOR: — Frame 57-GT. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the charging rate, loosen the screw on the generator end plate that holds the third brush arm and shift the third brush. Shifting the brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. Tighten the screw after making the adjustment. The maximum charging rate is 11 amperes reached at 1100 R. P. M. of the generator armature.

Generator Date.

Hot Test			Cold Test		
Amperes.	Volts.	R. P. M.	Amperes.	Volts.	R. P. M.
0	13	500	0	13	475
6	15	800	6	15	650
			9-11	15	750-1100
			6	15	2000

The shunt field draws 3.5 amperes at 12 volts. The pressure of the brushes on the commutator should be 1 to 1½ pounds each.

OILING: — Fill the oiler on either end of the generator with light engine oil every week or each 250 miles.

RELAY: — The relay contacts close at 475 R. P. M. of the generator armature or when the voltage of the generator reaches 13 volts, and open with a discharge current of 0 to 3 amperes. Relay contacts separate .035 to .045 inch. The air gap between the relay armature and coil core is .015 inch, contacts closed.

LIGHTING: — Delco Combination Switch, Model 1256. Head lamps and stop lamp are each 12 volt, 21 cp. S. C. Dimmer lamps are 12 volt, 4 cp. S. C. Dome lamp is 12 volt, 6 cp. S. C. Dash and tail lamps are each 12 volt, 2 cp. S. C.

FUSES: — Generator field fuse is 5 ampere. A vibrating circuit breaker mounted on the back of the switch protects the horn and lighting circuits.

STERLING KNIGHT

MODEL B-6 (1925-26)

DEJON GENERATING, STARTING AND LIGHTING SYSTEM

DEJON IGNITION

BATTERY:—Exide, Type 6-XC-11-1. 12 volt, 75 ampere hour. The starting capacity is 81.5 amperes for 20 minutes. The lighting capacity is 5 amperes for 13.4 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model CA-4006. Distributor Model IA-4006. Breaker contacts separate .018-.020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file or on a medium hard oilstone. The coil draws 4.75-5 amperes at 12 volts which reduces to 2-2.1 amperes as the ballast resistance becomes hot.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every two weeks; or each 500 miles if the car is driven more than 500 miles in two weeks. Place a small bit of vaseline on the surface of the breaker cam every 1000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position. At this point the dead center mark on the flywheel will be opposite the indicator mark on the flywheel housing.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .022-.025 inch.

STARTER:—Model SB-4004. The starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter should never be run free with more than 6 volts.

Starter Data.

Torque.	R.P.M.	Volts.	Amperes
0 lb. ft.		5	40
1. lb. ft.	3400	11	100
3.6 lb. ft.	2250	10	200
6.6 lb. ft.	1700	9	300
10.2 lb. ft.	1250	8	400
29. lb. ft.	Lock	4	880

Oiling:—Put 4 or 5 drops of light engine oil in each of the starter oilers every month; or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR:—Model DC-4002. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the charging rate, insert a screwdriver in the slotted head of the third brush shifting shaft located in the generator end plate above the bearing retainer. Turn the shaft in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate.

Generator Data

Cold Test		Hot Test.	
Amperes.	R.P.M.	Amperes.	R.P.M.
0	500	0	600
4	600	5	800
8	800	8	1000
11	1000	9	1200
12	1200	11	1600
14	1600	9	2000
12	2000	8	2400
11	2400	7	2800
10	2800		

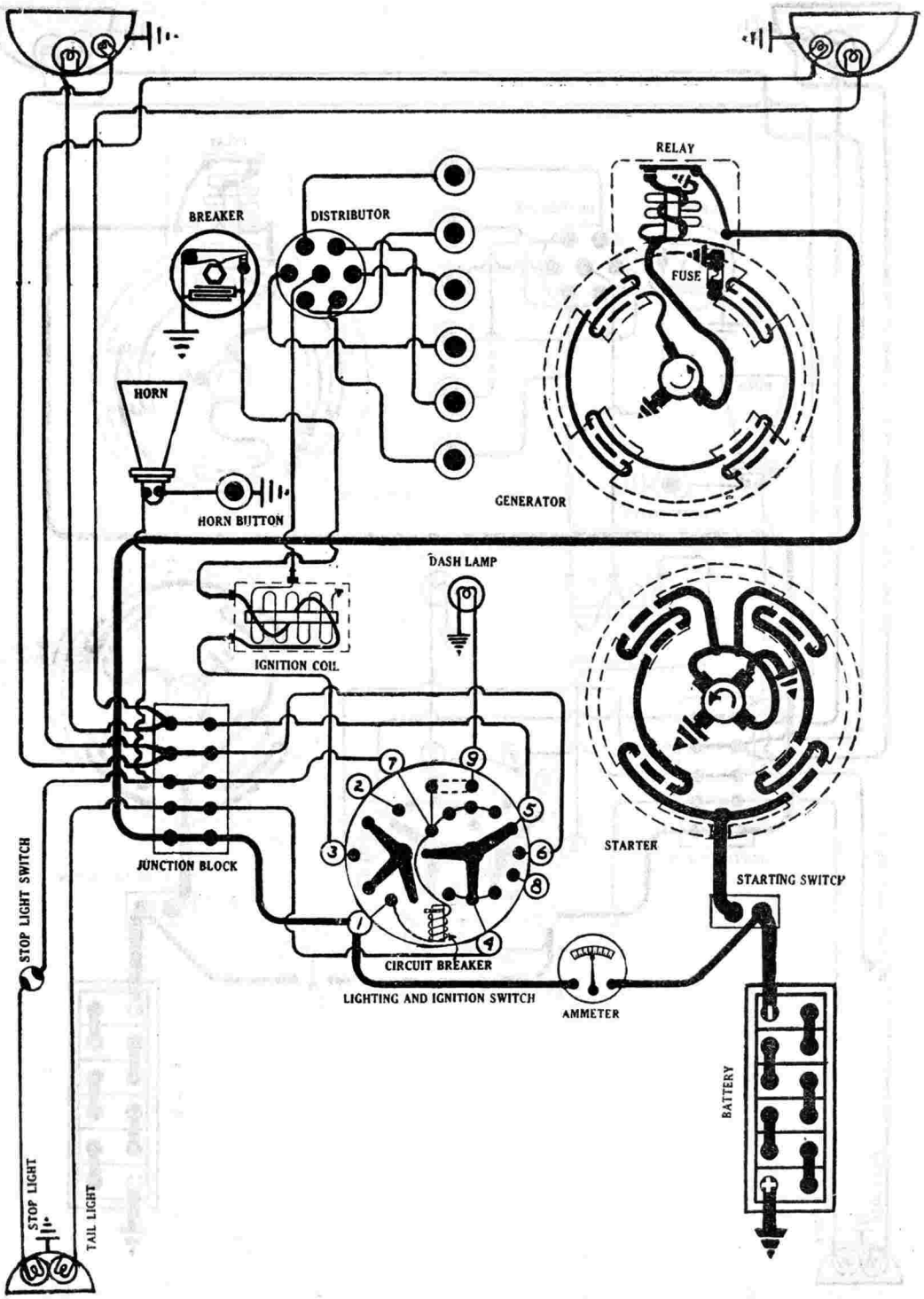
The shunt field current is 1.6 to 1.8 amperes at 12 volts.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month; or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY:—Model RA-4002. Relay is mounted on top of the generator. Relay contacts close at 500 to 575 R.P.M. of the generator armature with a voltage of 13.5 to 14.5 volts and open with a discharge current of 1/2 to 2 amperes. Charging current is approximately 1 ampere at closing of contacts. Contacts separate .025 to .035 inch. Air gap between relay armature and coil core is .015 inch, contacts closed.

LIGHTING:—Head and stop lamps are 12 volt, 21 cp. S. C. Dimmer lamps and dome lamp are 12 volt, 4 cp. S. C. Dash and tail lamps are each 12 volt, 2 cp. S. C.

FUSES:—Generator field fuse is 5 ampere. It is located in the plug on the generator end plate.



Stevens-Duryea

Model D-6 (1915)

Delco Starting and Lighting System
Eisemann Magneto Ignition

Battery.—Battery is 6 volt, 150 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Magneto breaker contacts should open .015 inch to .018 inch.

Care.—Keep clean, by using gasoline. If badly burned or pitted, resurface them with a fine, flat jeweler's file or a small strip of worn No. 00 sand paper.

Timing.—Magneto should be set so that the contacts will begin to separate when the top dead center mark on the flywheel is 1½ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—The spark plug gap should be .028 inch to .031 inch.

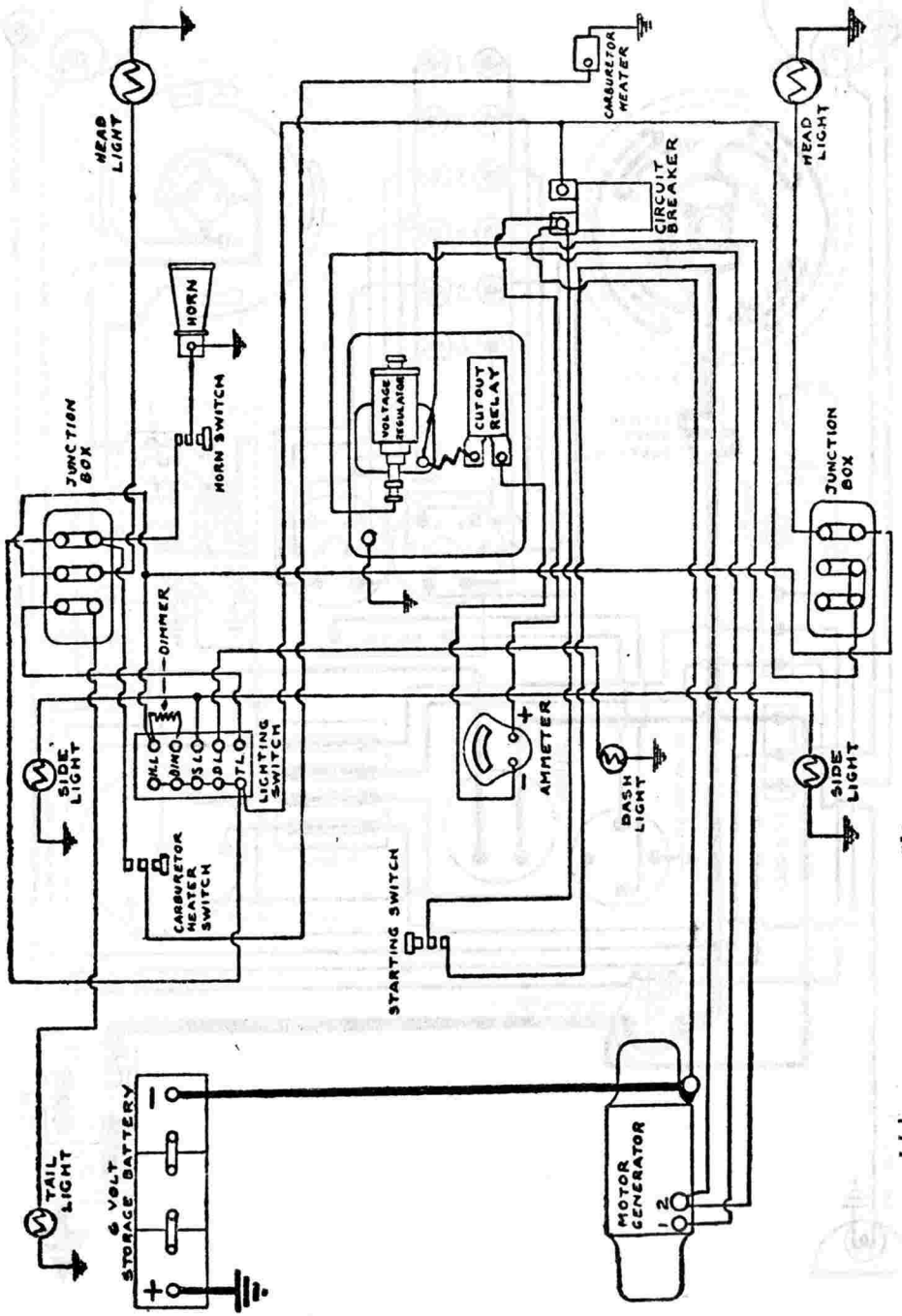
Starter.—Motor-generator No. 35 consists of motor and generator combined into one frame, but electrically separate. There are two separate armature and two separate field windings. When the "Start" button is pressed, a current flow of 4.5 amperes causes the generator to run slowly as a motor, facilitating the meshing of the starting gears. Depressing the starting pedal draws the gears into mesh and allows the motor brush to come in contact with the commutator, applying full battery pressure to motor and cranking engine.

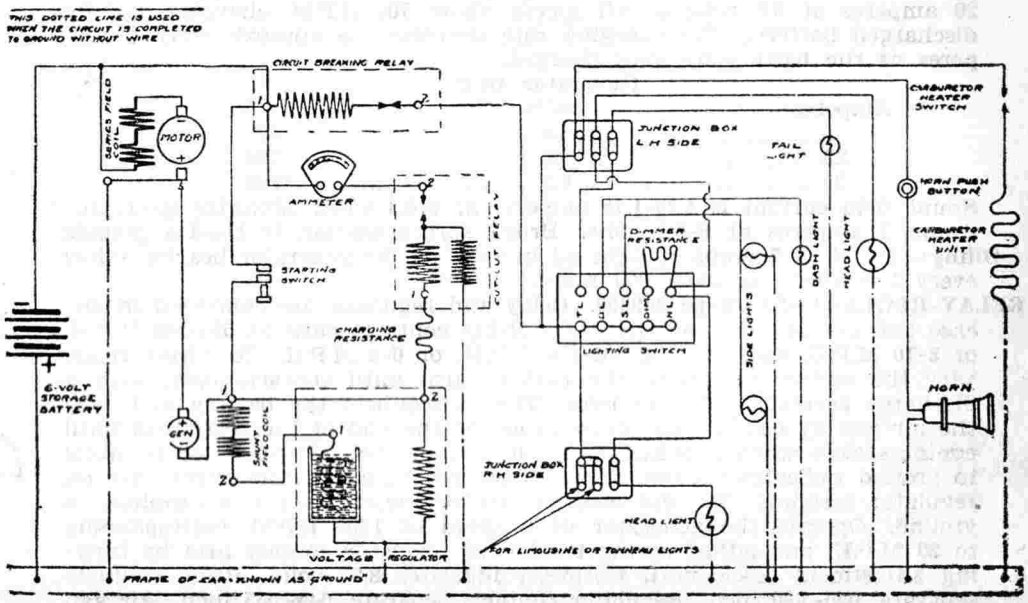
Relay should close at 8-10 miles per hour. The generator should reach the neutral point, that is the point at which it neither receives current from or delivers current to the battery, when being driven at about 400 R. P. M. It should deliver 5 amperes at 500, 12 amperes at 1000, and 16-20 amperes at 1500 R. P. M.

Generator.—Generator voltage regulation is by a mercury regulator. This device is fully described on Page Nos. 65 and 65A.

Lamps.—Head lamps are 6-8 volts, 15 cp. Side lamps are 6-8 volts, 4-6 cp. Dash lamp is 6-8 volts, 2 cp. Tail lamp is 6-8 volts, 2 cp. Tonneau and pillar lamps are 6-8 2 cp.

Circuit Breaker.—There is a circuit breaker to take the place of fuses in the light circuits.





MODEL E (1920-21-22-23)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
BERLING MAGNETO IGNITION

BATTERY:—U.S.L. Type 3-HVX-8Z. 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 170 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 33 hours.

IGNITION:—Berling Magneto. Magneto is of two spark independent type. Breaker contacts separate .016-.020 inch. They are made of platinum. Resurface contacts with a fine flat joweler's file or with worn No. 00 sandpaper.

Oiling:—Put 8 to 10 drops of light oil in the magneto oilers every month or each 1000 miles. Every month put a small bit of vaseline on the face of the breaker cam and the rubbing surface of the fiber bumper.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark lever fully retarded.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plug gaps are .025 inch.

STARTER:—Frame No. 777. Starter is connected to the engine through a magnetic pinion shift. A solenoid or pinion shifting coil mounted on the end of the starter is connected in series with the starter windings. When the starting switch is closed, the starting current flows through this coil causing the pinion shaft to move endwise and meshing the gears. Two resistance coils connected in parallel with the field windings weaken the field current and assist this operation. The pinion must be pulled into mesh by a current of 125 amperes at 4 volts and must not be held in by the no-load current of 70 amperes at 5.5 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
.0 lb. ft.	5000	5.5	70
3.5 "	1250	5.5	230
27.5 "	Lock	4.0	750

Oiling:—Put 4 or 5 drops of light oil in each of the starter bearing oilers and in the pinion oiler every month or each 1000 miles.

GENERATOR:—Frame No. 781. Generator voltage regulation is by vibrating regulator. To adjust charging rate, change the regulator contact arm spring tension by turning the thumbscrew directly above the contact arm. Increase the spring tension to increase the charging rate and decrease spring tension to decrease the charging rate. Maximum charging rate is 20 amperes at 6.5 volts at all speeds above 700 R.P.M. charging a fully discharged battery. The charging rate decreases to approximately 4 amperes as the battery becomes charged.

Generator Data

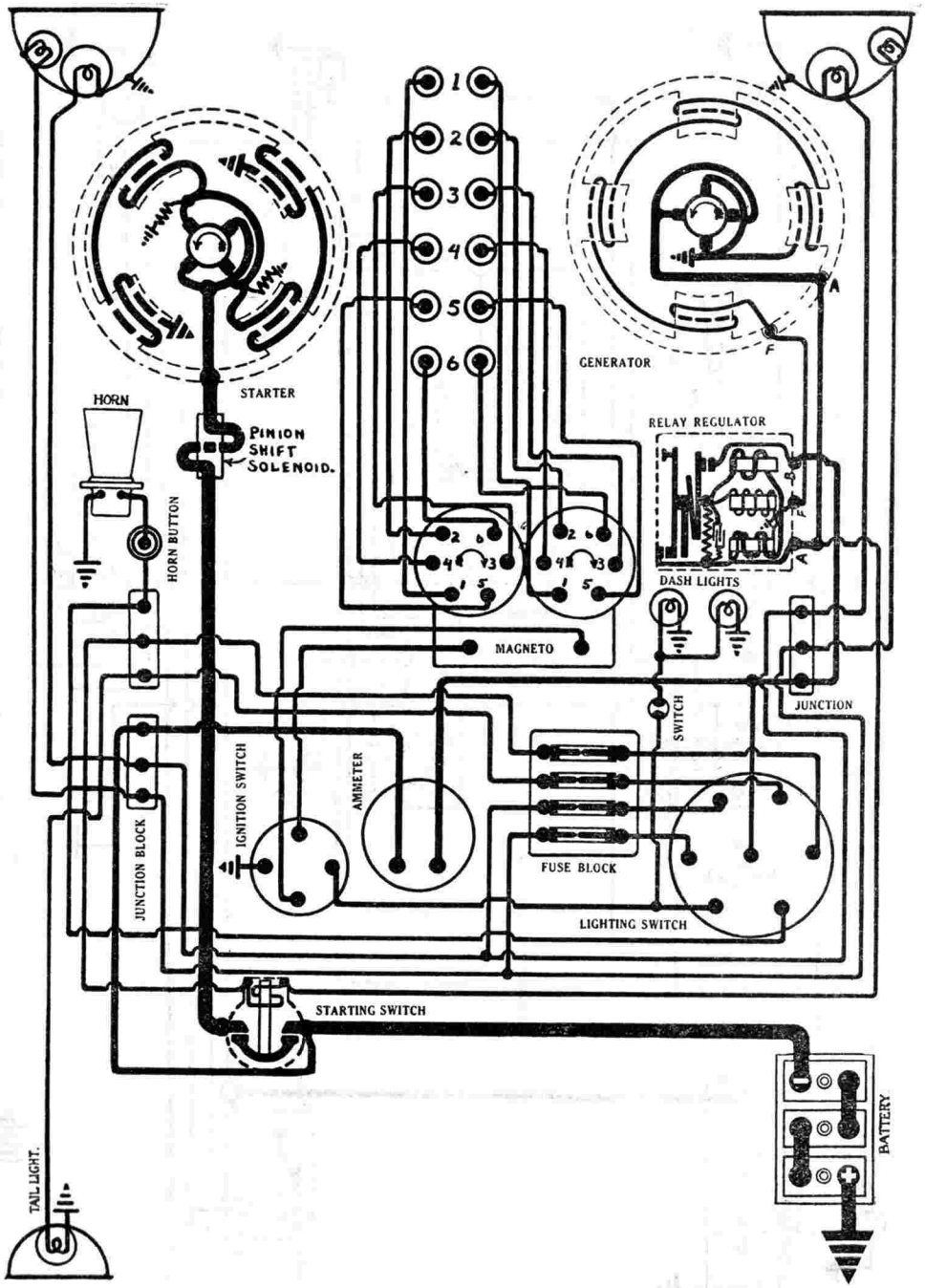
Amperes	Volts	R.P.M.
0	6.5	425
20	6.5	700
20	6.5	1200

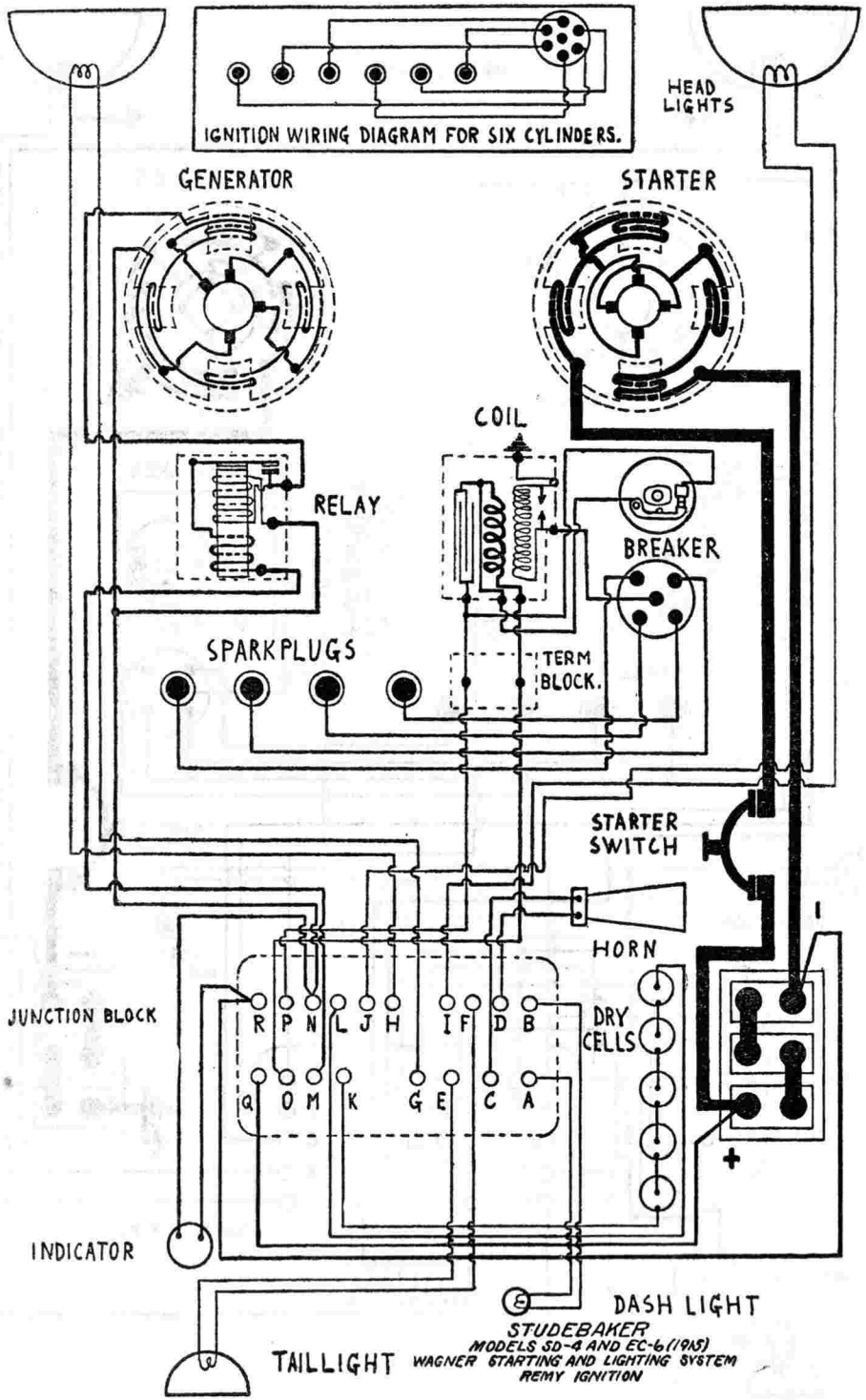
Shunt field current is 1.25-1.75 amperes at 6-6.3 volts. Motoring generator draws 5 amperes at 6-6.3 volts. Brush spring tension is 1¼-1½ pounds

Oiling:—Put 4 or 5 drops of light oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY-REGULATOR:—Type 269309. Relay and regulator are combined in one case and are mounted on the dash. Relay contacts close at 550-600 R.P.M. or 8-10 M.P.H. and open at 500-550 R.P.M. or 6-8 M.P.H. To adjust relay, vary the spring tension of the contact arm until contacts open with a discharge current of 0-3 amperes. Then disconnect the battery and vary the air gap by bending the brass prong at the end of the relay arm until contacts close when a voltmeter reading from the "A" generator terminal to ground indicates 6.5 volts. To adjust the regulator, disconnect wire on regulator terminal "B" and connect the voltmeter from this terminal to ground. Operate the generator at a speed of 1200 R.P.M. corresponding to 20 M.P.H. and adjust spring tension of regulator contact arm by turning adjustment screw until voltmeter indicates 8.75 volts. Relay contacts separate .055-.060 inch. Regulator contacts separate .045-.055 inch. Air gap in center is .015-.019 inch.

LIGHTING:—Head lights are 6-8 volt, 21 cp. S.C. Dimmer lights are 6-8 volt,





Studebaker

MODELS S.D.-4 AND E.C.-6 (1915)

WAGNER GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY.—Willard, Type S-J-W-4. 6 volts, 100 ampere-hour. The two-wire system is used.

IGNITION.—Breaker contacts separate .015 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 4 or 5 drops of light engine oil in the oiler behind the distributor housing, every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when the flywheel marking "U.D.C. No. 1" is 5/8 inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order of the 4 cylinder cars is 1, 3, 4, 2. The firing order of the 6 cylinder cars is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model E.M.-113, Type 53-T-3. Starter is connected to the engine through a chain drive and an overrunning clutch.

OILING.—Put 5 or 6 drops of light engine oil in each of starter bearing oilers every month. At the same time remove the plug from the reduction gear case and inject Gredag grease.

GENERATOR.—E.M.-114, Type 51-X. Generator current regulation is by third brush system. Rotation is counter-clockwise, viewed from commutator end. Maximum current output of 18 amperes is reached at 18-20 miles per hour.

Amperes	Generator Data	R.P.M.
10		700
16		900
18		1100
14		1500
9		2000
7		2500

OILING.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour and opens at 6-8 miles per hour. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Dash and tail lamps are each 6-8 volt, 2 cp.

FUSES.—Fuses are 15 ampere.

Studebaker

SERIES 16, 17 AND 18 (1916-17-18)
WAGNER GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Willard Type S-T-W-4, 6 volts, 100 ampere hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .015 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the flywheel marking "UP-D-C-1" is 4 inches before the indicator on the 4 cylinder cars, and 5⅛ inches before the indicator on the 6 cylinder cars, spark control lever and breaker assembly fully advanced.

FIRING ORDER.—The firing order of the 4 cylinder cars is 1, 3, 4, 2. The firing order of the 6 cylinder cars is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model E.M.-154, Type 36-T. Starter is connected to the engine through a set of reduction gears, a chain drive and an overrunning clutch.

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month. At the same time remove the plug from the reduction gear case and inject Gredag grease.

GENERATOR.—Model E.M.-126, Type 45-W. Generator current regulation is by third brush system. Rotation is counter-clockwise, viewed from commutator end. Maximum current output of 19 amperes is reached at 20 miles per hour.

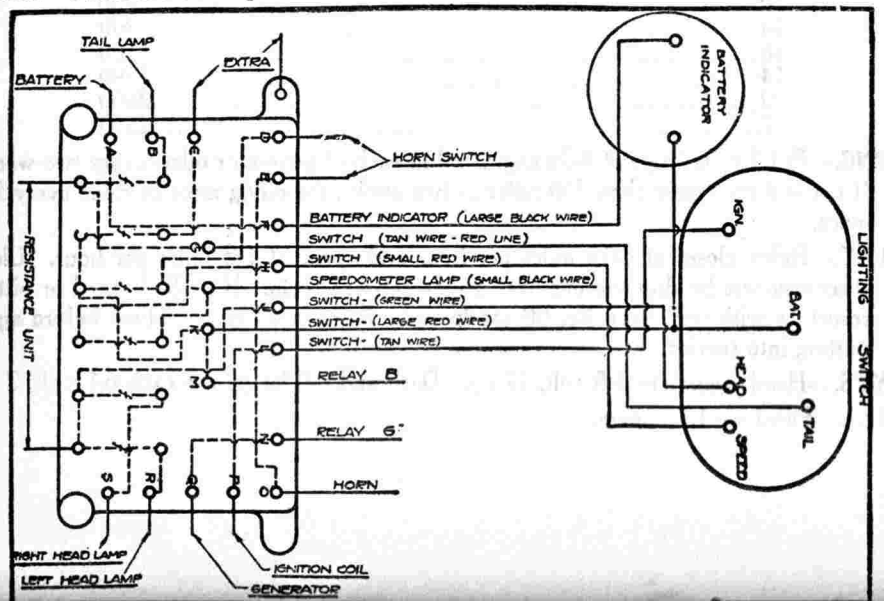
Amperes	Generator Data	R.P.M.
6.00		800
12.00		1000
17.00		1200
19.25		1400
15.00		1700
12.50		2000
9.00		2500

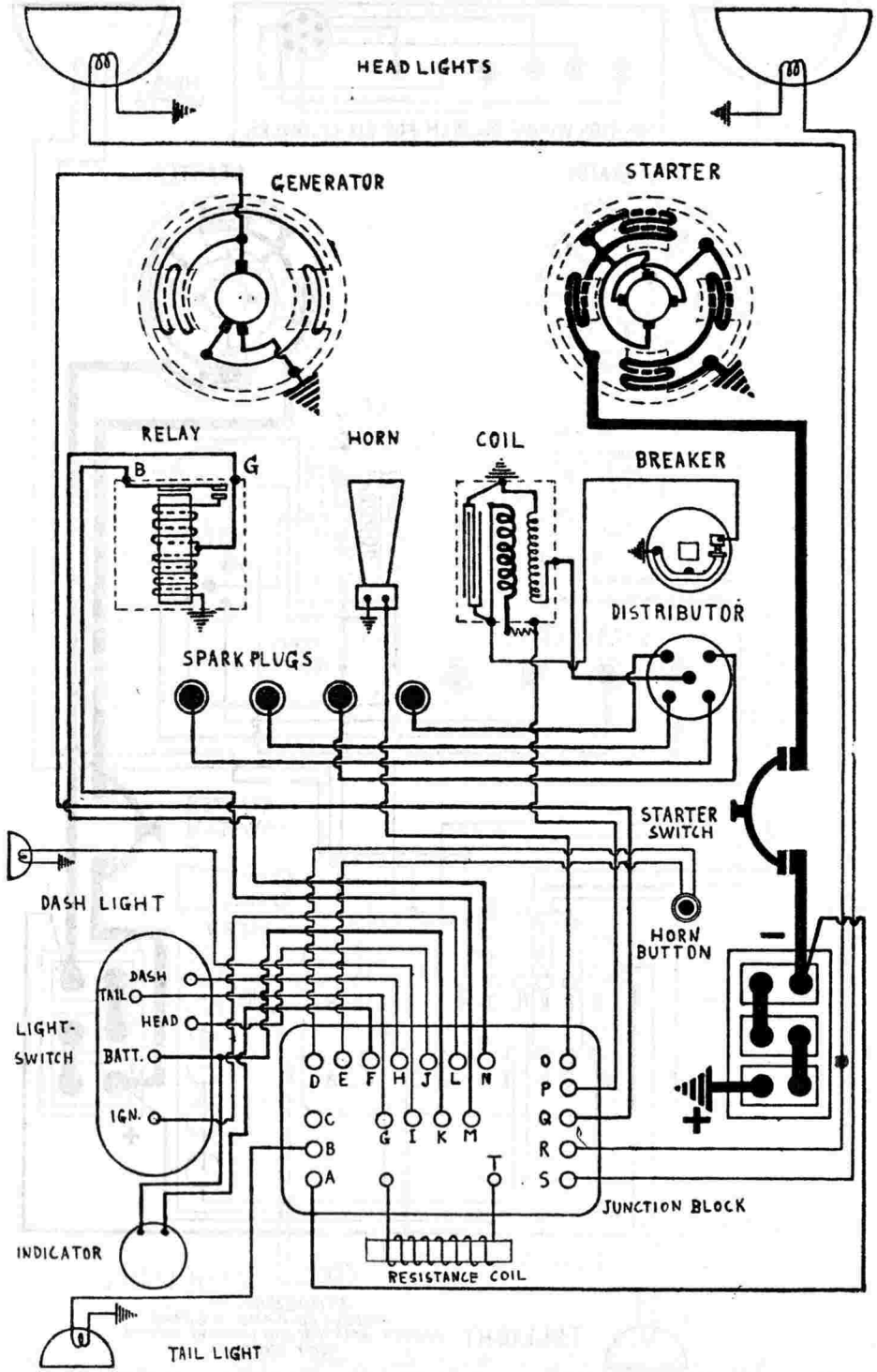
OILING.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

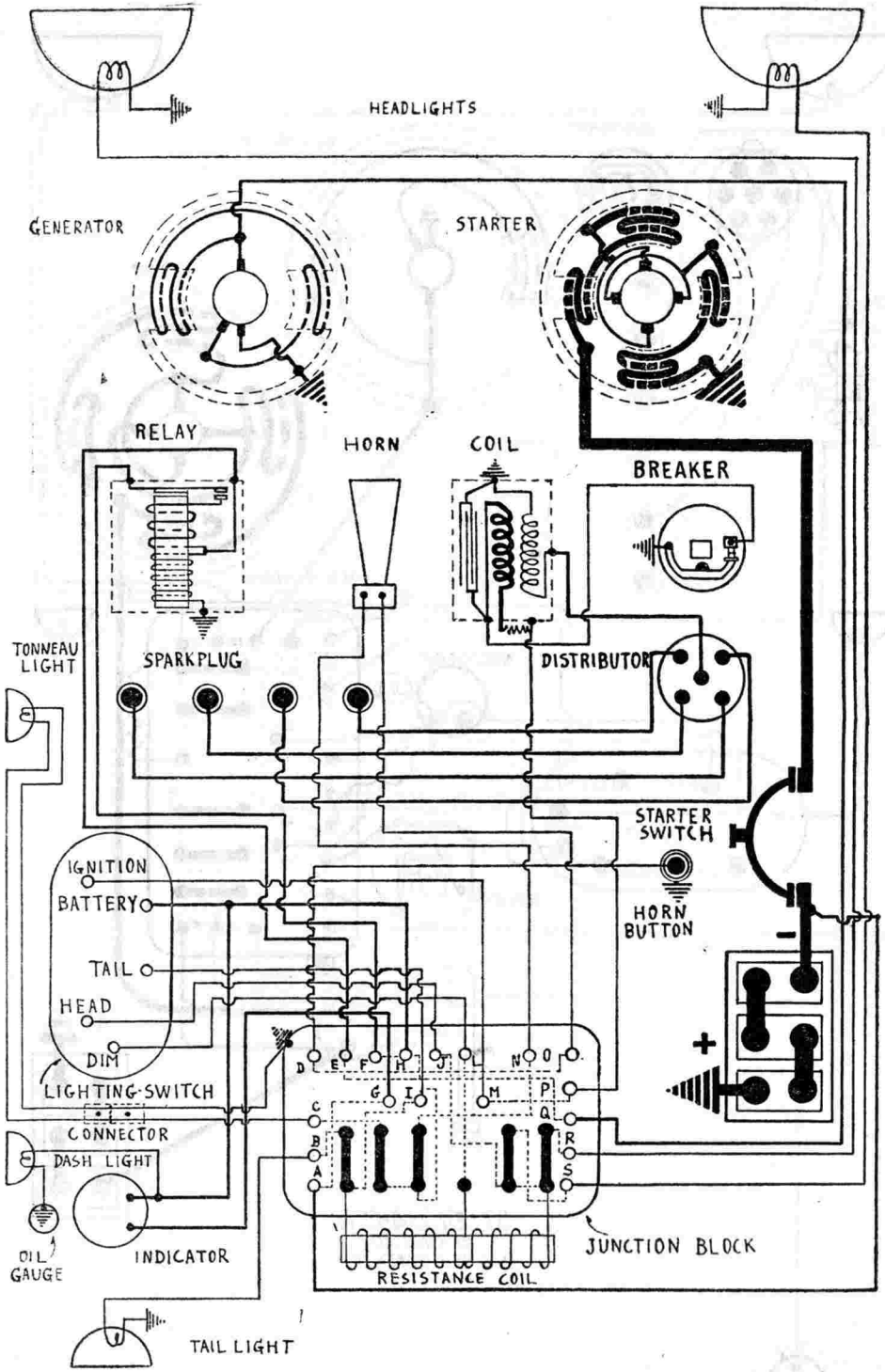
RELAY.—Relay closes at 8-10 miles per hour and opens at 6-8 miles per hour. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 17 cp. Dash and tail lamps are each 6-8 volt, 2 cp.

FUSES.—Fuses are 10 ampere.







Studebaker

SERIES 19 (1918-19)

WAGNER GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

BATTERY.—Battery is 6 volt, 100 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .020 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the flywheel marking "AD-SP" is at indicator, spark control lever and breaker assembly in the fully advanced position.

FIRING ORDER.—The firing order of the four cylinder cars is 1, 3, 4, 2. The firing order of the six cylinder cars is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model E.M.-201, Type 36T-3. Starter is connected to the engine through a chain drive and an overrunning clutch.

OILING.—Put 5 or 6 drops of light engine oil in each of starter bearing oilers every month.

GENERATOR.—Model E.M.-214, Type 45-W. Generator current regulation is by third brush system. Rotation is counter-clockwise, viewed from commutator end. Maximum current output of 19 amperes is reached at 20 miles per hour.

Amperes	Generator Data	R.P.M.
6.00		800
12.00		1000
17.00		1200
19.25		1400
15.00		1700
12.50		2000
9.00		2500

OILING.—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour and opens at 6-8 miles per hour. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 12 cp. Dash and tail lamps are each 6-8 volt, 2 cp. Tonneau lamp is 6-8 volt, 5 cp.

FUSES.—Fuses are 15 ampere.

STUDEBAKER

MODELS EH AND EG, SERIES 20 (1920-21), SERIAL NOS. 257465 UP
WAGNER GENERATING, STARTING AND LIGHTING SYSTEM
WAGNER IGNITION

BATTERY.—Willard, Type SJR-4, 6 volt, 115 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model K-43. Distributor Model KC-666. Breaker contacts separate .024 to .029 inch. They are made of tungsten. When the condition of the contacts affects the ignition, renew the contact screw and lever arm.

OILING.—Screw up the grease cup under the breaker head one-half turn every two weeks. If the car is driven more than 500 miles in two weeks, this must be done every 500 miles. Put 3 or 4 drops of light engine oil in the wick in the breaker lever spindle every six months.

TIMING.—Breaker contacts begin to separate when the flywheel marking "AD-SP" is at the indicator, spark control lever and breaker assembly in the fully advanced position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 to .028 inch.

STARTER.—Model EM-201, Type 36-T. Starter is connected to the engine through a chain drive an overrunning clutch. Starter cranks the engine at 110 R.P.M., taking 160 amperes. Lock torque is 35 pound-feet, current being 475 amperes. Running freely, starter takes 60-90 amperes, armature revolving at 9000 R.P.M.

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR:—Model EM-326 or EM-338, Type 45-W. Generator current regulation is by the third brush system. Maximum current output is 16-18 amperes, reached at 1500 R.P.M. of the armature or 20-22 miles per hour.

Amperes	Generator Data	R.P.M.
0		650
4		740
8		850
12		980
16-18		1400
10		2200

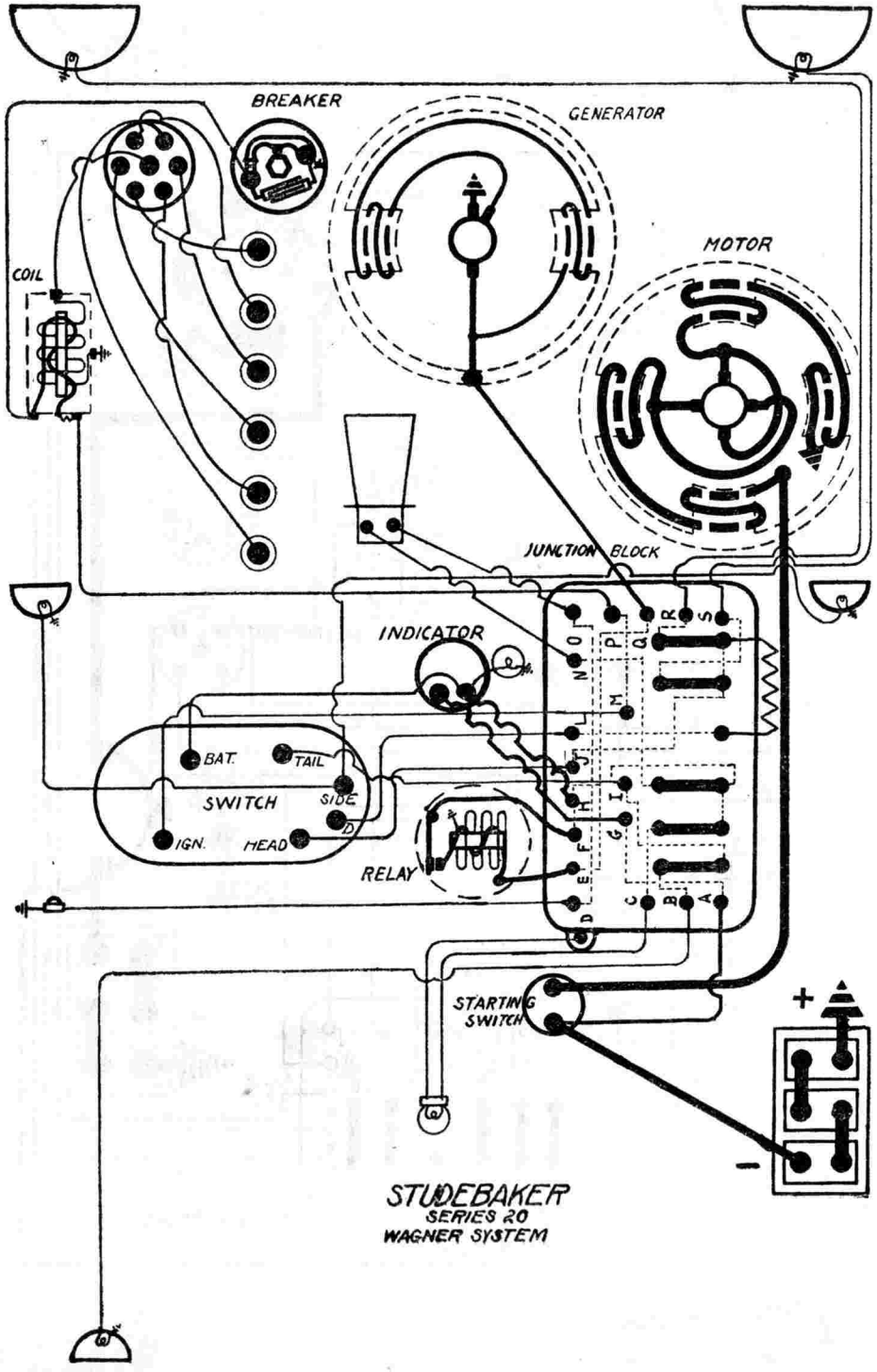
Charging rate is varied by adjusting third brush setting. Move the third brush in the direction of armature rotation to increase the charging rate, and against the direction of rotation to decrease the charging rate. Reseat the brush after adjusting position.

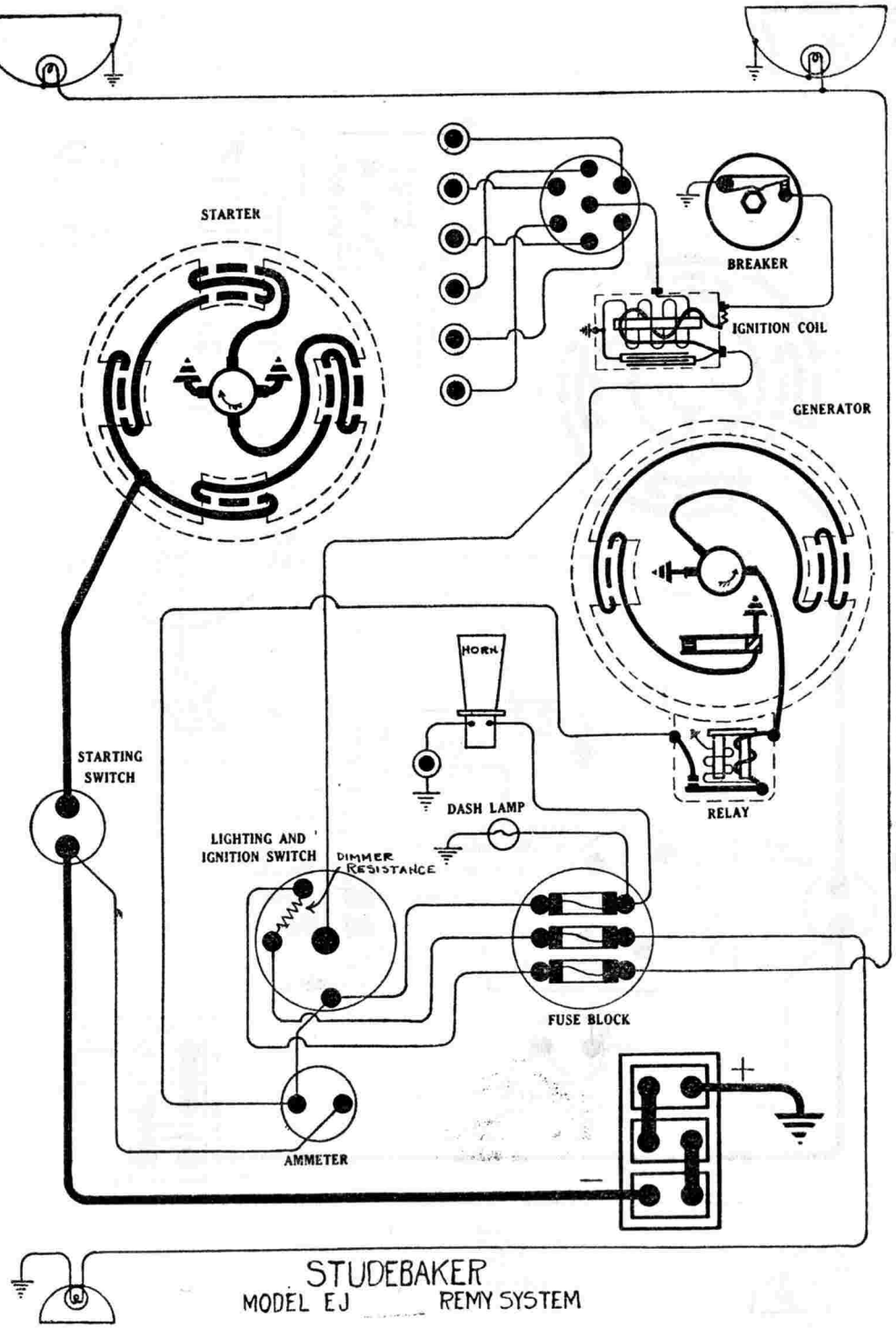
OILING.—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Type K-44 or I-471. Relay closes at 8-10 miles per hour or 600-700 R.P.M. of the armature and opens at 6-8 miles per hour or 500-560 R.P.M. of the armature. Charging current is 2 amperes at closing and the discharge current 0-4 amperes at the opening of relay contacts. Contacts of the Type K-44 relay separate .031 inch, and the air gap between relay armature and coil core is .031 inch, contacts closed. Contacts of the Type L-471 relay separate .035 to .065 inch, and the air gap between relay armature and coil core is .025 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash, tail and tonneau lamps are 6-8 volt, 2 cp. Side lamps are 6-8 volt, 4 cp.

FUSES.—Fuses are 10 ampere.





STUDEBAKER
MODEL EJ REMY SYSTEM

STUDEBAKER

MODEL EJ (1920-21)

REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Willard, (1921) Type SJR-4 (1922) Type SJRN-3, 6 volt, 112 ampere hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model 284-A. Disctributor Model 606-A. Breaker contacts separate .003 to .013 inch. When the condition of the contacts affects the ignition, resurface with a fine flat jeweler's file or a piece of well worn No. 00 sandpaper.

Oiling:—Screw up the grease cup under the breaker head one-half turn every two weeks. If the car is driven more than 500 miles in two weeks, this must be done every 500 miles. Put 3 or 4 drops of light engine oil in the wick in the breaker lever spindle every six months.

Timing.—Breaker contacts begin to separate when the flywheel marking "AD-SP" is at the indicator, spark control lever and breaker assembly in the fully advanced position.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER.—Model No. 715-B. Starter is connected to the engine through a Bendix drive and a set of reduction gears.

Oiling.—Put 5 or 6 drops of light engine oil in starter oilers every month. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles. Once each season apply graphite grease through plug in reduction gear case.

GENERATOR.—Model 917-A. Generator current regulation is by the third brush system. Thermostat opens at 195° to 200° F., cutting down the maximum charging rate to 11 amperes. The direction of rotation is counter-clockwise, looking at the commutator end.

Cold Test		Generator Data	Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M
7	7.1	850	6-9		1450
18-20	8.3-8.8	1800	11	8.2	1900
17-10		2500			

The brush tension is 14-18 ounces. The field draws 4.85 amperes at 6 volts. Charging rate is varied by adjusting the third brush setting. Move the third brush in the direction of armature rotation to increase the charging rate, and against the direction of rotation to decrease the charging rate. Reseat the brush after position adjustment.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every month. If the car is driven more than 1000 miles in a month, this oiling must be done every 1000 miles.

RELAY.—Model No. 264-B. Relay closes at 8-10 miles per hour, and opens at 6-8 miles per hour. Air gaps between relay armature and coil core is .012 to .015 inch, contact points closed. Contact opens .012 to .015 inch. Adjust spring tension by bending brass strip through which spring passes. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Fuses are 10 ampere.

STUDEBAKER

MODEL EJ (1921-22)

WAGNER GENERATING, STARTING AND LIGHTING SYSTEM

WAGNER IGNITION

BATTERY.—Willard, (1921) Type SJR-4 (1922) Type SJRN-3, 6volt, 112 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model K83. Distributor Model K-97. Breaker contacts separate .024 to .029 inch. They are made of tungsten. When the condition of the contacts affects the ignition, renew the contact screw and lever arm.

Oiling.—Put 5 or 6 drops of light engine oil in the distributor bearing oilers every month. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

Timing.—Breaker contacts begin to separate when the flywheel marking "AD-SP" is at the indicator, spark control lever and breaker assembly in the fully advanced position.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—The spark plug gaps are .025 inch.

STARTER.—Model EM 356, Type 36T. Starter is connected to the engine through a Bendix drive. Starter cranks the engine at 125 R.P.M., taking a current of 160 amperes. Lock torque is 11.5 pound-feet, current being 475 amperes. Running freely, starter takes 60-90 amperes, armature revolving 8000 R.P.M.

Oiling.—Put 5 or 6 drops of light engine oil in starter oilers every month.

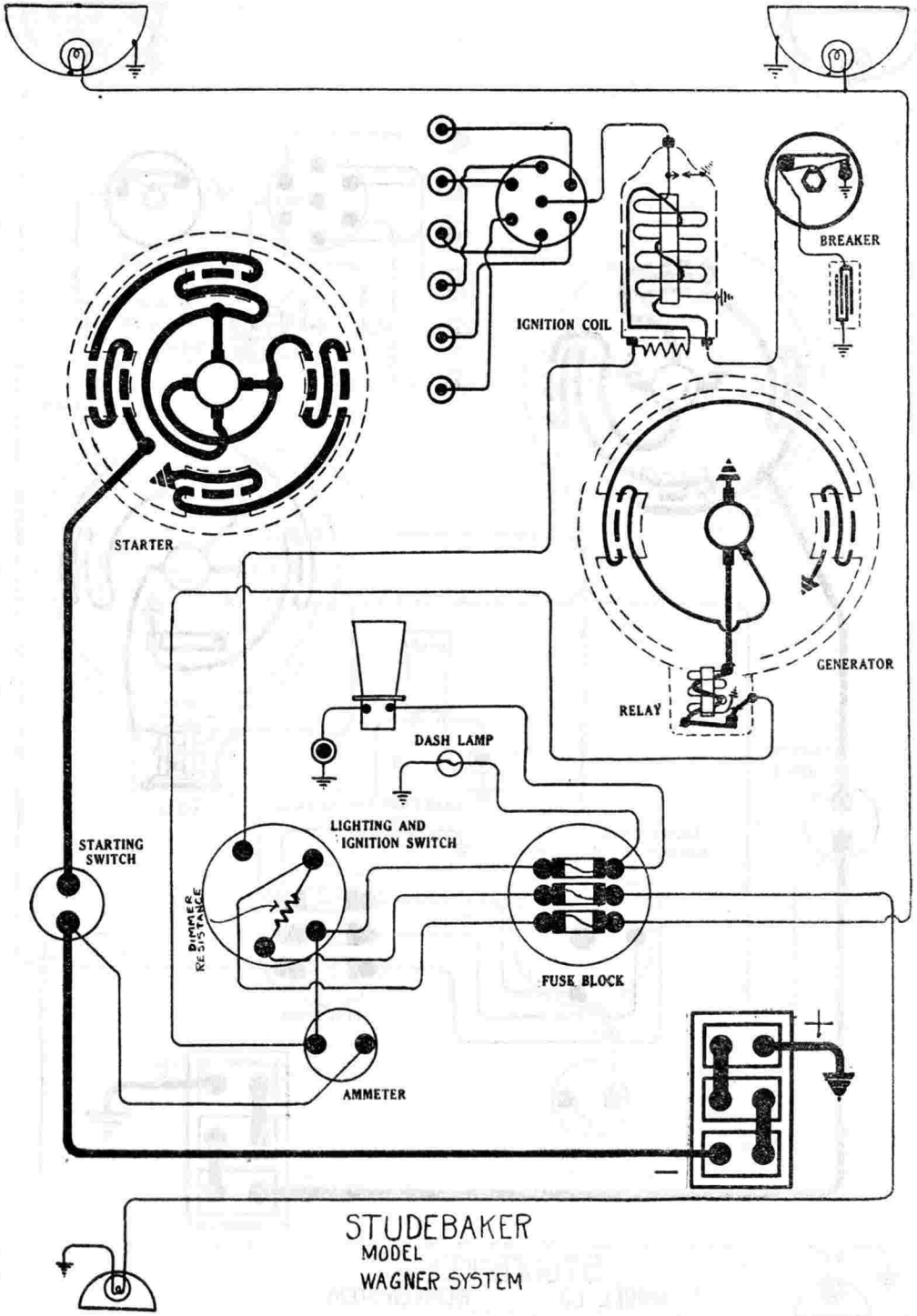
GENERATOR.—Model EM-355, Type 46-V. Generator current regulation is by the third brush system. Maximum charging rate is 12 amperes, reached at 20-23 miles per hour.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

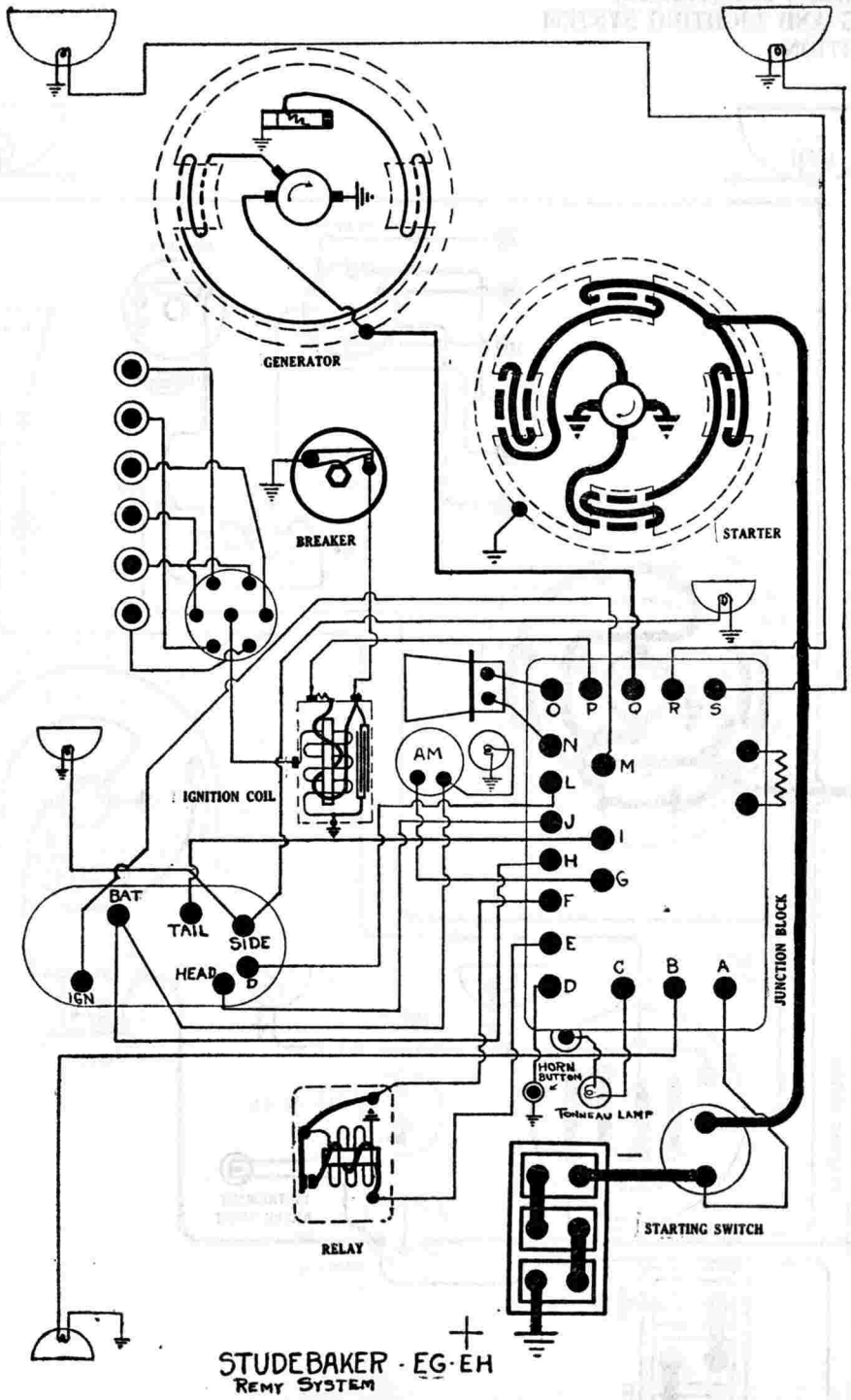
RELAY.—Model I-471. Relay closes at 8-10 miles per hour or 640-800 R.P.M. of the armature, and opens at 6-8 miles per hour or 480-640 R.P.M. of the armature. Charging current at closing is 2 amperes, and the discharge current is 0-4 amperes at opening of relay contacts. Relay contacts separate .035 to .065 inch. Air gap between relay armature (moving member) and coil core is .025 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Fuses are 10 ampere.



STUDEBAKER
MODEL
WAGNER SYSTEM



STUDEBAKER

BIG SIX AND SPECIAL SIX, MODELS EG, EH (1921)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Willard, Type SJR-4, 6 volt, 115 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model 284-D. Distributor Model 358-A. Breaker contacts separate .020 inch. When the condition of the points affects the ignition, resurface with a fine flat jeweler's file or worn No. 00 sandpaper.

Oiling.—Screw up the grease cup under the breaker head one-half turn every two weeks. If the car is driven more than 500 miles in two weeks, this must be done every 500 miles. Put 3 or 4 drops of light engine oil in the wick in the breaker lever spindle every six months.

Timing.—Breaker contacts begin to separate when the flywheel marking "AD-SP" is at the indicator, spark control lever and breaker assembly in the fully advanced position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .025 to .028 inch.

STARTER.—Model No. 736-A. Starter is connected to the engine through a chain drive and an overrunning clutch. Brush tension is 16-20 ounces. Running freely, starter takes 75 amperes at 5 volts, armature revolving approximately 900 R.P.M. Lock torque is 55 pound-feet, current being 600 amperes at 3 volts.

Oiling:—Put 4 or 5 drops of light engine oil in each starter oiler every 1000 miles Once each year remove the grease plug in the reduction gear case and repack with graphite cup grease. Every three months oil the starter clutch in the sprocket on the engine crankshaft with light engine oil through the oil hole on the forward side.

GENERATOR.—Model No. 917-E. Generator current regulation is by the third brush system. The direction of rotation is counter-clockwise, looking at the commutator end. A thermostat in the shunt field circuit cuts in a resitance that lowers the generator output approximately 50%.

Generator Data

Cold			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	Cut in	675			
7	7.1	850	6-9		1450
18-20	8.3-8.8	1800	11	8.2	1900
17-10		2500			

The brush tension is 14-18 ounces. The field draws 4.85 amperes at 6 volts. Charging rate is varied by adjusting the third brush setting. Move the third brush in the direction of armature rotation to increase the charging rate, and against the direction of rotation to decrease the charging rate. Reseat the brush after position adjustment.

Oiling:—Put 4 or 5 drops of light engine oil in each generator oiler every 1000 miles.

RELAY.—Model 263-F. Relay is mounted on the dash. Relay contacts close at 8-10 M.P.H. with a generator voltage of 7.2 volts and open at 6-8 M.P.H. with a discharge current of 0-2.5 volts. Contacts separate .014 inch. Air gap between relay armature and coil core is .014 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well-worn No. 00 sandpaper. Remove all grit and adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dash, tail and tonneau lamps are 6-8 volt, 2 cp. Side lamps are 6-8 volts, 4 cp.

FUSES.—The fuses are 10 amperes

STUDEBAKER

LIGHT SIX MODEL EJ (1922), EM (1923-24)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY:—Willard, Type SJRN-3. 6 volt, 90 ampere hour. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 18 hours.

IGNITION:—Coil Model 284-A. Distributor Model 626-A. Breaker contacts separate .020-.024 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine flat jeweler's file. Distributor is semi-automatic. Maximum manual advance is 15 degrees. Maximum automatic advance is 20 degrees. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

Mounting:—Distributor is mounted on accessory bracket at right of engine. To remove distributor, disconnect manual advance rod and primary lead and remove head with high tension cables intact. Then loosen clamp screw and lift distributor from place.

Oiling:—Screw up the grease cup under the breaker head one-half turn every two weeks. If the car is driven more than 500 miles in two weeks, this must be done every 500 miles. Put 3 or 4 drops of light engine oil in the wick in the breaker lever spindle every six months.

Timing:—Breaker contacts begin to separate when piston No. 1 reaches a position near top dead center on the compression stroke when the flywheel mark "MA-AD-SP" is opposite the indicator on the flywheel case with the manual advance lever in the fully advanced position. To set timing, crank engine over until engine reaches firing position. Then loosen locknut on breaker cam, pry cam upward and rotate until contacts begin to open. Reseat the cam and tighten the locknut. Connect the segment opposite the rotor to the spark plug in cylinder No. 1 and connect the remaining plugs in order 4-2-6-3-5 clockwise around the distributor head.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Model No. 720-C. The starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension is 20-28 ounces.

Starter Test Data

Torque	Volts	Amperes	R.P.M.
0 lb. ft.	5	65	6000
15 lb. ft.	3.15	570	Lock

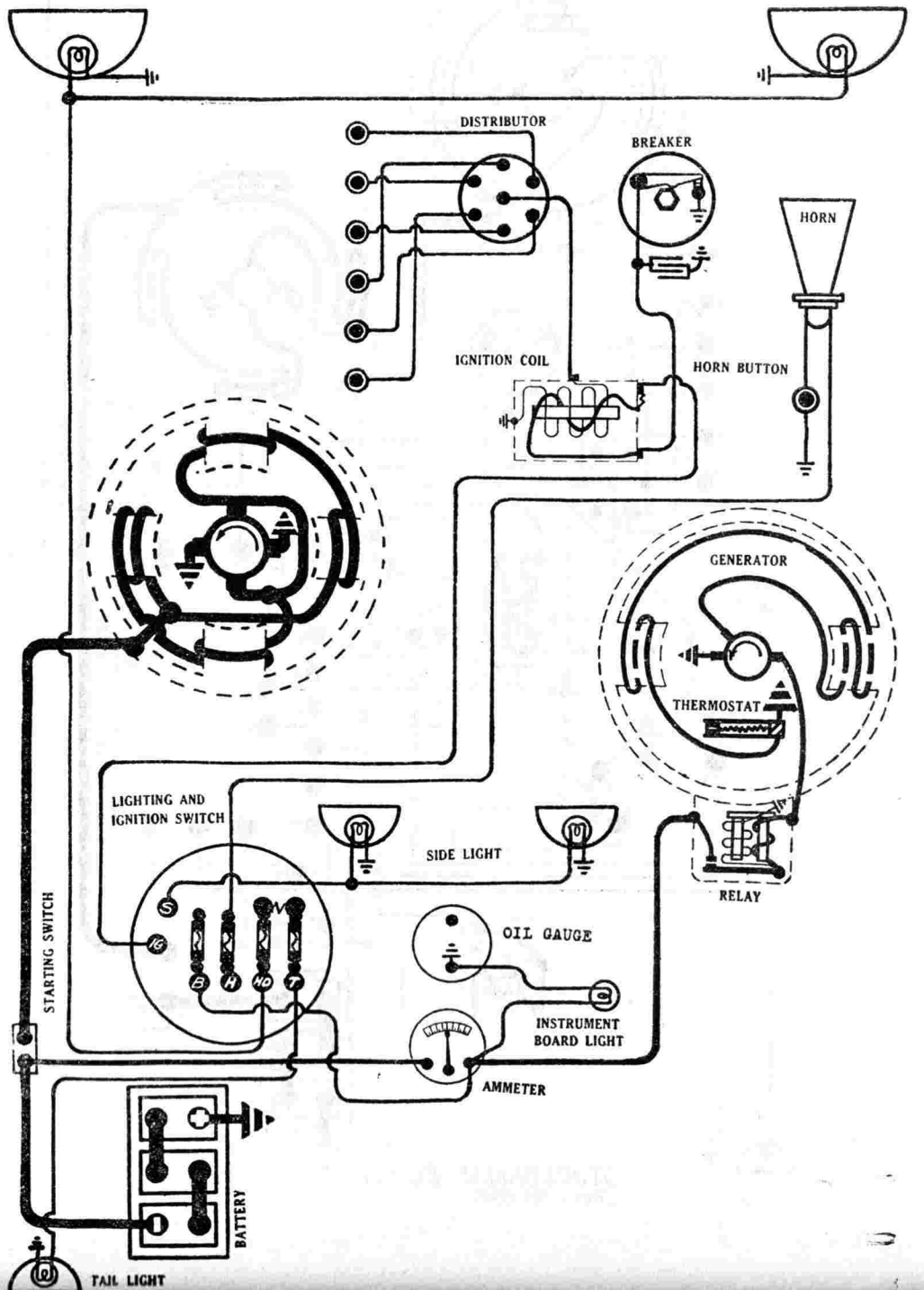
Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove three flange mounting capscrews. Then slide starter forward and lift from place.

Oiling:—Put 5 or 6 drops of light engine oil in starter oilers every month. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

GENERATOR:—Model 917-A. Generator current regulation is by the third brush system. Thermostat opens at 195° to 200° F., cutting down the maximum charging rate to 11 amperes. The direction of rotation is counter-clockwise, looking at the commutator end.

Generator Data

	Cold Test			Hot Test	
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7.1	850	6-9	——	1450
18-20	8.3-8.8	1800	11	8.2	1900
17-10	——	2500			



STUDEBAKER

LIGHT SIX MODEL EJ (1922), EM (1923-24)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

The brush tension is 14-18 ounces. The field draws 4.85 amperes at 6 volts. Charging rate is varied by adjusting the third brush setting. Move the third brush in the direction of armature rotation to increase the charging rate, and against the direction of rotation to decrease the charging rate. Reseat the brush after position adjustment.

Mounting:—Generator is flange mounted on rear of accessory bracket at right of engine. To remove generator, disconnect lead and remove flange mounting bolts. Then slide generator to rear and lift from place.

Oiling:—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every month. If the car is driven more than 1000 miles in a month, this oiling must be done every 1000 miles.

RELAY:—Model No. 264-B. Relay closes at 8-10 miles per hour, and opens at 6-8 miles per hour. Air gaps between relay armature and coil core is .012 to .015 inch, contact points closed. Contact opens .012 to .015 inch. Adjust spring tension by bending brass strip through which spring passes. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS:—Head lamps are 6-8 volt, 21 cp. S.C. Dash, tail and side lamps are each 6-8 volt, 2 cp. S.C. Dome, stop and corner lamps are each 6-8 volt, 4 cp. S.C.

FUSES:—Fuses are 10 ampere.

STUDEBAKER

BIG SIX AND SPECIAL SIX
MODELS EK AND EL (1922-23-24)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY:—Willard, Type SJR-4. 6 volts, 111 ampere hour. The positive (+) is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours.

IGNITION:—Coil Model No. 284-A. Distributor Model No. 626-F. The breaker contacts separate .020-.025 inch with breaker arm on lobe of cam. When the condition of the contacts affects the ignition, resurface with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Maximum manual advance is 15 degrees. Maximum automatic advance is 20 degrees.

Mounting:—Distributor is mounted at front of engine. To remove distributor, disconnect manual advance rod and primary lead and remove head with high tension cables attached. Then take out advance arm clamp screw and lift distributor from place.

Oiling:—Screw up the grease cup under the breaker head one-half turn every two weeks. If the car is driven more than 500 miles in two weeks, this must be done every 500 miles. Put 3 or 4 drops of light engine oil in the wick in the breaker lever spindle every six months.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual advance lever in the fully retarded position. To set timing, crank engine until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Fully retard spark lever and continue to crank engine until piston reaches top dead center when the flywheel mark "UP-DC-1-6" will be opposite the indicator on the flywheel case. Loosen the locknut on the breaker cam, pry cam upward and rotate until contacts begin to open. Reseat the cam and tighten the locknut. Connect the segment opposite the rotor to the spark plug in cylinder No. 1 and connect the remaining plugs in order 5-3-6-2-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Model 736-A (1922), 723-A (1923-24). Starter is connected to the engine through a chain and sprocket drive to the forward end of the crankshaft. There is an overrunning clutch in the flywheel sprocket to prevent the engine driving the starter. The direction of rotation is clockwise, looking at the commutator end.

Starter Data

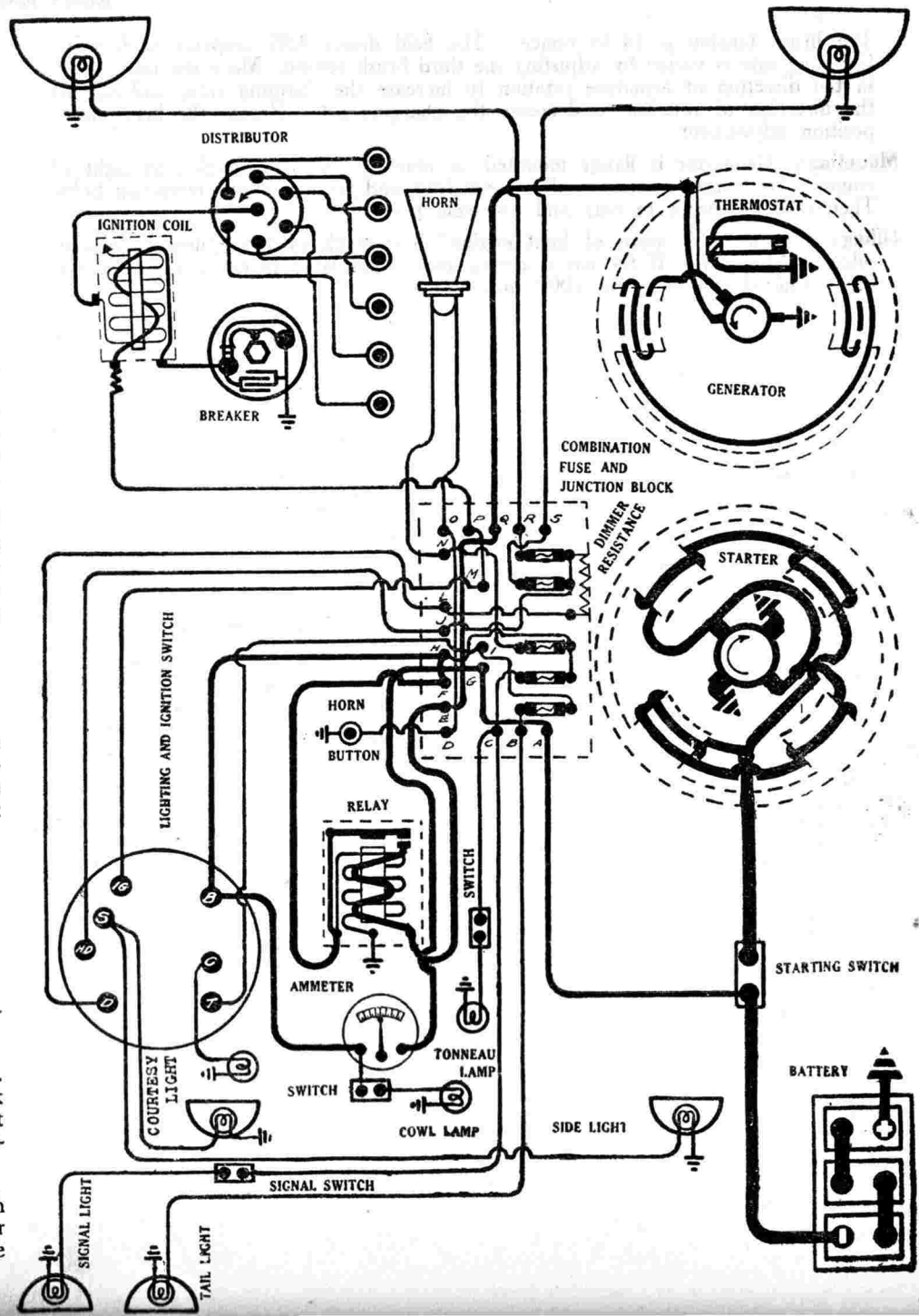
Torque	Volts	Amperes	R.P.M.
0 lb. ft.	5	70	1000
70 "	3.25	600	Lock

The starter brush pressure should be 20-28 ounces each.

Mounting:—Starter is mounted at forward end of engine on the right side. Mounting is by special bracket.

Oiling:—Put 4 or 5 drops of light engine oil in each starter oiler every 1000 miles. Once each year remove the grease plug in the reduction gear case and repack with graphite cup grease. Every three months oil the starter clutch in the sprocket on the engine crankshaft with light engine oil through the oil hole on the forward side.

GENERATOR:—Model No. 917-E. Generator current regulation is by the third brush system. The direction of rotation is counter-clockwise, looking at the commutator end. A thermostat in the shunt field circuit cuts in a resistance that lowers the generator output approximately 50%.



STUDEBAKER

BIG SIX AND SPECIAL SIX
MODELS EK AND EL (1922-23-24)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

Generator Data

Cold			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	Cut in	675	6-9	——	1450
7	7.1	850	11	8.2	1900
18-20	8.3-8.8	1800			
17-10	——	2500			

The brush tension is 14-18 ounces. The field draws 4.85 amperes at 6 volts. Charging rate is varied by adjusting the third brush setting. Move the third brush in the direction of armature rotation to increase the charging rate, and against the direction of rotation to decrease the charging rate. Reseat the brush after position adjustment.

Mounting:—Generator is mounted vertically at the front of the engine and can be removed from the right side. To remove generator, disconnect lead and remove three flange mounting cap screws. Then lift generator straight up to disengage coupling.

Oiling:—Put 4 or 5 drops of light engine oil in each generator oiler every 1000 miles.

RELAY:—Model 263-F. Relay is mounted on the dash. Relay contacts close at 8-10 M.P.H. with a generator voltage of 7.2 volts and open at 6-8 M.P.H. with a discharge current of 0-2.5 amperes. Contacts separate. 014 inch. Air gap between relay armature and coil core is .014 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well-worn No. 00 sandpaper. Remove all grit and adjust before again putting into service.

LAMPS:—Head lamps are 6-8 volt, 21 cp. S.C. Dash, tail and side lamps are each 6-8 volt, 2 cp. S.C. Tonneau, stop and dome lamps are each 6-8 volt, 4 cp. S.C.

FUSES:—Fuses are 10 amperes.

STUDEBAKER

MODEL ER (1925-26), STANDARD SIX
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Willard, Type SJRR-3. 6 volt, 90 ampere hour. The starting capacity is 105 amperes for 20 minutes. The lighting capacity is 5 amperes for 18 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model 284-S. Distributor Model 626-K. Breaker contacts separate .020-.025 inch. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone. The distributor is of the full automatic type. Automatic advance is 25°.

Mounting:—Distributor is mounted at right of engine.

Oiling:—Screw up the grease cup under the breaker head one-half turn every two weeks. If the car is driven more than 500 miles in two weeks, this must be done every 500 miles. Put 3 or 4 drops of light engine oil in the wick in the breaker lever spindle every six months.

Timing:—Breaker contacts begin to separate when the flywheel marking "UP-DC-1-6" is at the indicator on the flywheel housing with the breaker assembly in the fully retarded position. To adjust timing, loosen the nut on top of the breaker cam and pry up the cam with a screw driver. Then rotate the cam in a counter-clockwise direction until the contacts begin to separate. Tighten the nut. A fine adjustment can be made by loosening the screw on the breaker plate and rotating the plate, a graduated scale being provided to gauge the movement. Tighten the screw after making the adjustment.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Model No. 720-M. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The starter brush pressure should be 20-28 ounces each.

Starter Data

Torque	Volts	Amperes	R.P.M.
0 lb. ft.	5	65	6000
15 "	3.15	570	Lock

Mounting:—Starter is mounted at left of engine. To remove starter remove three flange mounting screws and withdraw starter from position.

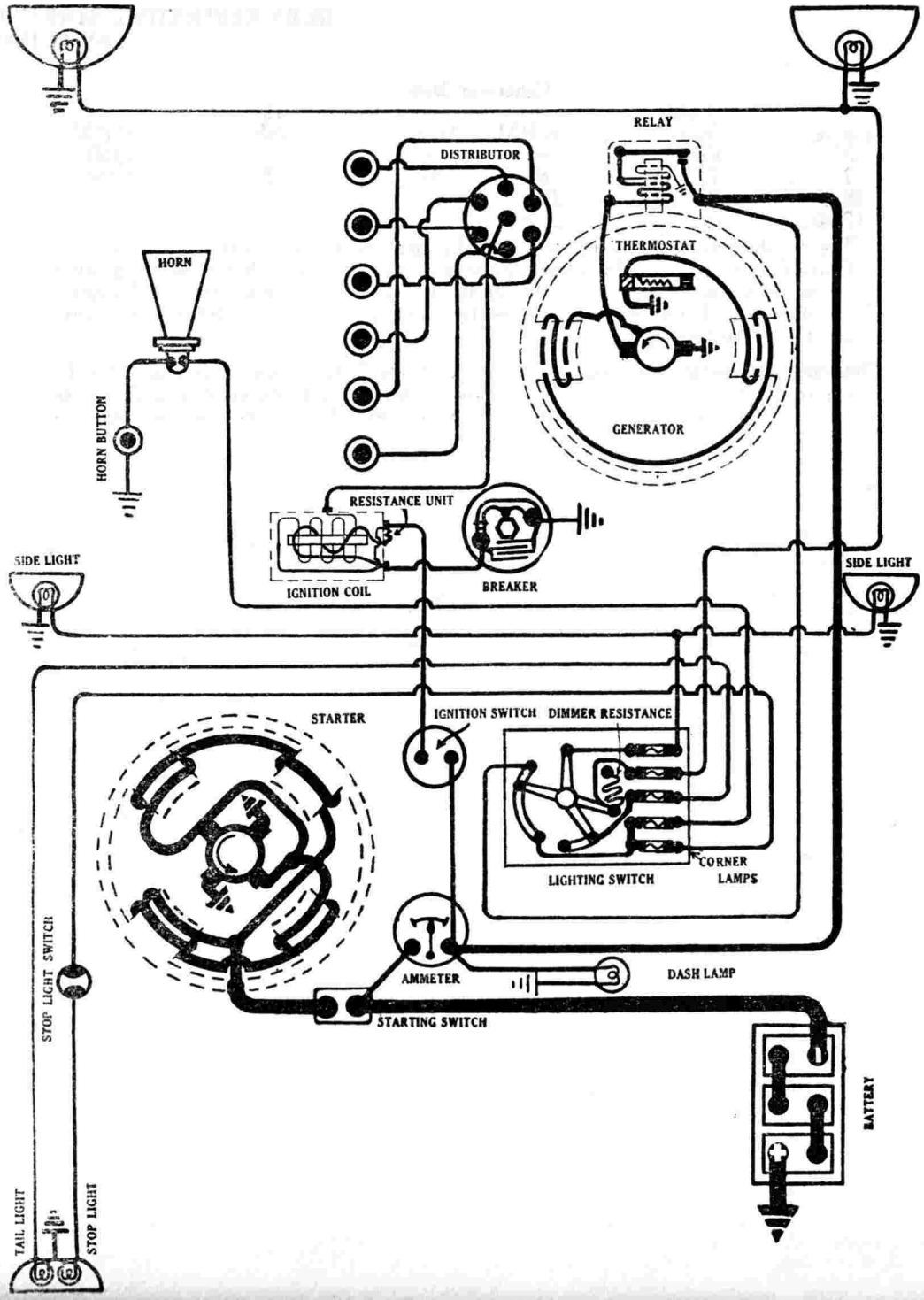
Oiling:—Put 5 or 6 drops of light engine oil in starter oilers every month. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

GENERATOR:—Model 917-A. Generator current regulation is by the third brush system. Thermostat opens at 195° to 200° F., cutting down the maximum charging rate to 11 amperes. The direction of rotation is counter-clockwise, looking at the commutator end.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7.1	850	6-9	——	1450
18-20	8.3-8.8	1800	11	8.2	1900
17-10	——	2500			

The brush tension is 14-18 ounces. The field draws 4.85 amperes at 6 volts. Charging rate is varied by adjusting the third brush setting. Move the third brush in the direction of the armature rotation to increase the charging rate, and against the direction of rotation to decrease the charging rate. Reseat the brush after position adjustment.



STUDEBAKER

MODEL ER (1925-26), STANDARD SIX
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

Mounting:—Generator is mounted at right of engine. To remove generator, remove three flange mounting screws and slide generator from position.

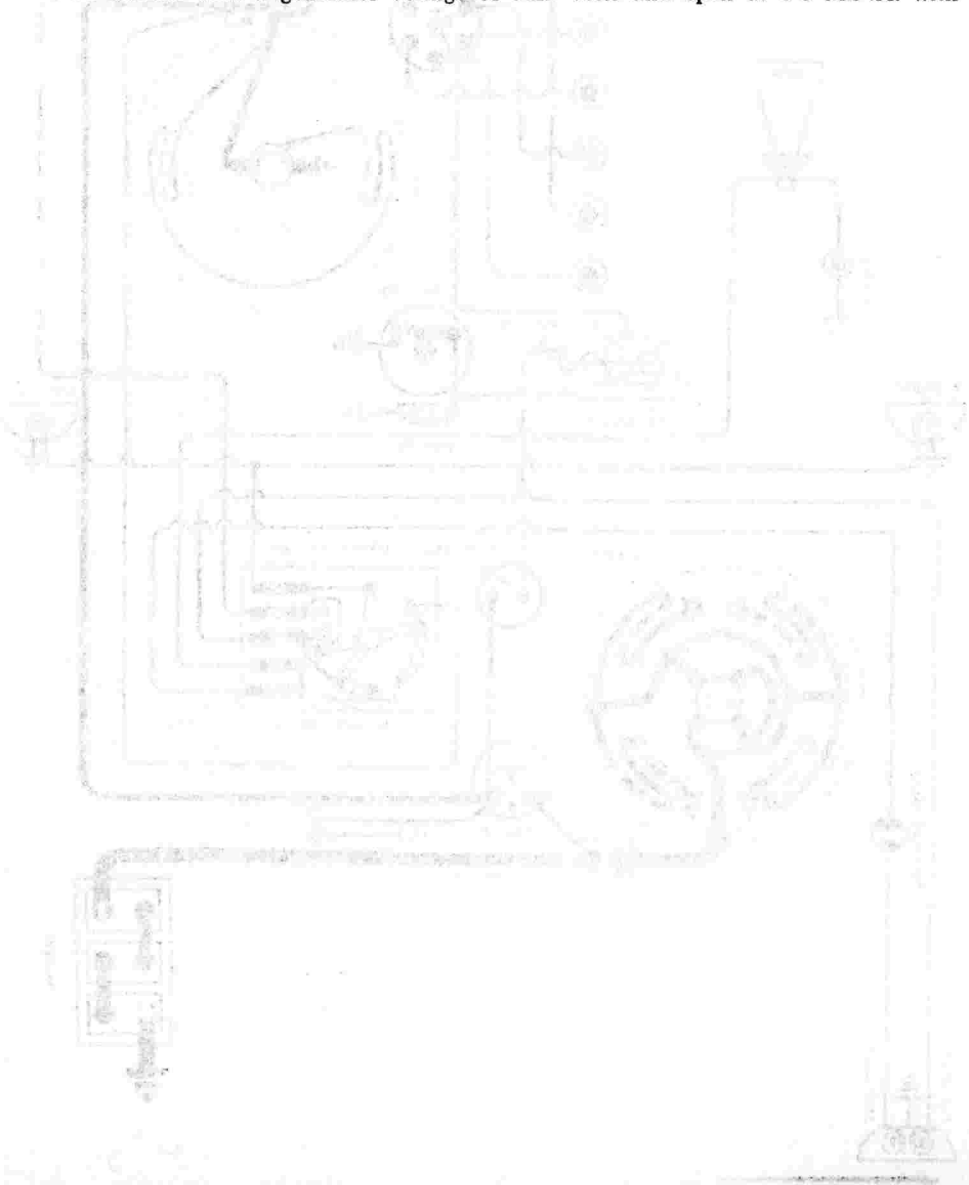
Oiling:—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every month. If the car is driven more than 1000 miles in a month, this oiling must be done every 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 8-10 M.P.H. with a generator voltage of 7.25 volts and open at 6-8 M.P.H. with a discharge current of 0-2.5 amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LAMPS:—Head lamps are 6-8 volt, 21 cp. S.C. Dash, tail and side lamps are each 6-8 volt, 2 cp. S.C. Dome, stop and corner lamps are each 6-8 volt, 4 cp. S.C.

Switches:—Starting switch is Model 406-B. Ignition switch is Model 440-A. Lighting switch is Model 420-A.

FUSES:—Fuses are 10 ampere.



STUDEBAKER

MODEL ER (1925-26) STANDARD SIX
WAGNER GENERATING, STARTING AND LIGHTING SYSTEM
WAGNER IGNITION

BATTERY:—Willard, Type SJRR-3. 6 volt, 90 ampere hour. The positive (+) terminal is grounded.

IGNITION:—Coil Model K-789. Distributor Model K-815. The breaker contacts separate .020-.025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone or with a fine flat jeweler's file.

Mounting:—Distributor is mounted at the right of the engine.

Oiling:—Put 4 or 5 drops of light engine oil in each of the oilers on the side of the distributor housing. Lift the spring arm on top of the breaker arm pivot and put 2 or 3 drops of light engine oil on the wick exposed. Remove the rotor and put several drops of oil in the oiler in the center of the breaker cam. These attentions must be given every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing:—Breaker contacts begin to separate when the mark on the flywheel "UP-DC-1-6" is opposite the pointer on the right side of the flywheel housing, with the breaker assembly in the fully retarded position. To set timing, loosen screw in center of breaker cam and shift cam until the contacts begin to separate. Then tighten the screw. Provision is made for accurate setting by loosening the screw on the breaker plate and rotating the plate. A graduated scale is provided to gauge the setting. Tighten the screw after making the adjustment.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Model No. S-533. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The starter brush pressure should be 1000 grams each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5500	5.85	65
16 "	Lock	3.2	530

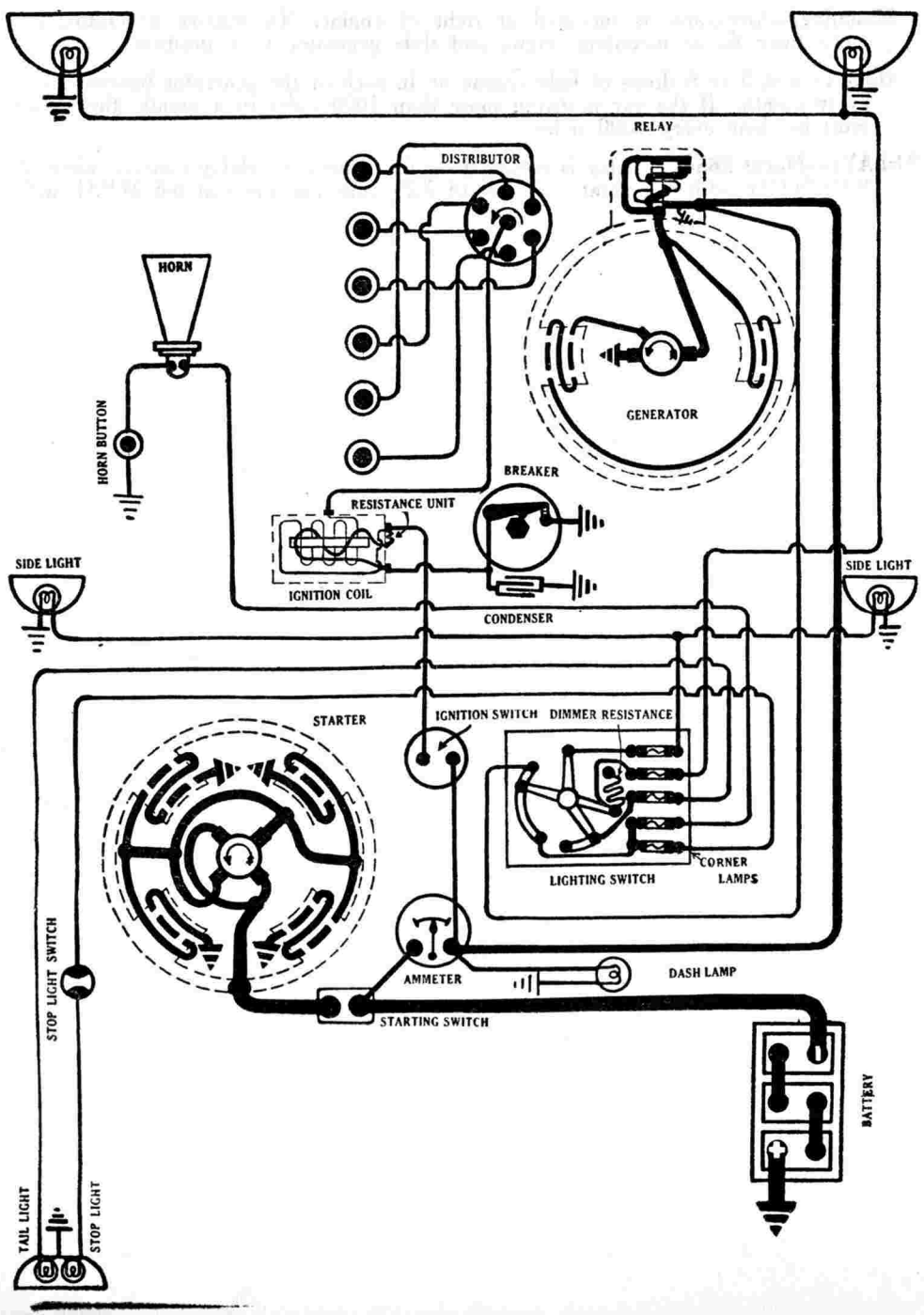
Mounting:—Starter is mounted at left of engine and is flange mounted. To remove starter, remove three flange mounting screws and slide starter to front. Then lift from position.

Oiling:—Put 4 or 5 drops of light engine oil in the bearing oiler on the commutator end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR:—Model No. S-509. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. The third brush mounting plate is held in position by a screw in the generator end plate. To adjust the charging rate, shift the third brush in the direction of generator rotation to increase the charging rate and in the opposite direction to decrease the charging rate. The maximum output is 15 amperes reached at 1500 R.P.M. of the generator armature.

Generator Data

Amperes	Volts	R.P.M.
0	7.2	580
10	7.75	1000
15	8.1	1500
8.5	7.68	3000



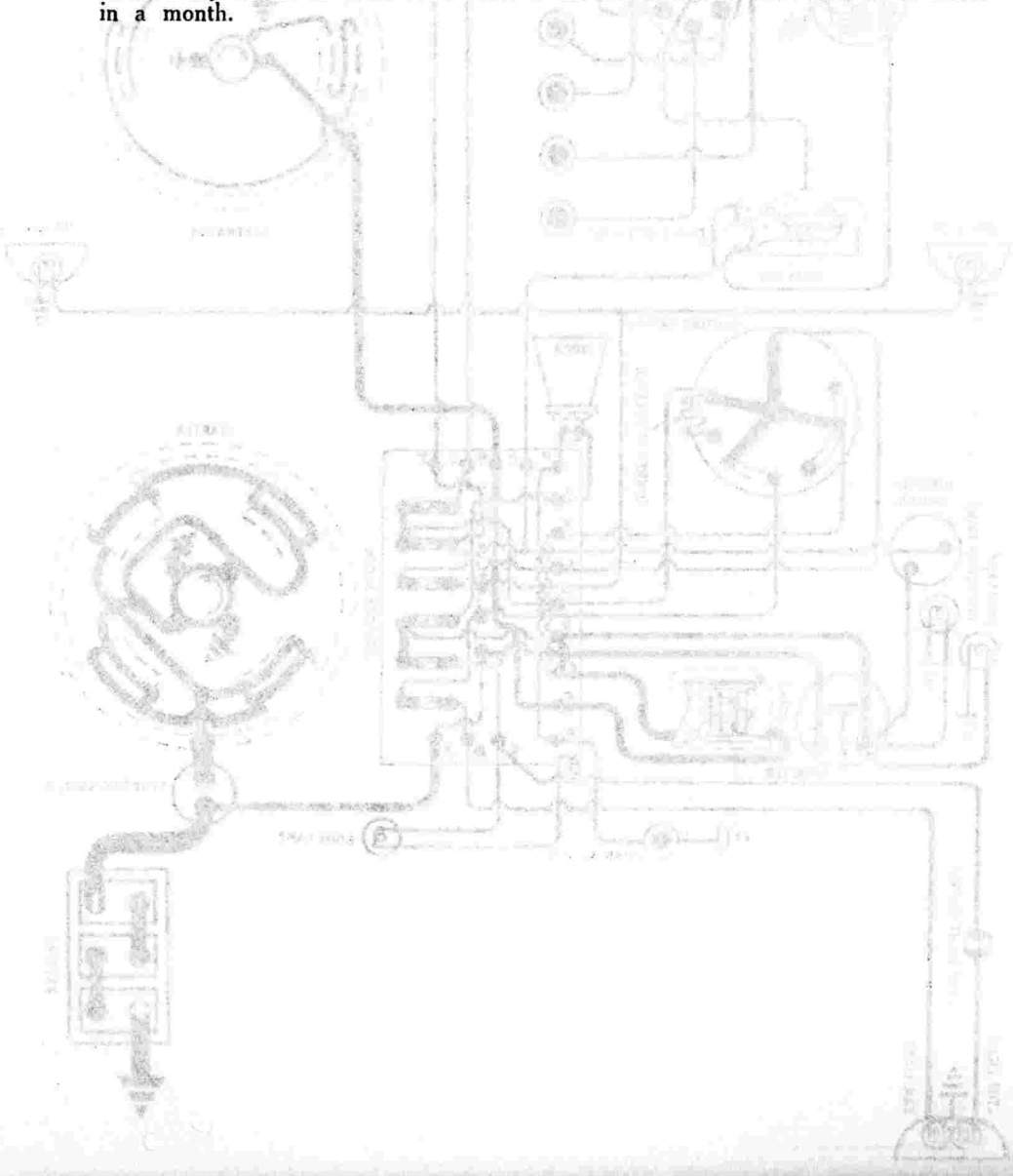
STUDEBAKER

MODEL ER (1925-26) STANDARD SIX
WAGNER GENERATING, STARTING AND LIGHTING SYSTEM
WAGNER IGNITION

Operating freely as a motor, generator makes 300 R.P.M. taking 5 amperes at 6 volts. The brush pressure should be 550 grams each.

Mounting:—Generator is mounted at right of engine by a flange mounting. To remove generator, remove three flange mounting screws and slide generator from position.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.



RELAY:—Model No. K-44. Relay contacts close at 580 R.P.M. with a generator voltage of 7.2 volts and open with a discharge current of 0-4 amperes. The contacts separate .035 inch. The air gap between the relay armature and coil core is .025 inch, contacts closed.

LIGHTING:—Lighting Switch Model 420-A. Head lamps are 6-8 volt, 21 cp.S.C. Dash, and tail lamps are 6-8 volt, 3 cp.S.C. Dome, stop, side and corner lamps are 6-8 volt, 4 cp.S.C.

FUSES:—Fuses are 10 ampere.

BIG SIX AND SPECIAL SIX, MODELS EP AND EQ (1925-26)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Willard, Type SJRR-4. 6 volt, 120 ampere hour. The starting capacity is 125 amperes for 20 minutes. Lighting capacity is 5 amperes for 22 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model No. 284-S. Distributor Model No. 626-L. Breaker contacts separate .020-.025 inch. When the condition of the contacts affects the ignition, resurface with a fine flat jeweler's file or on a medium hard oilstone. Distributor is of the full automatic type. Automatic advance is 24°.

Mounting:—Distributor is mounted at front of engine.

Oiling:—Screw up the grease cup under the breaker head one-half turn every two weeks. If the car is driven more than 500 miles in two weeks, this must be done every 500 miles. Put 3 or 4 drops of light engine oil in the wick in the breaker lever spindle every six months.

Timing:—Breaker contacts begin to separate when flywheel marking "UP-DC-1-6" is at the indicator on the flywheel housing with the breaker assembly in the fully retarded position. To set timing, loosen the nut on the top of the breaker cam and rotate the cam in a counter-clockwise direction until the contacts begin to open. Then tighten the nut. For close setting loosen the screw on the breaker mounting plate and rotate the plate. A graduated scale is provided for accurate movement. Tighten the screw after making the adjustment.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Model No. 723-A. Starter is connected to the engine through a chain drive and an over-running clutch. The direction of rotation is clockwise, looking at the commutator end.

Starter Data

Torque	Volts	Amperes	R.P.M.
0 lb. ft.	5	70	1000
70 "	3.25	600	Lock

The starter brush pressure should be 20-28 ounces each.

Mounting:—Starter is mounted at right front of engine and drives through a chain and sprocket drive and over-running clutch to the forward end of the crankshaft. Mounting is by special bracket to the engine block.

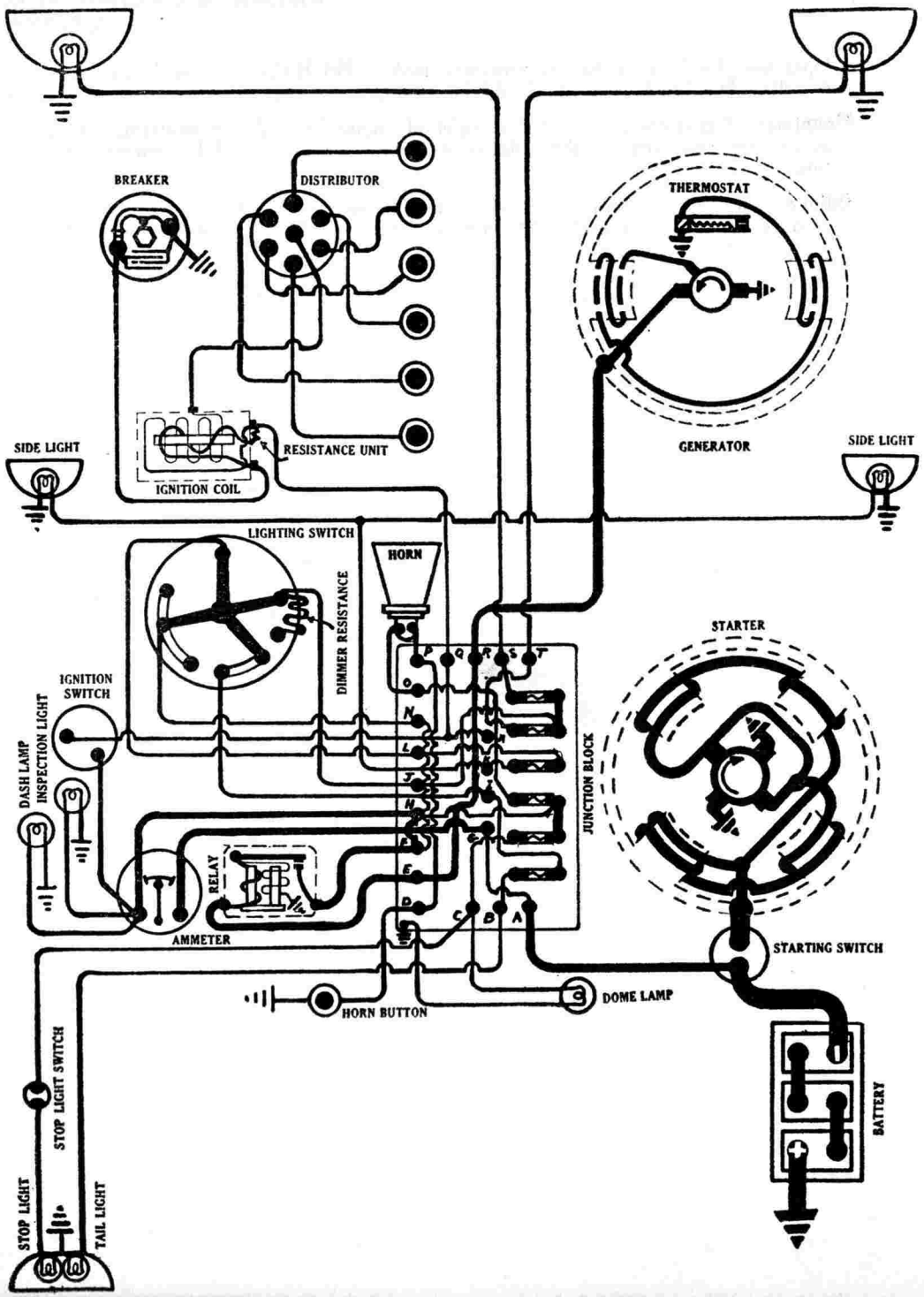
Oiling:—Put 4 or 5 drops of light engine oil in each starter oiler every 1000 miles. Once each year remove the grease plug in the reduction gear case and repack with graphite cup grease. Every three months oil the starter clutch in the sprocket on the engine crankshaft with light engine oil through the oil hole on the forward side.

GENERATOR:—Model No. 917-E. Generator current regulation is by the third brush system. The direction of rotation is counter-clockwise, looking at the commutator end. A thermostat in the shunt field circuit cuts in a resistance that lowers the generator output approximately 50%.

Generator Data

Cold			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	Cut in	675	6-9	——	1450
7	7.1	850	11	8.2	1900
18-20	8.3-8.8	1800			
17-10	——	2500			

The brush tension is 14-18 ounces. The field draws 4.85 amperes at 6 volts.



Charging rate is varied by adjusting the third brush setting. Move the third brush in the direction of armature rotation to increase the charging rate, and against the direction of rotation to decrease the charging rate. Reseat the brush after position adjustment.

Mounting:—Generator is vertically mounted at right front of engine. To remove generator, remove three flange mounting screws and lift unit from place.

Oiling:—Put 4 or 5 drops of light engine oil in each generator oiler every 1000 miles.

RELAY:—Model 263-F. Relay is mounted on the dash. Relay contacts close at 8-10 M.P.H. with a generator voltage of 7.2 volts and open at 6-8 M.P.H. with a discharge current of 0-2.5 amperes. Contacts separate .014 inch. Air gap between relay armature and coil core is .014 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit and adjust before again putting into service.

LAMPS:—Head lamps are 6-8 volt, 21 cp. S.C. Dash, tail and side lamps are each 6-8 volt, 2 cp. S.C. Tonneau, stop and dome lamps are each 6-8 volt, 4 cp. S.C.

Switches:—Starting switch is Model 406-B. Ignition switch is Model 440-A. Lighting switch is Model 420-B.

FUSES:—The fuses are 10 ampers.

STUDEBAKER

MODELS EP AND EQ (1925-26) BIG AND SPECIAL SIXES
WAGNER GENERATING, STARTING AND LIGHTING SYSTEM
WAGNER IGNITION

BATTERY:—Willard, Type SJRR-4. 6 volt, 120 ampere hour. The starting capacity is 125 amperes for 20 minutes. The lighting capacity is 5 amperes for 22 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model No. K-789. ..Distributor Model No. K-814. Breaker contacts separate .020-.025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone or with a fine, flat jeweler's file.

Mounting:—Distributor is mounted at front of engine.

Oiling:—Fill the oilers on the side of the distributor housing with light engine oil. Remove the rotor and put several drops of oil in the oil hole in the center of the breaker cam. Lift the spring arm on the breaker arm pivot and put 2 or 3 drops of oil on the wick oiler exposed. This oiling must be done every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing:—Breaker contacts begin to separate when the flywheel marking "UP-DC-1-6" is opposite the indicator on the left side of the flywheel housing with the breaker assembly in the fully retarded position. To set timing, loosen the screw in the center of the breaker cam and rotate the cam in a counter-clockwise direction until the contacts begin to separate. Then tighten the screw. For close setting, loosen the screw on the breaker mounting plate and rotate the plate. A graduated scale is provided for accurate movement. Tighten the screw after making the adjustment.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Model No. S-503. Starter is mounted at front of the engine and is connected to the crankshaft through a sprocket and chain. An over-running clutch is provided to prevent the engine driving the starter. The direction of rotation is clockwise, looking at the commutator end.

Starter Data

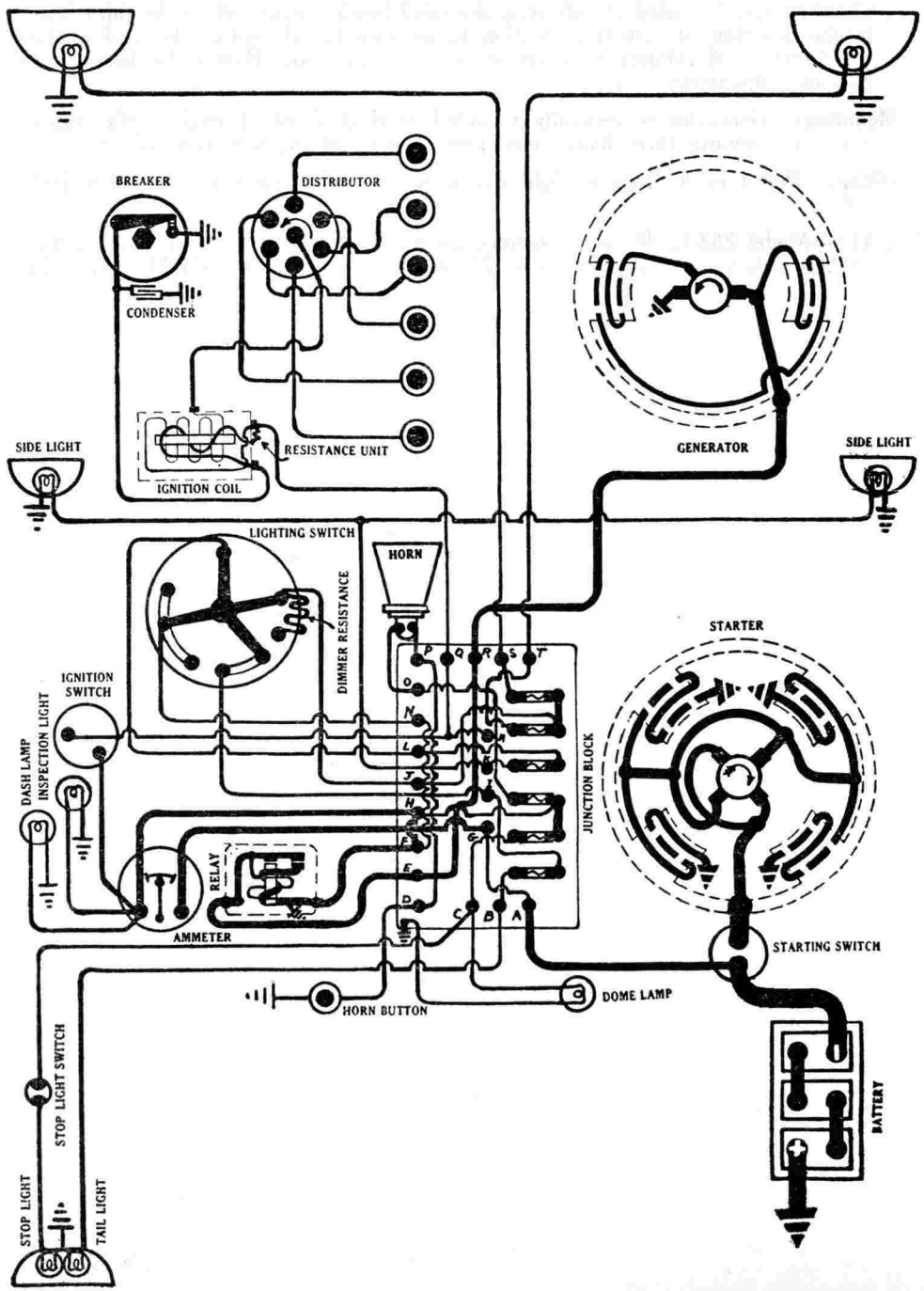
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	1000	5.8	67
75 "	Lock	3.2	530

The starter brush pressure should be 1000 grams each.

Mounting:—Starter is mounted at right front of engine and drives to the forward end of the crankshaft. Mounting is by a special bracket to the engine block.

Oiling:—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month. Once every three months lubricate the starter clutch with light engine oil applying through the oiler provided. Remove the grease plug in the reduction gear case and repack the gears with graphite grease once each year.

GENERATOR:—Model No. S-508. The direction of rotation is counter-clockwise, looking at the commutator end. The generator is mounted vertically at the forward end of the engine. Current regulation is by the third brush system. The third brush mounting plate is held in position by a screw in the generator end plate. To increase the charging rate, move the third brush in the direction of generator rotation and in the opposite direction to decrease the charging rate.



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STUDEBAKER

MODELS EP AND EQ (1925-26) BIG AND SPECIAL SIXES
WAGNER GENERATING, STARTING AND LIGHTING SYSTEM
WAGNER IGNITION

Generator Data

Amperes	Volts	R.P.M.
0	7.2	580
10	7.25	1000
16	8.1	1500
8.5	7.65	3000

Operating freely as a motor, generator makes 300 R.P.M. taking 5 amperes at 6 volts. The brush pressure should be 550 grams each.

Mounting:—Generator is vertically mounted at right front of engine. To remove generator, remove three flange mounting screws and lift unit from position.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY:—Model K-44. Relay contacts close at 580 R.P.M. with a generator voltage of 7.2 volts and open with a discharge current of 0-4 amperes. Contacts separate .035 inch. The air gap between the relay armature and coil core is .025 inch, contacts closed.

LIGHTING:—Lighting Switch Model 420-B. Head lamps are 6-8 volt, 21 cp.S.C. Tail and dash lamps are 6-8 volt, 3 cp.S.C. Tonneau, stop, side and dome lamps are each 6-8 volt, 4 cp.S.C.

FUSES:—Fuses are 10 ampere.

STUDEBAKER

MODEL ER (1926)
MODEL EU STANDARD SIX (1926-27), SERIAL NOS. 1346001 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type SJRR-3, 6 volt, 90 ampere hour. The positive (+) terminal is grounded.

IGNITION:—Coil Model 284-S. Distributor Model 626-K. Breaker contacts separate **.020-.025 inch. When the condition of the contacts affects the ignition, remove and** resurface on a medium hard oilstone. The distributor is of the full automatic type. Automatic advance is 25°.

Mounting.—Distributor is mounted at right of engine.

Oiling.—Screw up the grease cup under the breaker head one-half turn every two weeks. If the car is driven more than 500 miles in two weeks, this must be done every 500 miles. Put 3 or 4 drops of light engine oil in the wick in the breaker lever spindle every six months.

Timing:—Breaker contacts begin to separate when the flywheel marking UP-DC-1-6 is at the indicator on the flywheel housing with the breaker assembly in the fully retarded position. To adjust timing, loosen the nut on top of the breaker cam and pry up the cam with a screw driver. Then rotate the cam in a counter-clockwise direction until the contacts begin to separate. Tighten the nut. A fine adjustment can be made by loosening the screw on the breaker plate and rotating the plate, a graduated scale being provided to gauge the movement. Tighten the screw after making the adjustment.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

Valve Timing:—INLET VALVES:—Head diameter, 1 5/8 inches; tappet clearance, .006 (hot); valve lift, 19/64 inch; intake opens at 5° past top dead center and closes at 35° past lower dead center.

EXHAUST VALVES:—Head diameter, 1 5/8 inch; tappet clearance, .006 inch (hot); valve lift, 19/64 inch; exhaust opens at 40° before lower dead center and closes at 10° past top dead center. Stem guides are removable. No oversize valve stems are made.

STARTER:—Model 720-N. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 24-28 ounces. Starter switch is Model 400-B.

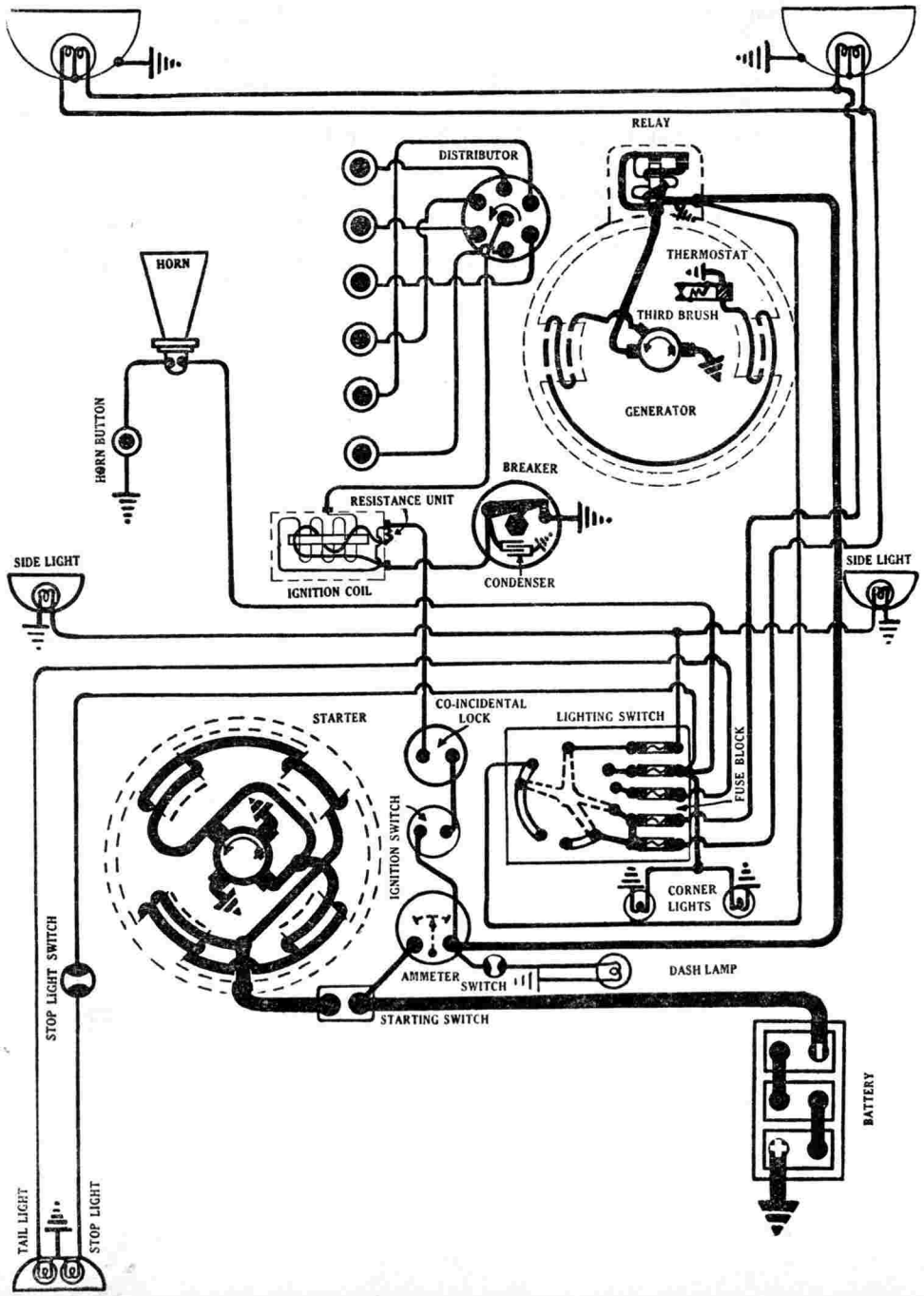
Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 lb. ft.	Lock	3.2	575

Mounting.—Starter is mounted at left of engine. To remove starter remove three flange mounting screws and withdraw starter from position.

Oiling:—Put 4 or 5 drops of light engine oil in the bearing oiler on the commutator end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR:—Model 941-K. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. A thermostat in the shuntfield circuit cuts a resistance into the field at 165°F. reducing the output to 9-12 amperes. To adjust charging rate, loosen the small



round-headed screw on the generator end plate and shift the third brush. Shifting the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. Tighten the screw after making the adjustment.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7.1	750			
19-21	8.35-8.5	1800	9-12	7.35-7.65	1800
10-12		2500			

Shuntfield current is 4 amperes at 6 volts. Generator brush tension should be 14-18 ounces each.

Mounting.—Generator is mounted at right of engine. To remove generator, remove three flange mounting screws and slide generator from position.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY.—Model 265-B. Relay is mounted on the generator. Relay contacts close at 8-10 M.P.H. with a generator voltage of 7.25 volts and open at 6-8 M.P.H. with a discharge current of 0-2.5 amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING:—Head lamps are 6-8 volt, 21 cp. D.C. double filament using second 21 cp. filament for dimming. Side lamps are 6-8 volt, 6 cp. S.C. Dash and tail lamps are each 6-8 volt, 3 cp. S.C. Dome, stop and corner lamps are each 6-8 volt, 4 cp. S.C.

Switches:—Lighting switch mounted on steering column is Model 420-J. Ignition switch is Model 440-A. Starting switch is Model 406-B.

FUSES:—Lighting fuses mounted on back of switch are 10 amperes.

STUDEBAKER

MODEL EU STANDARD SIX (1927), SERIAL NOS. 1346001 UP
WAGNER GENERATING, STARTING AND LIGHTING SYSTEM
WAGNER IGNITION

BATTERY:—Willard, Type SJRR-3. 6 volt, 90 ampere hour. The positive (+) terminal is grounded.

IGNITION:—Coil Model K-789. Distributor Model K-815. The breaker contacts separate .020-.025 inch. **They are made of tungsten. When the condition of the** contacts affects the ignition, remove and resurface on a medium hard oilstone or with a fine, flat jeweler's file.

Mounting.—Distributor is mounted at the right of the engine.

Oiling:—Put 4 or 5 drops of light engine oil in each of the oilers on the side of the distributor housing. Lift the spring arm on top of the breaker arm pivot and put 2 or 3 drops of light engine oil on the felt wick exposed. Remove the rotor and put several drops of oil in the oiler in the center of the breaker cam. These attentions must be given every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing:—Breaker contacts begin to separate when the mark on the flywheel "UP-DC" 1-6" is opposite the pointer on the right side of the flywheel housing, with the breaker assembly in the fully retarded position. To set timing, loosen screw in center of breaker cam and shift cam until the contacts begin to separate. Then tighten the screw. Provision is made for accurate setting by loosening the screw on the breaker plate and rotating the plate. A graduated scale is provided to gauge the setting. Tighten the screw after making the adjustment.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

Valve Timing:—INLET VALVES:—Head diameter, 1 5/8 inches; tappet clearance, .006 (hot); valve lift, 19/64 inch; intake opens at 5° past top dead center and closes at 35° past lower dead center.
EXHAUST VALVES:—Head diameter, 1 5/8 inch; tappet clearance, .006 inch (hot); valve lift, 19/64 inch; exhaust opens at 40° before lower dead center and closes at 10° past top dead center. Stem guides are removable. No oversize valve stems are made.

STARTER:—Model No. S-533. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. The starter brush pressure should be 1000 grams each.

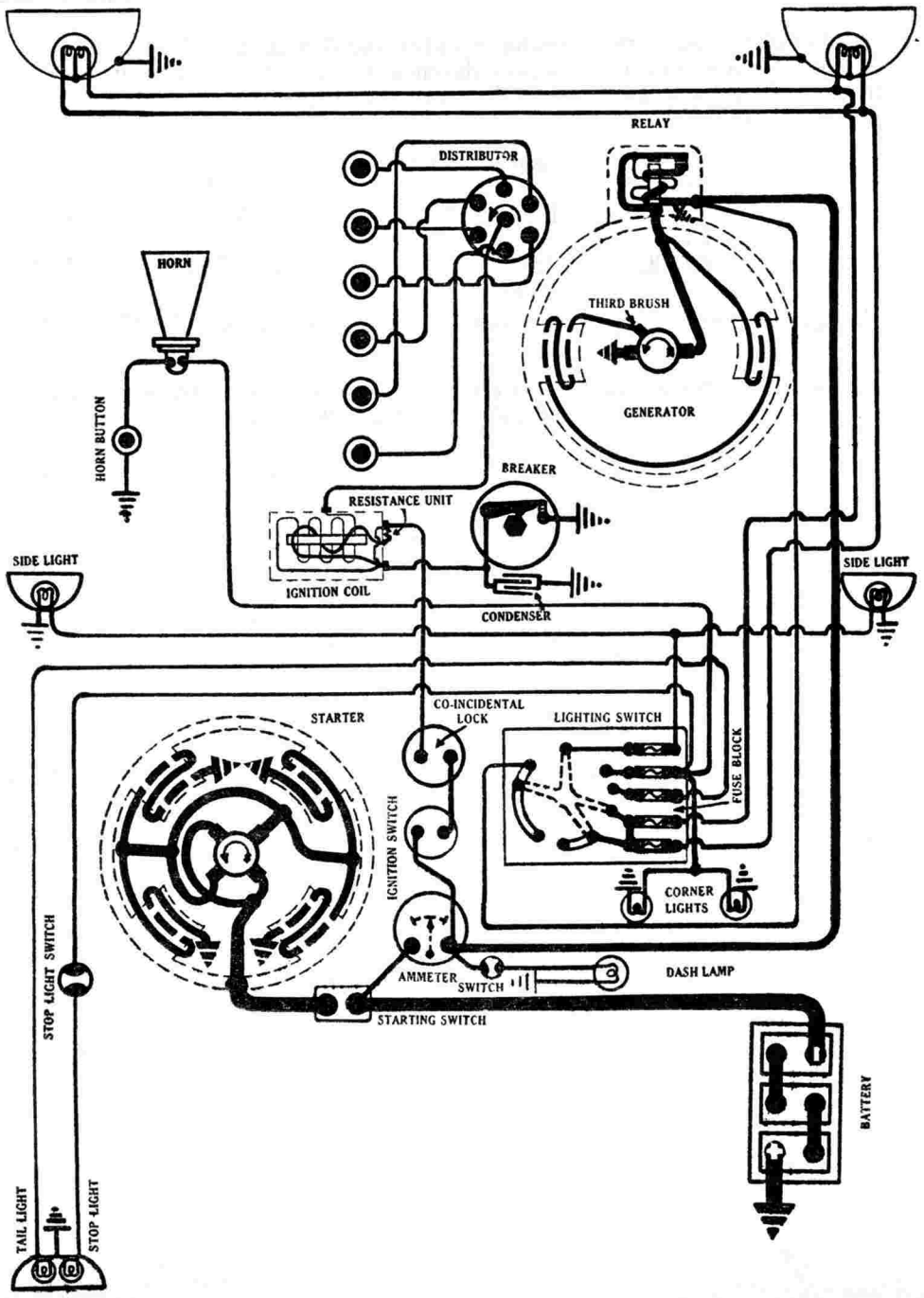
Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5500	5.85	65
16 "	Lock	3.2	530

Mounting.—Starter is mounted at left of engine and is flange mounted. To remove starter, remove three flange mounting screws and slide starter to front. Then lift from position.

Oiling:—Put 4 or 5 drops of light engine oil in the bearing oiler on the commutator end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR:—Model No. S-509. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. The third brush mounting plate is held in position by a screw in the generator end plate. To adjust the charging rate, shift the third brush in the direction of generator rotation to increase the charging rate and in the opposite direction to



decrease the charging rate. The maximum output is 15 amperes reached at 1500 R.P.M. of the generator armature.

Generator Data.

Amperes	Volts	R.P.M.
0	7.2	580
10	7.75	1000
15	8.1	1500
8.5	7.68	3000

Operating freely as a motor, generator makes 300 R.P.M. taking 5 amperes at 6 volts. The brush pressure should be 550 grams each.

Mounting.—Generator is mounted at right of engine by a flange mounting. To remove generator, remove three flange mounting screws and slide generator from position.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY:—Model No. K-44. Relay contacts close at 580 R. P. M. with a generator voltage of 7.2 volts and open with a discharge current of 0-4 amperes. The contacts separate .035 inch. The air gap between the relay armature and coil core is .025 inch, contacts closed.

LIGHTING:—Head lamps are 6-8 volt, 21 cp. D.C. double filament using second 21 cp. filament for dimming. Side lamps are 6-8 volt, 6 cp. S.C. Dash and tail lamps are each 6-8 volt, 3 cp. S.C. Dome, stop, and corner lamps are each 6-8 volt, 4 cp. S.C.

Switches:—Lighting switch mounted on steering column is Model 420-J. Ignition switch is Model 440-A. Starting switch is Model 406-B.

FUSES:—Lighting fuses mounted on back of switch are 10 amperes.



STUDEBAKER

MODELS EP, EQ (1926), ES, EW (1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type SJRR-4. 6 volt, 111 ampere hour. The starting capacity is 125 amperes for 20 minutes. The lighting capacity is 5 amperes for 22 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model 284-S. Distributor Model 626-W. Breaker contacts separate .028 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone. The distributor is of the full automatic type. Maximum automatic advance is 28°. Breaker arm spring tension should be 17.5-20.5 ounces.

Mounting:—Distributor is mounted at front of engine.

Oiling:—Fill the oilers on the side of the distributor housing with light engine oil. Remove the rotor and put several drops of oil in the oil hole in the center of the breaker cam. Lift the spring arm on the breaker arm pivot and put 2 or 3 drops of oil on the wick oiler exposed. This oiling must be done every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing:—Breaker contacts begin to separate when flywheel marking UP-DC-1-6 is at the indicator on the flywheel housing with the breaker assembly in the fully retarded position. To set timing, loosen the nut on the top of the breaker cam and rotate the cam in a counter-clockwise direction until the contacts begin to open. Then tighten the nut. For close setting loosen the screw on the breaker mounting plate and rotate the plate. A graduated scale is provided for accurate movement. Tighten the screw after making the adjustment.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

Valve Timing:—INLET VALVES:—Head diameter, 1 7/8 inch; tappet clearance, .006 (hot); valve lift, 5/16 inch; intake opens 7° 30 minutes past dead center and closes 37° 30 minutes past lower dead center.

EXHAUST VALVES:—Head diameter, 1 7/8 inches; tappet clearance, .006 inch (hot); valve lift, 5/16 inch; exhaust opens at 47° before lower dead center and closes 11° past top dead center.

STARTER:—Model 723-B. Starter is connected to the engine through reduction gears, chain drive and an overrunning clutch. The direction of rotation of the armature is clockwise, looking at the commutator end. Sprocket shaft rotation is clockwise, viewed from drive end. Starter brush tension is 24-28 ounces each. Starter switch is Model 406-A, B.

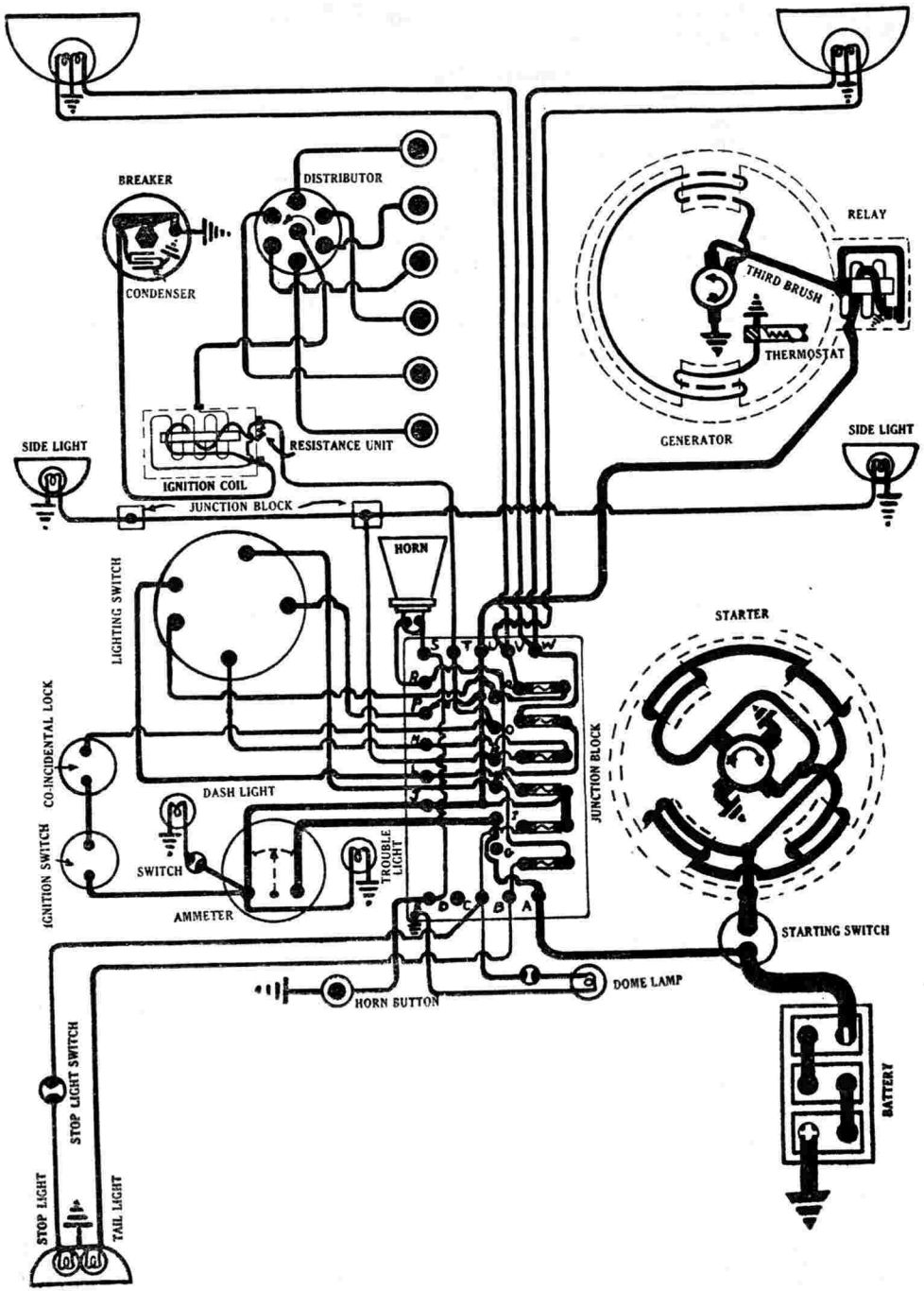
Starter Data.

Torque	Volts	Amperes	R.P.M.
0	5	70	1000
70	3.25	600	Lock

Torque and R.P.M. in each case measured at sprocket shaft.

Mounting.—Starter is mounted at right front of engine and drives through a chain and sprocket drive and overrunning clutch to the forward end of the crankshaft. Mounting is by special bracket to the engine block.

Oiling:—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month. Once every three months lubricate the starter clutch with light engine oil applying through the oiler provided. Remove the grease plug in the reduction gear case and repack the gears with graphite grease once each year.



STUDEBAKER

MODELS EP, EQ (1926), ES, EW (1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

GENERATOR:—Model 941-L. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. A thermostat is located in the shunt field circuit. Thermostat contacts open at 165°F. cutting a resistance into the field circuit and reducing the output to 9-12 amperes. To adjust generator output, loosen the small round-headed screw on the generator end plate and shift the third brush. Shifting the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. Tighten the screw after making the adjustment.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7.1	750			
21	8.5	1450	12	7.6	2000
10-12		2500			

Shuntfield current is 5 amperes at 6 volts. Generator brush spring tension is 14-18 ounces each.

Mounting.—Generator is vertically mounted at right front of engine. To remove generator, remove three flange mounting screws and lift unit from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY:—Model 266-E. Relay is mounted on the dash. Relay closes at 8-10 M.P.H. when the voltage of the generator reaches 7.25 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING:—Head lamps are 6-8 volt, 21-21 cp. double filament using second 21 cp. filament for dimming. Side lamps are 6-8 volt, 6 cp. S.C. Dash and tail lamps are each 6-8 volt, 3 cp. S.C. Tonneau, stop and dome lamps are each 6-8 volt, 4 cp. S.C.

Switches:—Lighting switch mounted on steering column is Model 420-K. Ignition switch is Model 440-A. Starting switch is Model 406-A or B.

FUSES:—Lighting fuses mounted on junction block are 10 amperes.

STUDEBAKER

MODELS ES AND EW (1927)
ES SERIAL NOS. 2102101 UP. EW SERIAL NOS. 4000001 UP
WAGNER GENERATING, STARTING AND LIGHTING SYSTEM
WAGNER IGNITION

BATTERY:—Willard, Type SJRR-4. 6 volt, 111 ampere hour. The starting capacity is 125 amperes for 20 minutes. The lighting capacity is 5 amperes for 22 hours. The positive (+) terminal is grounded.

IGNITION:—Coil Model K-789. Distributor Model K-889. Breaker contacts separate .020-.025 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine, flat contact file. Distributor is of the full automatic type. Automatic advance begins at 400 R.P.M. and reaches a maximum of 25° at 2200 R.P.M. of the engine. The tension of the breaker arm spring should be 325 grams.

Mounting.—Distributor is mounted at front of engine.

Oiling:—Fill the oilers on the side of the distributor housing with light engine oil. Remove the rotor and put several drops of oil in the oil hole in the center of the breaker cam. Lift the spring arm on the breaker arm pivot and put 2 or 3 drops of oil on the wick oiler exposed. This oiling must be done every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing:—Breaker contacts begin to separate when the flywheel marking "UP-DC-1-6" is opposite the indicator on the left side of the flywheel housing with the breaker assembly in the fully retarded position. To set timing, loosen the screw in the center of the breaker cam and rotate the cam in a counter-clockwise direction until the contacts begin to separate. Then tighten the screw. For close setting, loosen the screw on the breaker mounting plate and rotate the plate. A graduated scale is provided for accurate movement. Tighten the screw after making the adjustment.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

Valve Timing:—INLET VALVES:—Head diameter, 1 7/8 inches; tappet clearance, .006 (hot); valve lift, 5/16 inch; intake opens 7° 30 minutes past dead center and closes 37° 30 minutes past lower dead center.

EXHAUST VALVES:—Head diameter, 1 7/8 inches; tappet clearance, .006 inch (hot); valve lift, 5/16 inch; exhaust opens at 47° before lower dead center and closes 11° past top dead center.

STARTER:—Model No. S-503. Starter is mounted at front of the engine and is connected to the crankshaft through a sprocket and chain. An over-running clutch is provided to prevent the engine driving the starter. The direction of rotation is clockwise, looking at the commutator end.

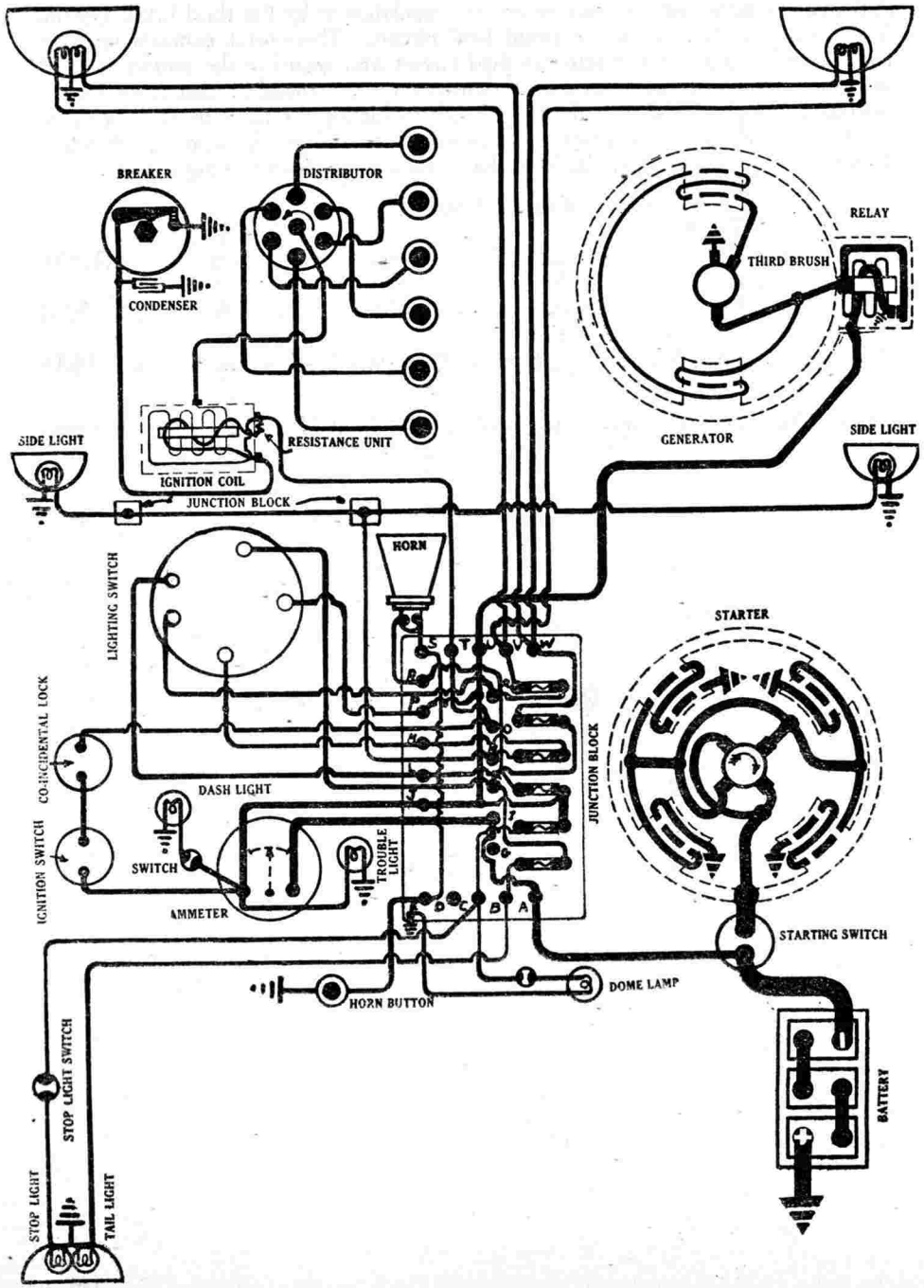
Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	1000	5.8	67
75 "	Lock	3.2	530

The starter brush pressure should be 1000 grams each.

Mounting.—Starter is mounted at right front of engine and drives to the forward end of the crankshaft. Mounting is by a special bracket to the engine block.

Oiling:—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.



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STUDEBAKER

MODELS ES AND EW (1927)
ES SERIAL NOS. 2102101 UP. EW SERIAL NOS. 4000001 UP
WAGNER GENERATING, STARTING AND LIGHTING SYSTEM
WAGNER IGNITION

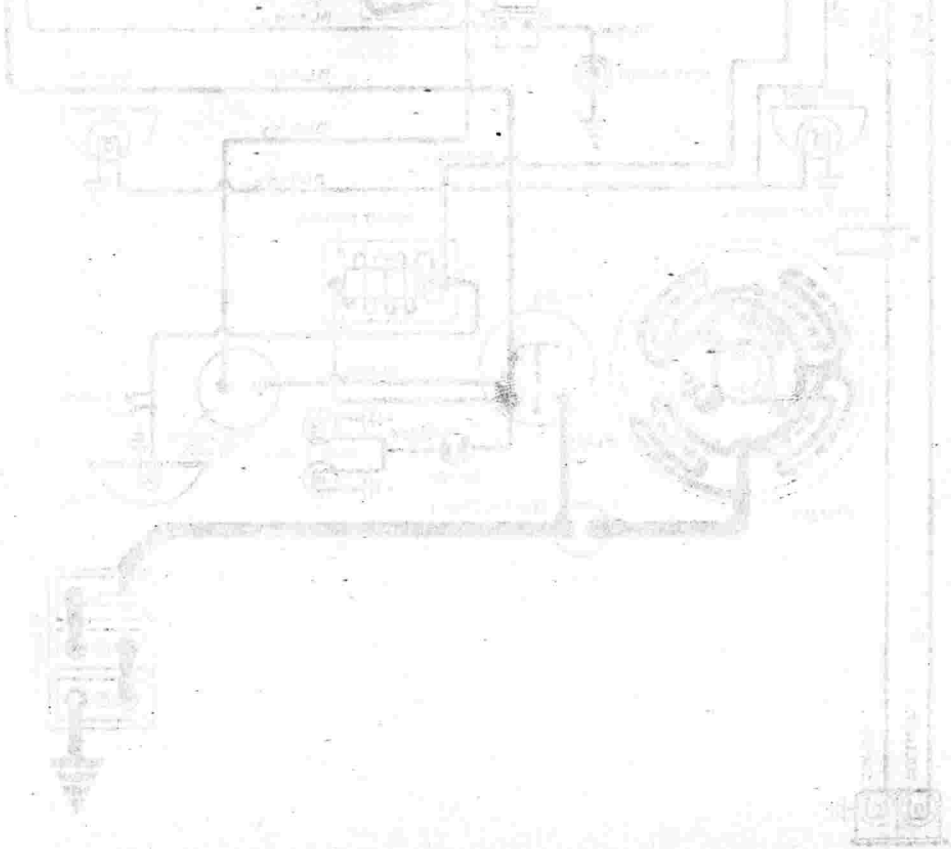
Once every three months lubricate the starter clutch with light engine oil applying through the oiler provided. Remove the grease plug in the reduction gear case and repack the gears with graphite grease once each year.

GENERATOR:—Model S-602. The direction of rotation is counter-clockwise, looking at the commutator end. The generator is mounted vertically at the forward end of the engine. Current regulation is by the third brush system. The third brush mounting plate is held in position by a screw in the generator end plate. To increase the charging rate, move the third brush in the direction of generator rotation and in the opposite direction to decrease the charging rate.

Generator Data.

Amperes	Volts	R.P.M.
0	7.2	580
10	7.25	1000
16	8.1	1500
8.5	7.65	3000

Operating freely as a motor, generator makes 300 R.P.M. taking 5 amperes at 6 volts. The brush pressure should be 550 grams each.



Mounting.—Generator is vertically mounted at right front of engine. To remove generator, remove three flange mounting screws and lift unit from position.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

RELAY:—Model K-880. Relay contacts close at 580 R.P.M. with a generator voltage of 7.2 volts and open with a discharge current of 0-4 amperes. Contacts separate .035 inch. The air gap between the relay armature and coil core is .025 inch, contacts closed.

LIGHTING:—Head lamps are 6-8 volt, 21-21 cp. double filament using second 21 cp. filament for dimming. Side lamps are 6-8 volt, 6 cp. S.C. Dash and tail lamps are each 6-8 volt, 3 cp. S.C. Tonneau, stop and dome lamps are each 6-8 volt, 4 cp. S.C.

Switches:—Lighting switch mounted on steering column is Model 420-K. Ignition switch is Model 440-A. Starting switch is Model 406-A or B.

FUSES:—Lighting fuses mounted on junction block are 10 amperes.

STUDEBAKER

"DICTATOR" MODEL GE (1928), SERIAL NUMBERS 1410001 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type SJWR-3, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 105 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 18 hours. Battery has 11 plates, each 5¾ inches wide, 5¼ inches high and ⅛ inch thick. Battery is mounted under the floor boards on the right frame member.

IGNITION:—Coil Model 525E. Ignition coil is mounted on the dash. Ignition current is ½-2 amperes at 6 volts with engine running, and 4-5 amperes at 6 volts with engine stopped.

Distributor Model 636Y. Breaker contacts separate .020-.025 inch with contact arm on lobe of cam. Adjust contact opening by loosening lock nut on stationary contact stud and turning stud. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension should be 14-16 ounces. Distributor is semi-automatic. Maximum manual advance is 15° (engine). Automatic advance begins at 450 R.P.M. of the engine. Maximum automatic advance is 32° reached at 3000 R.P.M.

Mounting:—Distributor is mounted on accessory bracket at right of engine. To remove distributor, disconnect manual advance rod and primary lead and remove head with high tension cables intact. Then loosen advance arm clamp screw and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor housing and turn down one turn every 1000 miles. Every six weeks remove distributor head and rotor and put 3 or 4 drops of light oil in the wick oiler.

Timing:—Breaker contacts separate when the piston entering power stroke reaches a position 7½ degrees after top dead center with the manual spark advance fully retarded. To set timing, crank engine until piston No. 1 reaches top dead center on compression stroke. At this point the flywheel mark 'UP-DC-1-6' will be opposite the indicator. Then advance spark lever exactly one half. Breaker contacts should begin to separate. If they do not, loosen advance arm clamp screw and rotate distributor housing until contacts begin to separate. Tighten the clamp screw. Make certain that segment directly opposite rotor is connected to spark plug in cylinder No. 1 and connect remaining plugs in order 4-2-6-3-5 counter-clockwise around the distributor.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are .025 inch.

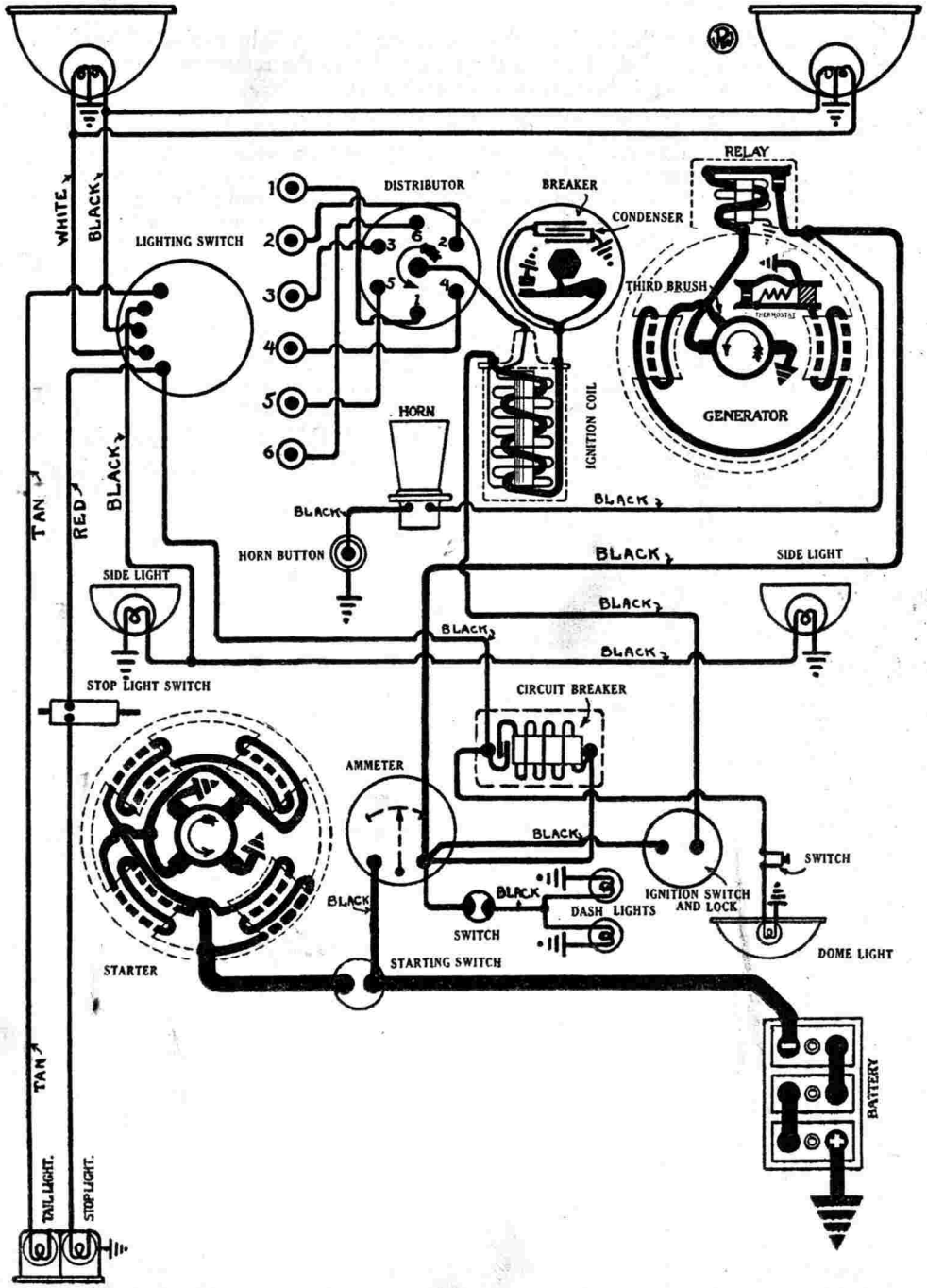
VALVE TIMING:—INLET VALVES:—Head diameter, 1⅝ inches; stem diameter, 5/16 inch; stem length, 4⅞ inches. Valve lift, 5/16 inch. Spring pressure, 50 pounds. Tappet clearance, .006 inch hot. Inlet valves open 5° after top dead center and close 53° after lower dead center. Flywheel is marked 'IN-OP-1-6' at point of inlet opening.

EXHAUST VALVES:—Head diameter, 1½ inches; stem diameter, 5/16 inch; stem length, 4⅞ inches. Tappet clearance, .006 inch hot. Valve lift, 5/16 inch. Spring pressure, 50 pounds. Exhaust valves open 58° before lower dead center and close 10° after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

STARTER:—Model 720-N. Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 100 R.P.M. drawing 275 amperes at 4.65 volts. Brush spring tension is 24-28 ounces. Starter switch is Model 406-J.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.2	575



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STUDEBAKER

"DICTATOR" MODEL GE (1928) SERIAL NUMBERS 1,410,001 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove 3 flange mounting capscrews. Then pull starter forward and lift from place.

Oiling:—Put 4 or 5 drops of oil in the oiler on the commutator end of the starter every 1000 miles. The drive end bearing is oilless.

GENERATOR:—Model 949-J. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. putting the resistance across the contacts in series with the field and reducing the output approximately 40%. To adjust generator output, loosen the small round-headed screw on the generator endplate and remove the commutator cover head. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, maximum charging rate is 11 amperes (hot) or 19 amperes (cold) reached at 1650 R.P.M. or 24 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
6	7.0	750	6	7.0	1050
19.5	8.3	1650	11.5	7.6	2150
12.5	7.6	2800			

Running as a motor, generator draws 5.5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 12-16 ounces.

Mounting:—Generator is flange mounted on rear of accessory bracket at right of engine. To remove generator, disconnect lead and remove 3 flange mounting capscrews. Then pull generator to the rear.

Oiling:—Put 4 or 5 drops of light oil in the oilers at each end of the generator every 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the side of the generator. Relay closes at 300 R.P.M. or 2⅛ M.P.H. when the generator voltage reaches 7-7.5 volts, and opens at 250 R.P.M. or 2 M.P.H. with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 484-D. Switch is mounted at base of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament, double contact base) Mazda No. 1110. Side, stop and dome lights are each 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

CIRCUIT BREAKER:—Model 410-C. A vibrating circuit breaker protects the lighting circuits. The circuit breaker begins to vibrate with a current of 25-30 amperes. While vibrating the current is 15 amperes.

STUDEBAKER

"COMMANDER" MODEL GB (1928)
SERIAL NUMBERS 4039801 UP
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type SJWR-4, 6 volt, 13 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours. Plates are 5¾ inches wide, 5¼ inches high and ⅛ inch thick. Battery is mounted under the front floor boards on the right frame member.

IGNITION:—Coil Model 525-E. Coil is mounted on the dash. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

Distributor Model 636-X. Breaker contacts separate .020-.025 inch. Adjust contact opening by loosening lock nut on stationary contact stud and turning contact stud. Resurface contacts with a fine flat contact file or on a medium hard oil-stone. Breaker arm spring tension is 14-16 ounces. Distributor is semi-automatic. Maximum manual advance is 15° (engine). Automatic advance begins at 550 R.P.M. of engine. Maximum automatic advance is 25½° reached at 2400 R.P.M.

Mounting:—Distributor is mounted on special bracket at front of engine. To remove distributor, disconnect manual advance rod and primary lead and remove head with high tension cables intact. Then loosen advance arm clamp screw and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor with medium cup grease and turn down one turn every 1000 miles. Every six weeks remove the distributor head and rotor and put 4 or 5 drops of light oil in the wick oiler.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 7½ degrees after top dead center on the flywheel with the manual spark fully retarded. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Continue to crank engine until piston reaches top dead center when the mark 'UP-DC-1-6' on the flywheel will be directly under the pointer in the flywheel case. Advance spark lever exactly one half. If breaker contacts do not separate at this point, loosen advance arm clamp screw and rotate distributor until contacts begin to separate. Tighten the clamp screw and make certain that the segment opposite the rotor button is connected to the spark plug in cylinder No. 1. Connect the remaining plugs in the order 5-3-6-2-4 counter-clockwise around the distributor head.

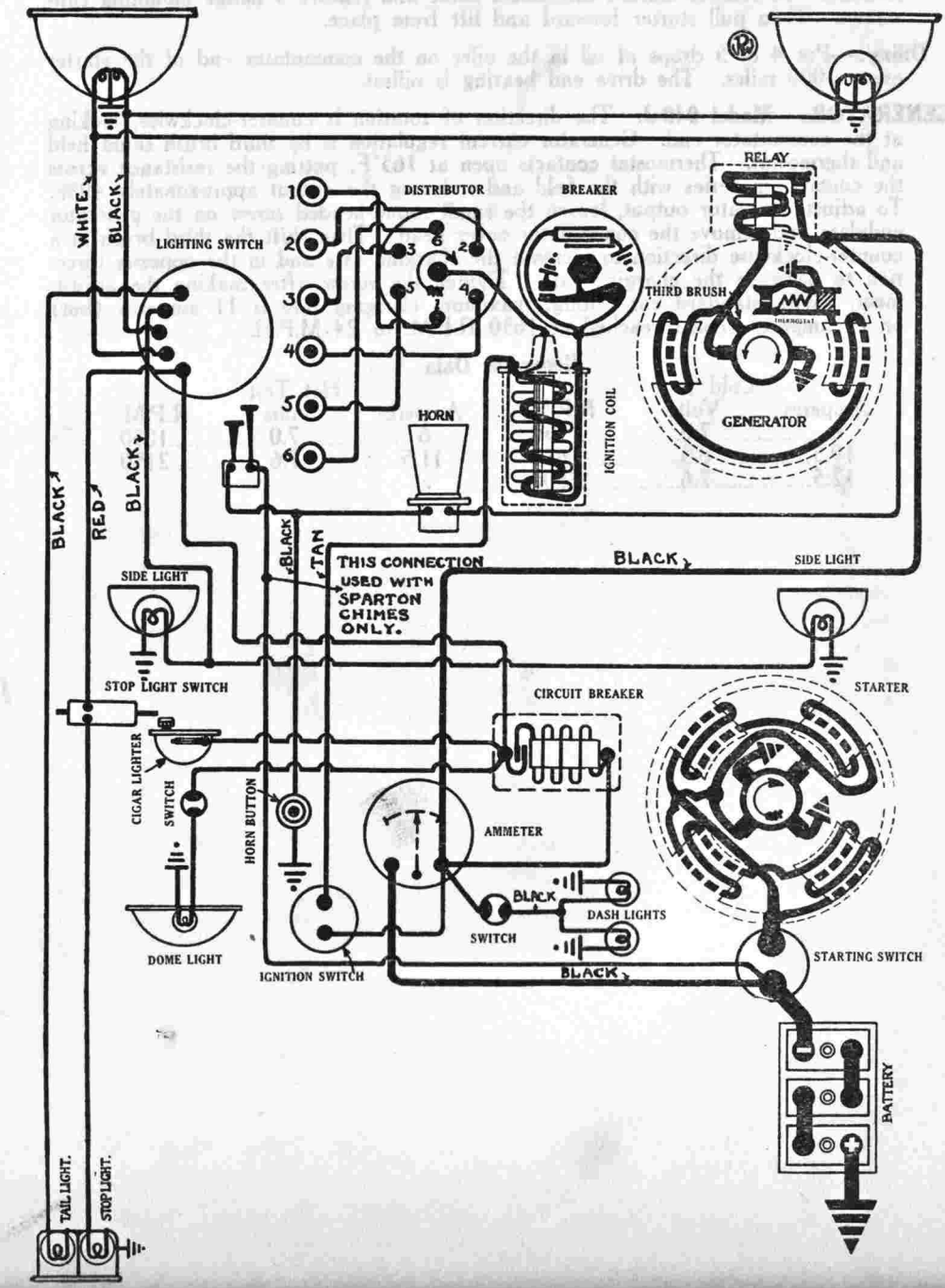
Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are .025 inch.

VALVE TIMING:—Specifications:—Head diameter, 1⅞ inches; stem diameter, ⅜ inch; stem length, 5¾ inches. Tappet clearance is .006 inch (hot). Spring pressure, 55-60 pounds. Valve lift, 5/16 inch. Valve stem guides are removable. Oversize valve stems are not made.

Timing:—Inlet valves open at top dead center and close 48° after lower dead center. Exhaust valves open 38° before lower dead center and close 10° after top dead center. Inlet opening of cylinder No. 1 is marked on flywheel by mark 'IN-OP-1-6'.

STARTER:—Model 723-B. Starter is connected to the engine through a special chain and sprocket drive and overrunning clutch. The direction of rotation is clockwise (armature), looking at the commutator end. Starter cranks the engine at 95 R.P.M. drawing 250 amperes at 4.75 volts. Brush spring tension is 24-28 ounces. Starter switch is Model 406-B.



STUDEBAKER

'COMMANDER' MODEL GB (1928)
SERIAL NUMBERS 4,039,801 UP
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	1000	5	70
70 "	Lock	3.25	600

Torque and R.P.M measured at sprocket shaft. Direction of rotation of sprocket shaft is clockwise at drive end.

Mounting:—Starter is mounted by special bracket at forward end of engine on right side and drives through chain to forward end of crankshaft. To remove starter, drain and remove radiator. Then remove starter clutch and drive chain. Remove bracket bolt and withdraw pin in hinge. Lift starter from place.

Oiling:—Put 4 or 5 drops of light oil in each of the starter oilers every 1000 miles. Every 3 months oil starter clutch through hole in case. Once each year remove plug in reduction gear case and repack gears with graphite grease.

GENERATOR:—Model 941-L. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. putting the resistance across the contacts in series with the field and cutting down the output approximately 40%. To adjust generator output, loosen the small round headed screw on the end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, maximum charging rate is 18 amperes (cold) and 11 amperes (hot) reached at 2096 R.P.M. or approximately 30 miles per hour.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7.1	750			
21	8.5	1450	12	7.6	2000
10-12		2500			

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is flange mounted in a vertical position at the front of the engine and can be removed from the right side. To remove generator, disconnect lead and remove 3 flange mounting cap screws. Then lift generator straight up to disengage coupling.

Oiling:—Put 4 or 5 drops of light oil in each of the generator oilers every 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the side of the generator. Relay closes at 550 R.P.M. or 7-9 M.P.H. when the generator voltage reaches 7-7.5 volts and opens at 540 R.P.M. with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Delco-Remy Switch, Model 484-D. Switch is mounted at lower end of steering column. Head lights are each 6-8 volt, 21-21 cp. (double filament, double contact base) Mazda No. 1110. Side, stop and dome lights are each 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

CIRCUIT BREAKER:—Model 410-C. A vibrating circuit breaker protects the lighting circuits. Circuit breaker begins to operate when current reaches 25-30 amperes and limits the current to 15 amperes while vibrating.

STUDEBAKER

"PRESIDENT" MODEL FA (1928)
SERIAL NUMBERS 6000001 UP
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type SJWR-4, 6 volt, 13 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours. Plates are 5¾ inches wide, 4¾ inches high, ⅛ inch thick. Battery is mounted under front floor boards on right frame member.

IGNITION:—Coil Model 525E. Coil is mounted on the dash. Ignition current is ½-2 amperes at 6 volts with engine running and 4-5 amperes at 6 volts with engine stopped.

Distributor:—Model 658-J. Breaker contacts separate .022 inch. Adjust contacts by loosening lockscrew and turning eccentric adjusting screw on stationary contact mounting plate. Resurface contacts with a fine flat file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 25° (engine). Automatic advance begins at 600 R.P.M. Maximum automatic advance is 24° reached at 2900 R.P.M. of the engine. Breaker has two sets of contacts on a single four-sided cam opening alternately at intervals of 45° corresponding to 90° of crankshaft speed. This firing interval is important and must be correctly set. See Timing.

Mounting:—Distributor is mounted on cylinder head. To remove distributor, disconnect primary lead and manual advance rod and remove head with high tension cables intact. Then loosen advance arm clamp screw and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down two turns every 1000 miles. Remove the distributor head oil and put a small amount of vaseline on the face of the breaker cam every 1000 miles.

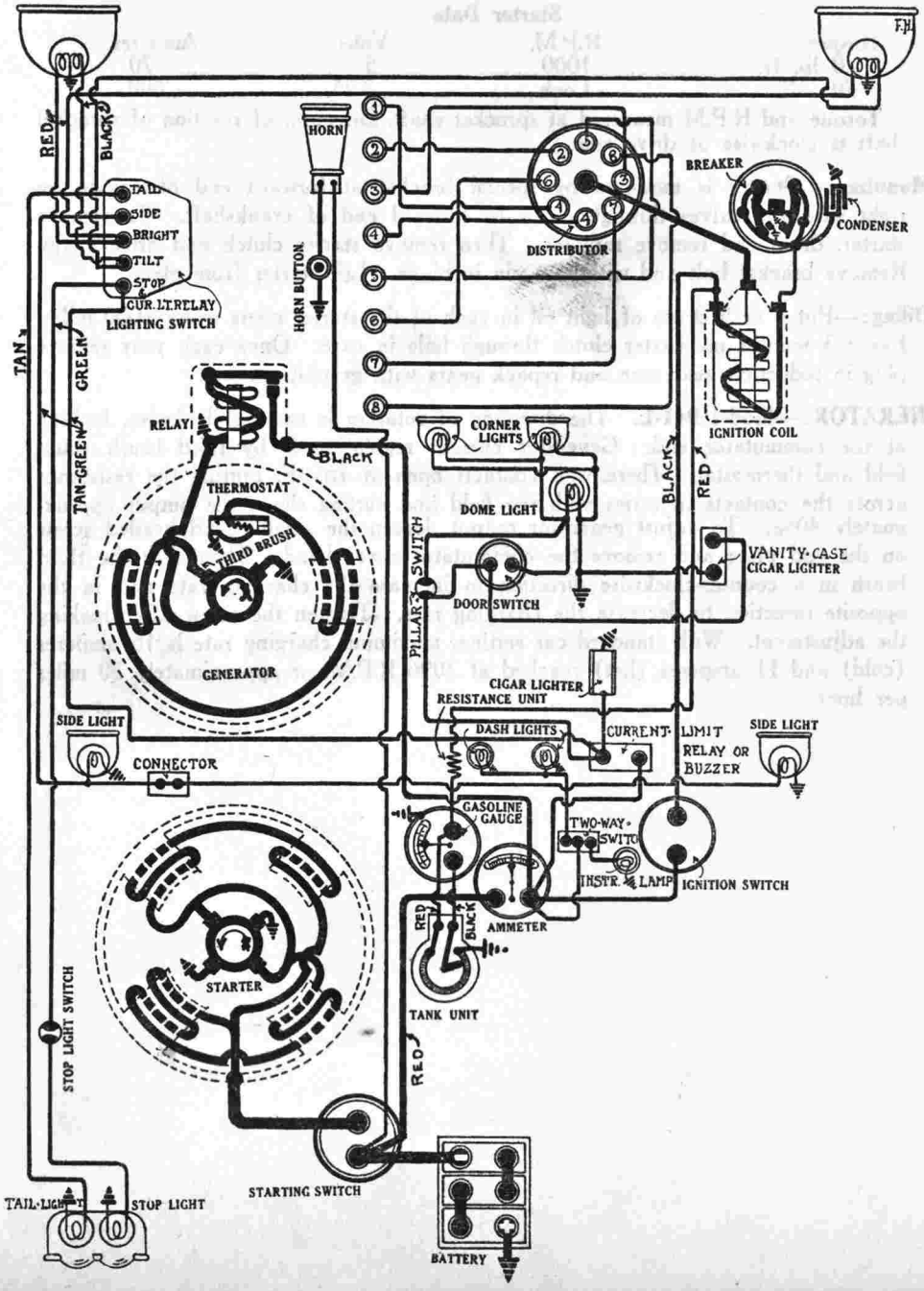
Timing:—Synchronization of Contacts:—Use Delco-Remy Part No. 820738 and follow directions on page S-2 to synchronize contacts. This can be checked also if distributor is timed to engine by cranking engine over 90° from point of firing of cylinder No. 1 until piston No. 6 is on top dead center entering power stroke. If second set of contacts do not separate at this point with manual advance lever fully advanced loosen lockscrew on breaker plate and turn eccentric adjusting screw until contacts begin to separate. Check contact opening after synchronization. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization operation.

Timing Distributor to Engine:—Breaker contacts begin to separate when piston entering power stroke reaches top dead center with the manual spark lever fully advanced. To set timing, crank engine until piston No. 1 enters compression stroke. This is the upstroke with both valves closed. Fully advance spark lever and continue to crank engine until piston No. 1 reaches top dead center. At this point the flywheel mark 'U-P-D-C-No. 1' will be opposite the timing pointer on the right side of the flywheel housing. If one set of breaker contacts are not separating at this point, loosen advance arm clamp screw and turn distributor until contacts separate. Tighten the clamp screw and make certain that the segment opposite the rotor is connected to the spark plug in cylinder No. 1. Connect the remaining plugs in order 6-2-5-8-3-7-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are ⅞-18 S.A.E. Standard. Gaps are .025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1 21/32 inches; stem diameter, ⅜ inch; stem length, 4¾ inches. Valve lift, 11/32 inch. Spring pressure, 45-50



STUDEBAKER

"PRESIDENT" MODEL FA (1928)
SERIAL NUMBERS 6,000,001 UP
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

pounds. Tappet clearance, .004 inch (hot). Inlet valves open 5° after top dead center and close 45° after lower dead center. The point of inlet opening is marked on the flywheel by 'IN-OP-1-8'.

EXHAUST VALVES:—Head diameter, 1 9/16 inches; stem diameter, 3/8 inch; stem length, 4 3/4 inches. Valve lift, 11/32 inch. Spring pressure, 45-50 pounds. Tappet clearance, .006 inch (hot). Exhaust valves open 40° before lower dead center and close 12° after top dead center. Valve stem guides are removable. Oversize valve stems are not made.

STARTER:—Model 724-H. Starter is connected to the engine through a manual pinion shift. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine drawing 300 amperes at 4.5 volts. Brush spring tension is 20-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2850	5.65	70
22 "	Lock	3.1	590

Mounting:—Starter is flange mounted at left of engine. To remove starter, disnect cable and pedal rod and remove 3 flange mounting capscrews. Then pull starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in starter bearing oilers every 1000 miles. Once each year remove grease plug in gear compartment and repack gears with medium grease.

GENERATOR:—Model 949-U. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F, inserting the resistance across the contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round screw on the generator endplate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting the maximum charging rate is 10 amperes (hot) or 20 amperes (cold) reached at 1650 R.P.M. or 23 miles per hour.

Generator Data

	Cold Test			Hot Test	
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
4	6.8	700	6	7.0	1050
19.5	8.3	1650	11.5	7.5	2150
12.25	7.75	2800			

Motoring generator draws 5.5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Generator brush spring tension is 12-16 ounces.

Mounting:—Generator is mounted on left of engine at forward end by special hinge bracket and is driven by the fan belt. To remove generator, disconnect lead and remove adjustment locknut in engine forward mounting flange and swing generator toward engine. Slip off fan belt. Then remove cotter and withdraw mounting bracket hinge pin. Lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay closes at 12 1/2 M.P.H. or 900 R.P.M. when the generator voltage reaches 7-7.5 volts and opens at 10 M.P.H. or 720 R.P.M. with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 3 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 484-D. Switch is mounted at lower end of steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact using second filament instead of dimming) Mazda No. 1110. Side, stop, dome and corner lights are each 6-8 volt, 6 cp. S.C. Mazda No. 81. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

CIRCUIT BREAKER:—Model 410-C. A vibrating circuit breaker is mounted on the dash to protect the lighting lines. The circuit breaker begins to operate with a current flow of 25-30 amperes. While vibrating it limits the current to 15 amperes.

STUTZ

1916-17-18-19.

REMY GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH OR DELCO IGNITION

BATTERY.—Battery is 6 volt, 115-130 ampere-hour. The two-wire system is used. The negative (—) terminal is grounded at center terminal of junction block.

IGNITION.—Delco. Battery breaker contacts separate .018 inch. There are two separate coils and distributors and two sets of breaker contacts, supplying a separate ignition system for each set of plugs. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel ,finishing on a hard oil stone.

IGNITION.—Bosch. Magneto breaker contacts separate .014 to .016 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Delco. Put several drops of light engine oil in ignition unit oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles. Every six months remove the plug in distributor gear housing and inject a quantity of grease.

OILING.—Bosch. Put several drops of light engine oil in each of magneto oilers every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

TIMING.—Magneto breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position. Battery breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever advanced 1½ inches from the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps with Delco ignition are .030 inch. Spark plug gaps with Bosch ignition are .020 to .025 inch.

STARTER.—Model No. 189-A is used on the 1916-17 cars and No. 291-A is used on the 1918 cars. Starter is connected to the engine through a Bendix drive. Starter current is 40-56 amperes at 5.8-6 volts, armature revolving at 3600-4200 R.P.M. Lock torque is 19-22 pound-feet, current 700-720 amperes at 3.6 volts.

OILING.—Put 4 or 5 drops of light engine oil in each of starter oilers every month.

GENERATOR.—Model OD. Generator current regulation is by third brush system.

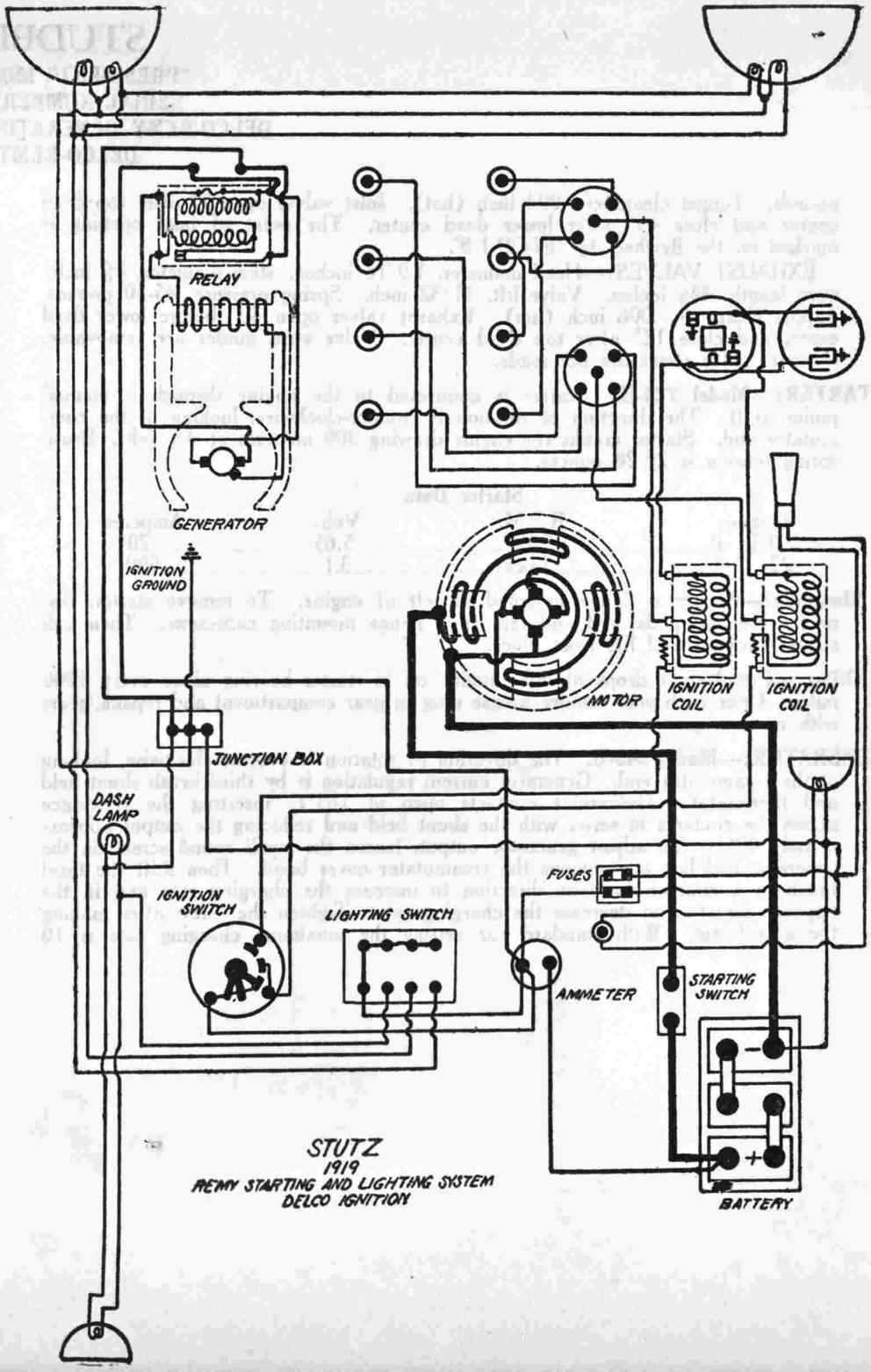
Amperes	Generator Data	R.P.M.
0.		300 or less
7.5		500
14-18		1000-1300
12		2050

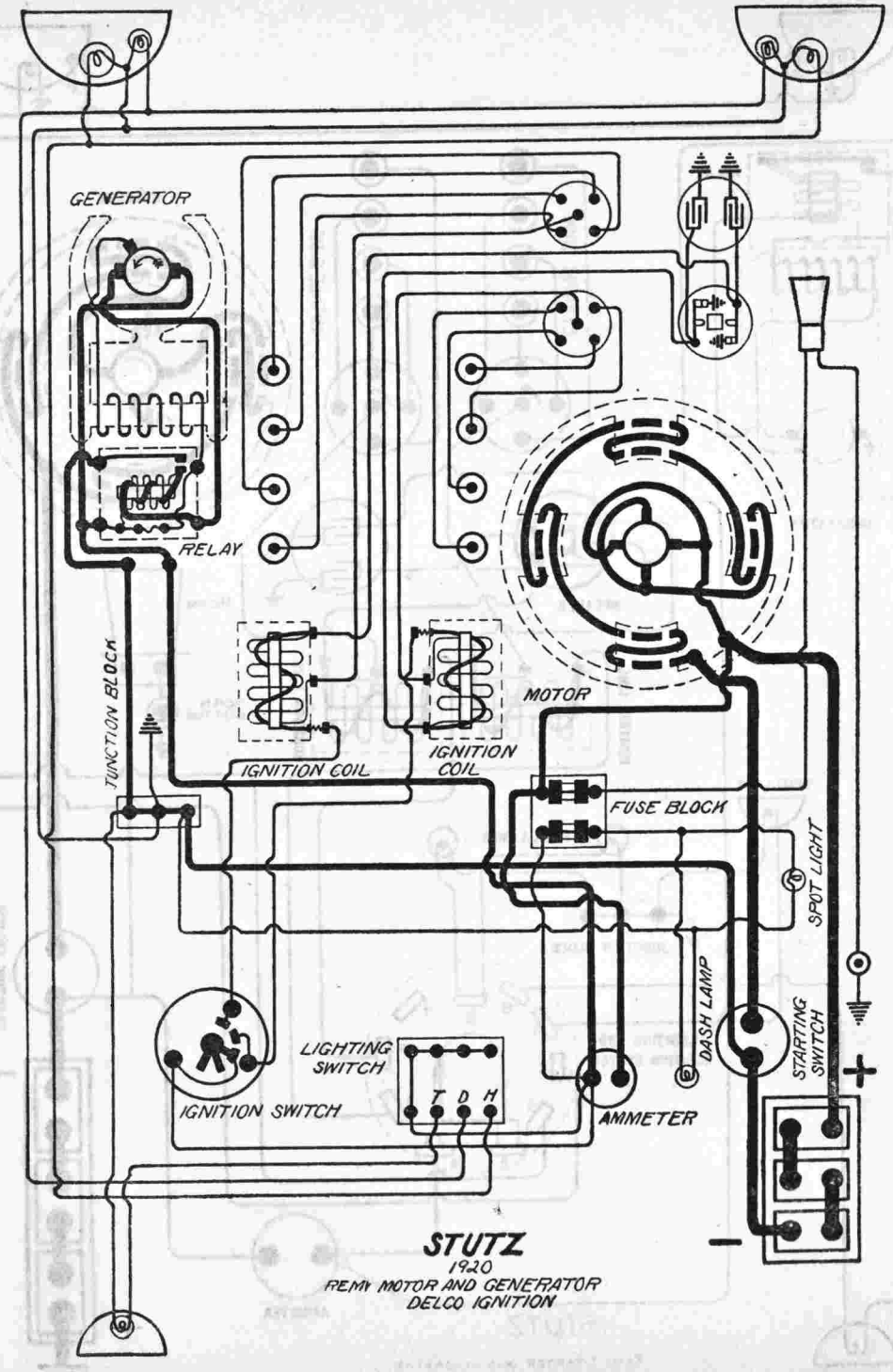
On generators before Serial No. 30,000, the armature current is 4 amperes and the field current 1.7 amperes, at 6.5 volts. After serial No. 30,000, the armature current is 12 amperes and the field current 1.3 amperes, at 6.5 volts. Maximum charging rate is reached at 20-25 miles per hour. The charging rate may be slightly decreased by filing away the edge of the third brush nearest the nearest main brush. Filing the opposite edge will increase the charching rate. Only a small portion of the third brush may be so removed however, or serious sparking will result.

OILING.—Put 4 or 5 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour, or 300-350 R.P.M. of armature, and opens at 6-8 miles per hour or 250-300 R.P.M. of armature. Charging current is .5 to 1.5 amperes at closing and the discharge current 0 to 1 ampere at opening of relay. Air gap between relay armature (moving member) and coil core is .040 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volts, 4 cp. Spot lamp is 6-8 volt, 6 cp. Dash lamp is 6-8 volt. 4 cp. Tail lamp is 6-8 volt, 2 cp.





STUTZ

MODEL H (1920)

REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, 6 volt, 130 ampere-hour. The two-wire system is used.

IGNITION.—Coils Model No. 2159. Distributor Model No. 5209. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone. Both sets of contacts must separate at the same instant.

OILING.—Put 4 or 5 drops of light engine oil in each of the ignition unit oilers every two weeks. If the tracks of the rotor buttons in the distributor heads are not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever 1½ inches from the fully retarded position. (First see that the breaker assembly is in the fully retarded position.)

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .027 to .030 inch.

STARTER:—Model No. 189-A. Starter is connected to the engine through a Bendix drive. When cranking the engine, the starter takes 160 amperes at 5.2 volts, armature revolving at 1960 R.P.M. Lock torque is 18 pound-feet, current being 650 amperes at 3.2 volts. Running freely, starter takes 40-65 amperes at 5.8-6 volts, armature revolving at 3600-4200 R.P.M.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Model OD. Generator current regulation is by the third brush system. Maximum charging rate is 17.5 amperes, reached at 1450 R.P.M. or 23 miles per hour.

Amperes	Generator Data	R.P.M.
0		300
7.5		500
14-18		1000-1300
12		2050

Armature takes 12 amperes, with 6.5 volts applied across the main brushes. Shunt field winding takes 1.3 amperes at 6.5 volts. The charging rate may be slightly decreased by filing away the edge of the third brush nearest the nearest main brush. Filing the opposite edge will increase the charching rate. Only a small portion of the third brush may be so removed however, or serious sparking will result.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 300-350 R.P.M. of the armature and opens at 6-8 miles per hour or 250-300 R.P.M. of the armature. Relay contacts separate .017 to .020 inch. Air gap between relay armature and coil core is .012 to .015 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

STUTZ

SERIES K (1921)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SJR-5, 6 volt, 132 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Coil Model No. 2159. Distributor Model No. 5209. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oilstone. Both sets of contacts must separate at the same instant.

Oiling.—Put 4 or 5 drops of light engine oil in each of the ignition unit oilers every two weeks. If the tracks of the rotor buttons in the distributor heads are not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever 1½ inches from the fully retarded position. (First see that the breaker assembly is in the fully retarded position.)

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark qlug gaps are .027 to .030 inch.

STARTER.—Model No. 741-A. Starter is connected to the engine through a set of reduction gears meshed by the operator. An overrunning clutch is provided, which permits the starting motor to turn the engine, but prevents the engine from turning the starting motor. The brush tension is 14 to 18 ounces. Running freely, the starter takes 75 amperes at 5 volts, armature revolving 2000 R.P.M. Lock torque is 66 pound-feet, current being 600 amperes at 3 volts.

Oiling.—Put 5 or 6 drops of light engine oil in the starter oilers, and turn down the grease cup two turns every 1000 miles.

GENERATOR.—Model O-F. Generator current regulation is by the third brush system. Main brush tension is 15 to 18 ounces. Third brush tension is 7-9 ounces.

Generator Data. Model O-F

Amperes	Volts	R.P.M.
0		275
7	7.15	475
12	7.65	675
15.2-17.5	7.95-8.2	1450
11.0-15.0	7.55-7.95	2000

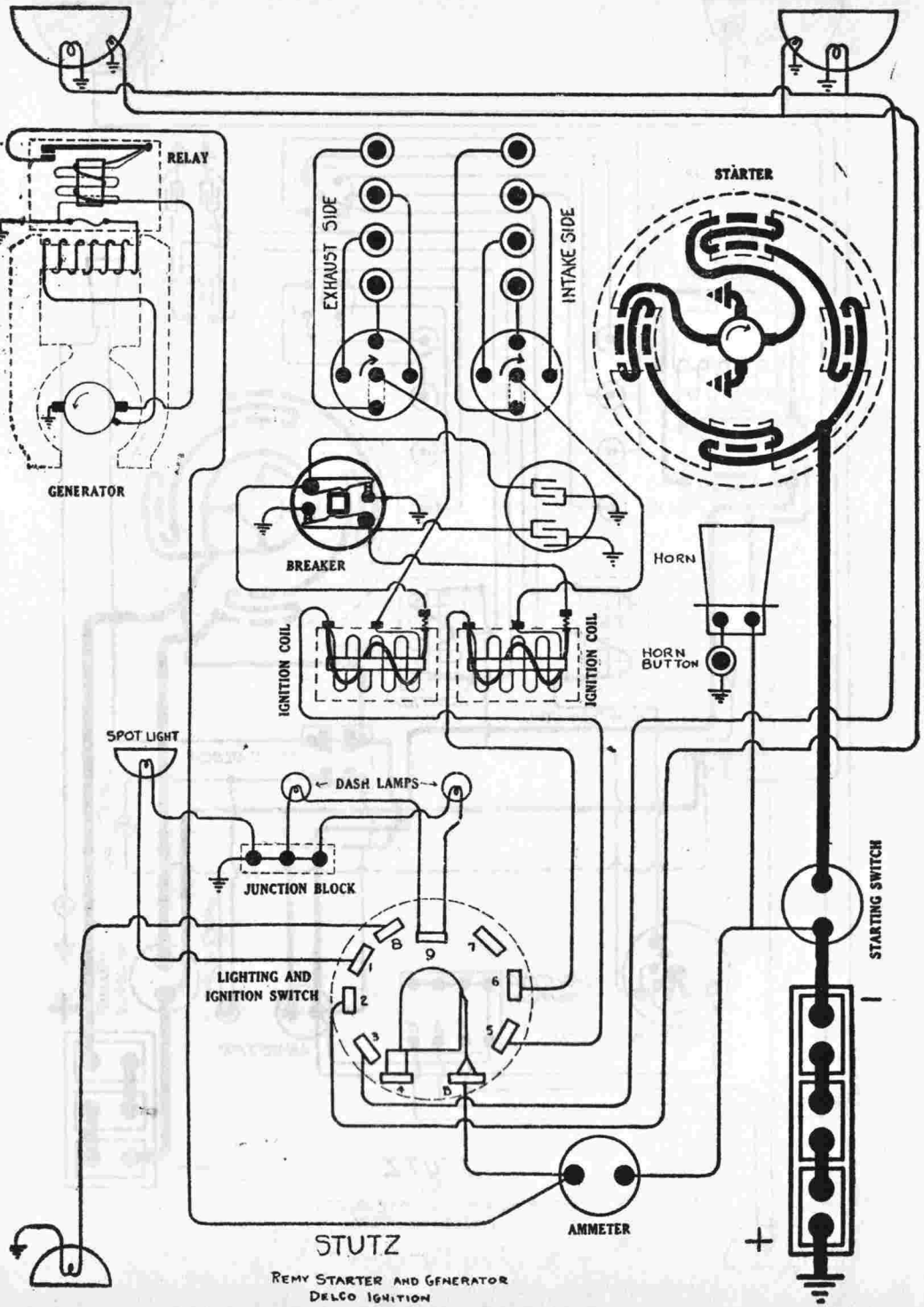
Field current takes 1.3 amperes at 6.5 volts. The charging rate may be slightly increased by filing away the edge of the third brush fortherest from the main brush, filing the edge nearest the nearest main brush decreases the charging rate. Only a small portion of the third brush may be removed or serious cparking will result.

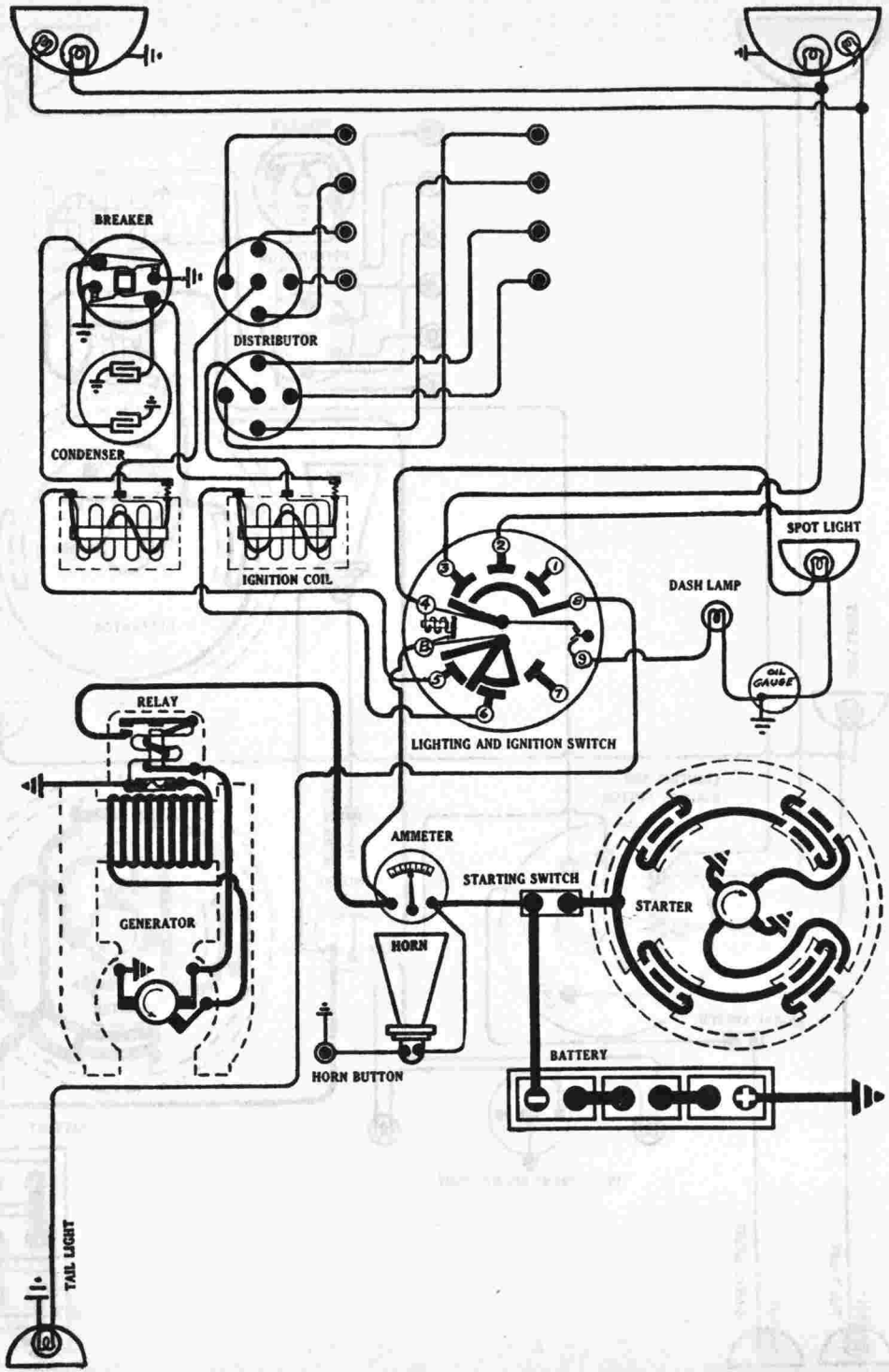
Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Model No. 264-C. Relay closes at 7-9 miles per hour or 275 R.P.M. of the armature, and opens at 6-8 miles per hour. Relay contacts separate .012 to .015 inch. Air gap between coil core and relay armature is .012 to .015 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Generator fuse is 2 amperes.





SERIES KL (1922-23-24)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SJRN-5, 6 volts, 120 ampere-hour capacity. The starting capacity is 135 amperes for 20 minutes. The lighting capacity is 5 amperes for 26 hours. The positive (+) terminal is grounded.

IGNITION.—Two coils are used. They are **Model No. 2159...Distributor Model No. 5209.** Breaker contacts separate .018 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface with a fine flat jeweler's file or on a medium hard oilstone.

Oiling.—Put 8 or 10 drops of light engine oil into the distributor oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles. Apply a very small amount of vaseline on rotor track during the first 2000 miles of operation.

Timing.—Breaker contacts begin to separate when piston No. 1 is 1½ inches (measured on flywheel) past top dead center entering power stroke, spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plugs.—The spark plug diameters are ⅞ inch. Gaps are .025 inch.

STARTER:—Model No. 741A-B. The starter is connected to the engine by a set of reduction gears, with overrunning clutch, meshed by the operator. The overrunning clutch permits the starting motor to revolve and crank the engine but prevents the engine from turning the starting motor. The direction of rotation is clockwise, looking at commutator end. The brush tension is 14-18 ounces. The starter cranks the engine at 100-150 R.P.M., taking a current of 150-175 amperes at 5.5 volts.

Starter Test Data.

Torque	Amperes	Volts	R.P.M.
0 (Running free)	75	5.0	2000
66 ft. lbs.	600	3.0	0 (Lock)

Oiling.—Put 8 or 10 drops of light engine oil into each of the starter oilers (at both ends of starter) every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

GENERATOR.—Model OF. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. The maximum charging rate is 15.2-17.5 amperes at 7.95-8.2 volts, reached at 1450 R.P.M. of armature, or 25 miles per hour, car speed in high gear. The main brush tension is 15-18 ounces. The third brush tension is 7-9 ounces.

Generator Test Data

Amperes	Volts	R.P.M.
0	——	275
7	7.15	475
12	7.65	675
15.2-17.5 (Max.)	7.95-8.2	1450
11.0-15.0	7.55-7.95	2000

The charging rate may be slightly altered by filing away one edge of the third brush to reduce the third brush surface in contact with the commutator. Filing the edge nearest the nearest main brush will decrease the charging rate, while filing the opposite edge will increase the charging rate. Only a small portion of the third brush may be thus removed or excessive sparking will result. The generator field takes 1.3 amperes at 6.5 volts.

Oiling.—Put 8 or 10 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Model No. 264-C. Relay closes at 7-9 M.P.H. or 275 R.P.M. of armature or 6.5 volts, and opens at 6-8 miles per hour or at 250 R.P.M. of armature with a current discharge of 0-1 ampere. The relay contact gap is .013-.015 inch, contact points fully separated. The air gap between relay armature and coil core is .012 to .015 inch, contact points fully closed.

LIGHTING.—Combination Switch Model No. 1175 is used. The head lights are each 6-8 volts, 21 cp. Auxiliary head lights or dimmer lights are each 6-8 volts, 4 cp. Tail and dash lights are each 6-8 volts, 2 cp. Spot light is 6-8 volts, 21 cp. All of the above lights are of the single contact type.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. Circuit breaker begins to operate with a current of 25-30 amperes and continues to vibrate with a current flow of not more than 15 amperes. Also not over 15 amperes must pass with dead short circuit across the circuit breaker terminals.

STUTZ

MODEL 6-60 (1923-24) 690, 692, 695 (1924)
MODELS 693, 694 AND 695 (1925)
REMY GENERATING, STARTING, AND LIGHTING SYSTEM
REMY IGNITION

BATTERY: — Willard, Type XR-17, 6 volt, 130 ampere hour. The starting capacity is 135 amperes for 20 minutes. The lighting capacity is 5 amperes for 26 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model No. 284-P. Distributor Model No. 626-H. Breaker contacts separate .015 inch. When the condition of the contact points affects the ignition, remove and resurface with a fine jeweller's file or on a medium hard oilstone. It is not necessary to grind the contact points if they are badly pitted or burned. Just brighten up the surface of the point and remove the raised portion of the opposite point.

Oiling.—Fill oil cup under distributor head with light engine oil every two weeks. Apply a small amount of vaseline to the breaker cam every two weeks. If the car is driven more than 500 miles in two weeks, this attention must be given every 500 miles.

Timing.—Breaker contacts begin to separate when piston No. 1 is at top head center on compression stroke, spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plugs.—The spark plug diameters are 7/8 inch, and the gaps are .022 inch.

STARTER.—Model No. 720-J. The starter is connected to the engine by an outboard Bendix drive. The direction of rotation is counter-clockwise, looking at commutator end. No. 1 S.A.E. flange mounting is used.

Starter Test Data

Torque	Amperes	Volts	R.P.M.
0 (Running Free)	65	5.0	6000 (Approx.)
15 ft.-lbs.	570	3.15	0 (Lock)

The brush tension is 20-28 ounces.

Oiling.—Fill oil cup at each end of starter with light engine oil every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

GENERATOR:—Model 917 J & R. Direction of rotation is counter-clockwise, looking at commutator end. The generator is base mounted, and is driven by a coupling at 1½ times engine speed. The third brush system is used for current regulation with automatic thermostatic control. The charging rate is adjusted by loosening the screw on the end plate which holds the third brush and shift the same in the direction of rotation (clockwise) to increase the charging rate. To decrease the charging rate, shift the third brush in the opposite direction (counter-clockwise). The maximum charging rate is 18 amperes, reached at 1900 R.P.M. of armature.

Generator Test Data

Hot Test			Cold Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
			0	6	75 (Relay cut-in.)
9-12 (Max.)	8.0-8.5	1800-2000	7	7.0-7.3	850
			18-20 (Max.)	8.4	1900
			10-17		2500

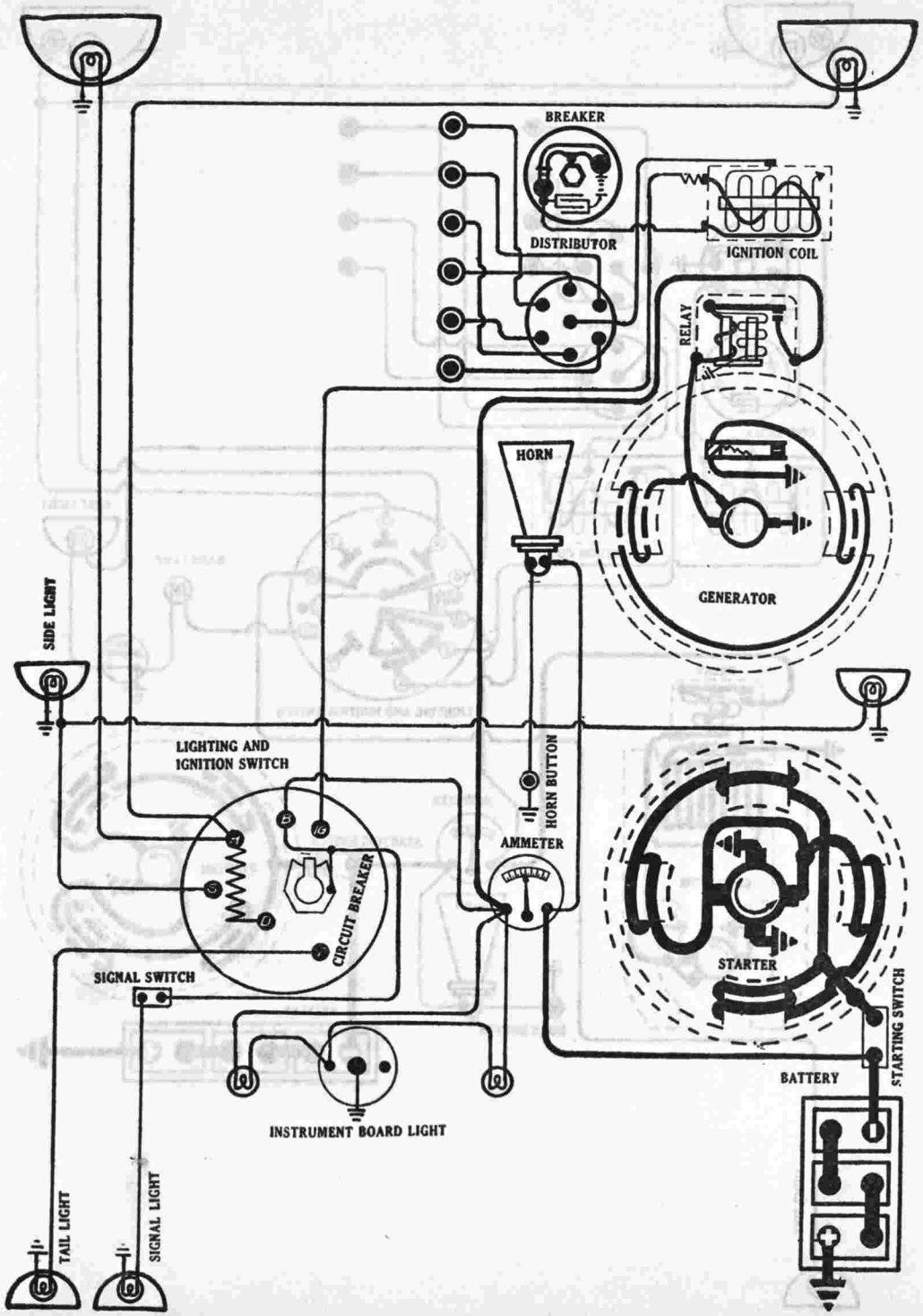
The brush tension is 22-28 ounces. The shunt field draws 5 amperes at 6 volts

Oiling.—Fill oil cups at each end of generator with light engine oil once every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Relay closes at 675 R.P.M. of armature, or 10 M.P.H. at 6.9 volts; and opens with a current discharge of 0-3 amperes. The contact gap is .014 inch, contacts fully separated. The air gap between relay armature and coil core is .020 inch, contacts fully closed.

LIGHTING.—Head lights are each 6-8 volts, 21 cp. Signal light is 6-8 volts, 15 cp. Side, tail, and instrument lights are each 6-8 volts, 2 cp. All of the above lights are of the single contact type. The instrument lights are grounded to the oil gauge.

CIRCUIT BREAKER.—A vibrating circuit breaker mounted on the back of the combination switch takes the place of fuses.

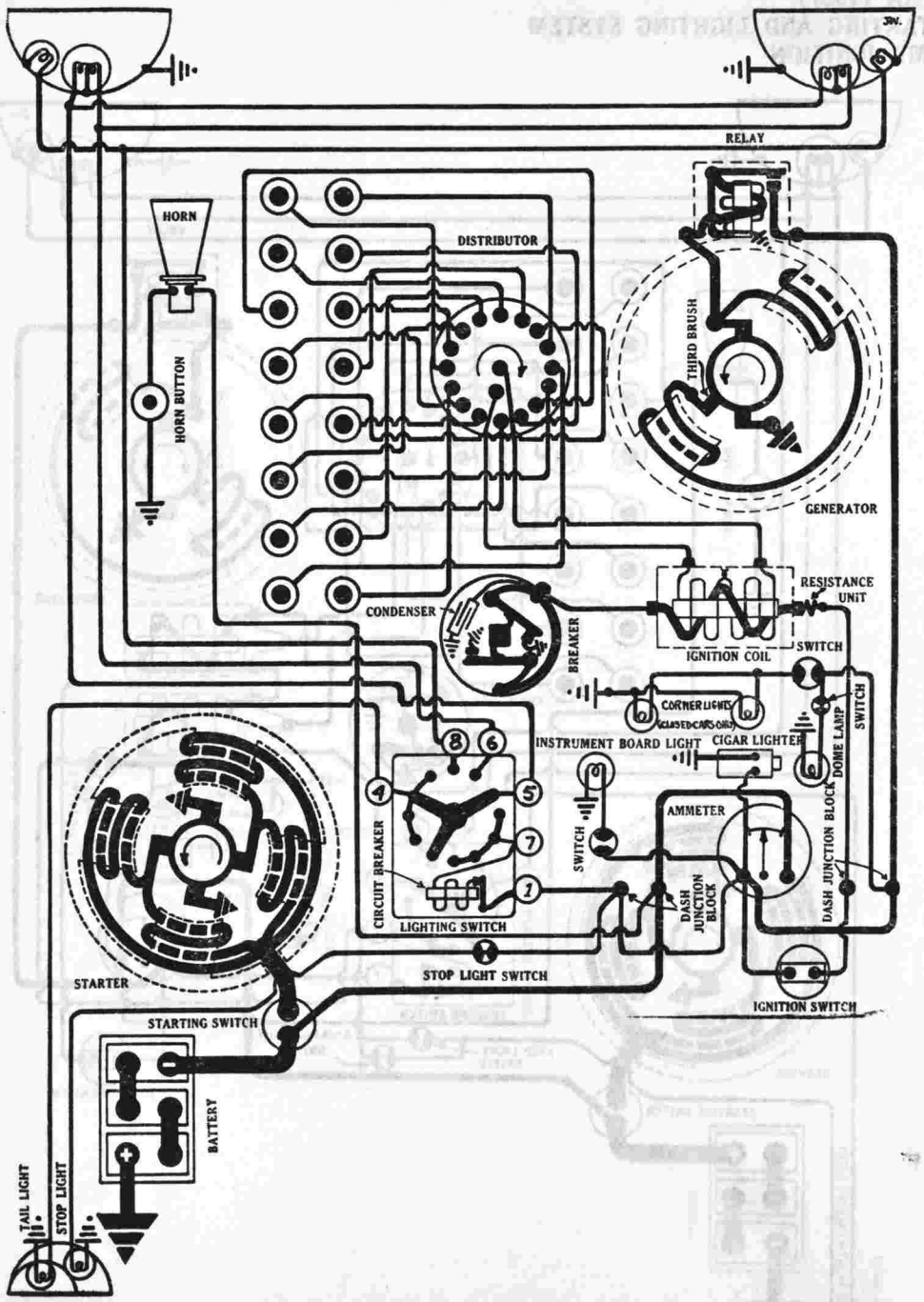


STUTZ

VERTICAL EIGHT MODEL AA (1926)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION



BATTERY.—Prest-O-Lite, Type 617-SHK. 6 volt. Starting capacity is 170 amperes for 20 minutes. Lighting capacity is 5 amperes for 32 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model 2191. Distributor Model 5296. Breaker contacts separate .0225-.0275 inch. Resurface contacts with a fine, flat jeweler's file or on a medium hard oilstone. Breaker uses two sets of contacts with a four-sided cam, contacts opening alternately at intervals of 45°, corresponding to 90° of crankshaft travel. Ignition coil has two secondary windings connected to separate high tension terminals of the distributor and firing a double set of plugs. Distributor is equipped with both manual and automatic spark advance. Manual advance is 30°. Automatic advance begins at 700 R.P.M. and reaches a maximum of 24° at 2000 R.P.M Breaker arm tension is 16-20 ounces.

Oiling.—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every month or each 1000 miles.

Timing.—Breaker contacts begin to separate when the piston entering power stroke reaches a position 5 teeth before top dead center measured on the flywheel with the spark control lever in the fully advanced position.

Firing Order.—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs.—Spark plug diameters are metric standard. Gaps are .025 inch.

STARTER.—Model 334. Starter is connected to the engine through an over-running clutch and a manual pinion shift incorporated in the starting switch. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 2¼-2½ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	4	60
11.5 "	Lock	2.75	500

Oiling.—Starter bearings are oilless. They require no attention.

GENERATOR.—Model 333. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the generator output, shift the third brush mounting plate by turning the screw on the generator end plate. Turn the screw in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The maximum charging rate of 12 amperes is reached at 1600 R.P.M. or 25 M.P.H.

Generator Data

Amperes	R.P.M.
8	1050
12-14	1600

Generator brush tension should be 1¼ pounds each.

Oiling.—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY.—Relay is mounted on the generator. Relay contacts close at 8-10 M.P.H. when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-3 amperes.

LIGHTING.—Head lamps are 6-8 volt, 21 cp. D. C., using double filament for dimming. Auxiliary head lamps are 6-8 volt, 4 cp. S. C. Quarter lamps used on closed models only are 6-8 volt, 21 cp. D. C. Stop lamp and inspection lamp are each 6-8 volt, 21 cp. S. C. Dash and tail lamps are each 6-8 volt, 2 cp. S. C.

Switches.—Lighting switch mounted on steering column is Model 1283. Ignition switch is Model 1293.

CIRCUIT BREAKER.—A vibrating circuit breaker mounted on the back of the switch protects the lighting circuits. It begins to operate when the current flow reaches 25-30 amperes and continues with a current flow of 10-15 amperes.

STUTZ

MODEL AA (1927)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 617-SHK, 6 volt. Starting capacity is 170 amperes for 20 minutes. Lighting capacity is 5 amperes for 32 hours. The negative (—) terminal is grounded. Battery is mounted under the left front seat.

IGNITION:—Coil Model 2195. Distributor Model 4022. Breaker contacts separate .015-.020 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 38° (engine). Automatic advance begins at 450 R.P.M. of the crankshaft. Maximum automatic advance is 20° at 2400 R.P.M. of the crankshaft. Breaker arm spring tension is 16-20 ounces. Breaker has two sets of contacts. They must be synchronized for correct ignition (see Timing).

Mounting:—Ignition coil is mounted on hood ledge at right of engine. Distributor is mounted on right of engine at forward end. To remove distributor, disconnect manual advance rod and breaker lead. Remove distributor head with high tension cables intact. Then remove two cap screws in distributor base mounting and lift distributor from place.

Oiling:—Put 8 or 10 drops of light oil in the oiler on the side of the distributor housing every 750 miles. Put a small bit of vaseline on the face of the breaker cam every month.

Timing:—Check synchronization of contacts before setting timing. Breaker has two sets of contacts on an eight sided cam. Both sets of contacts must open at the same instant. Crank engine over slowly and watch dash ammeter. Ammeter should indicate 4 amperes discharge with contacts closed decreasing to '0' as contacts open. If ammeter drops to '0' in two stages indicating 2 amperes discharge after dropping from 4 amperes and then indicating '0' the contacts must be synchronized. Use special dial which is Stutz part No. 21309 or connect six volt lamp in each primary line. Set contact opening at .017 inch with contact arm on lobe of cam. This is important. Then loosen four screws on breaker mounting plate. Shift the plate backward to make the front contacts (nearest engine) open earlier and forward toward front of car to make rear contacts (furtherest from engine) open earlier. Tighten the four screws. With correct setting the two lamps in primary circuit will go out at the same instant.

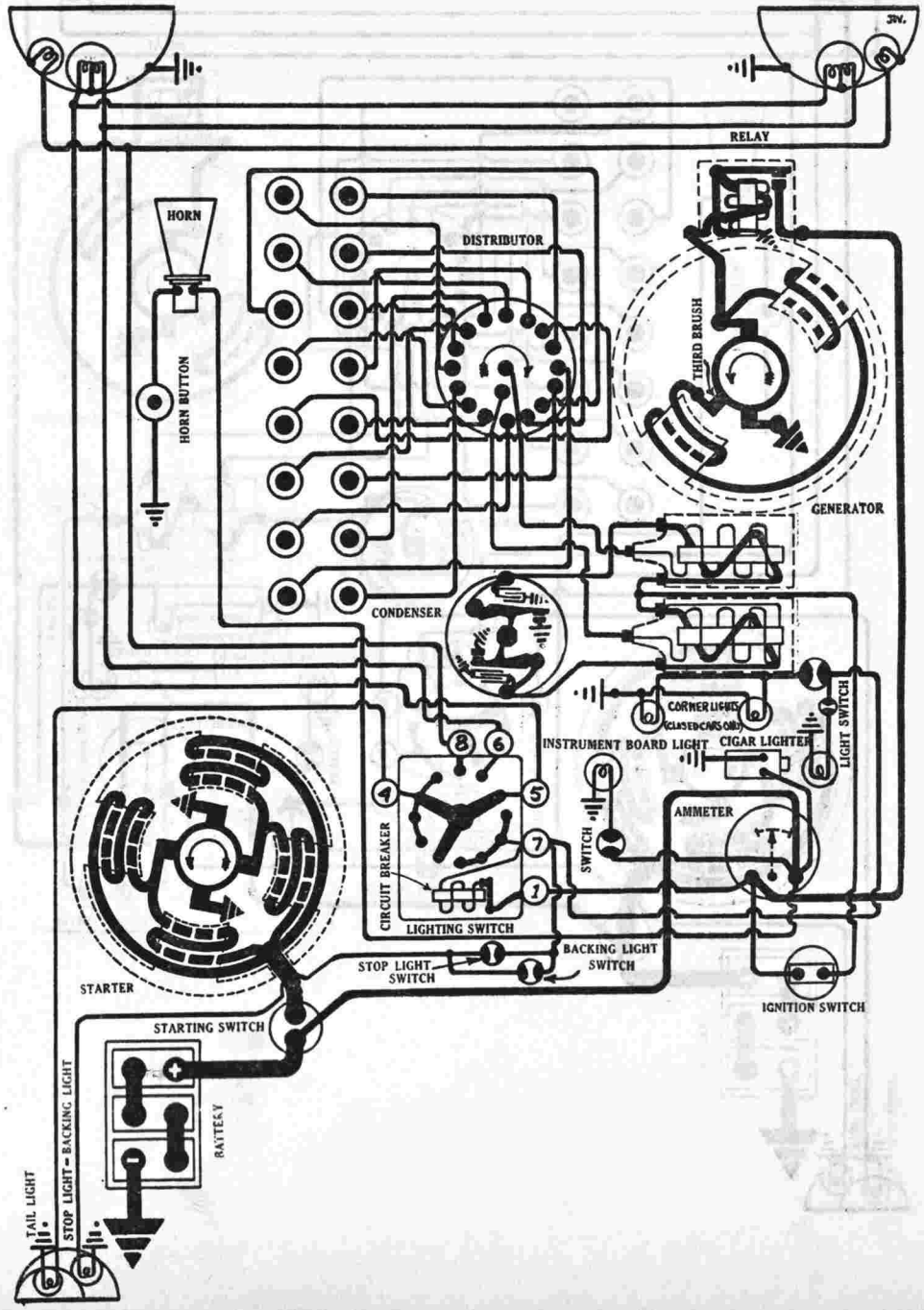
Breaker contacts separate when the piston entering power stroke reaches top dead center with the manual spark lever advanced approximately 7/10 or between the 'eight' and 'nine o'clock' positions on the steering wheel. To check timing, crank engine until piston No. 1 reaches top dead center on compression stroke. At this point the flywheel mark 'Top C 1 & 8' will be opposite the indicator in the inspection hole on the top of the flywheel case. Then advance spark control lever 7/10

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 18 MM. metric. Gaps are .025 inch.

Valve Timing:—INLET VALVES:—Head diameter, 1 19/32 inches; stem diameter, 3/8 inch; stem length, 6 11/32 inches (over all); valve lift, 11/32 inch; spring pressure, 40 pounds valve closed and 90 pounds valve open; tappet clearance, .028 inch. Inlet valves open 10° or 1 7/64 inches on flywheel past top dead center and close 50° past lower dead center.

EXHAUST VALVES:—Head diameter, 1 19/32 inches; stem diameter, 3/8 inch; stem length, 6 11/32 inches (over all); valve lift, 11/32 inch; spring pressure, 40 pounds valve closed and 90 pounds valve open; tappet clearance, .028 inch. Exhaust valves open 46° before lower dead center and close 10° past top dead center. Valve stem guides are removable. Oversize valve stems are not made. Inlet opening and exhaust closing of cylinder No. 1 is marked on flywheel by mark 'IN OPEN'. This is 10° or 1 7/64 inches on the flywheel past the top dead center mark for cylinder No. 1 which is 'Top C 1 & 8'.



of timing range. If the breaker contacts do not separate at this point, remove rotor and loosen screw in center of breaker cam. Rotate cam until contacts begin to separate. Tighten the screw and check the synchronization of contacts by watching dash ammeter as contacts open.

To set valve timing crank engine until flywheel mark 'Top C 1 & 8' is opposite indicator in inspection hole on flywheel case. Then turn camshaft until heel of cam is over No. 2 valve (the inlet valve of cylinder No. 1). Set valve with clearance of .032 inch. This is very important. Then insert .004 feeler between cam and valve cap and turn camshaft in a clockwise direction (viewed from front) until feeler is just gripped by cam. This is proper position for camshaft. Then mesh camshaft sprocket in chain and turn until all play is taken up on right or carburetor side of chain. Then slip chain on transfer sprocket one tooth at a time until holes in camshaft sprocket and camshaft line up. Put in four capscrews mounting sprocket on camshaft. The spring tension of the automatic adjusting sprocket must then be set. Mesh adjusting sprocket in chain and insert eccentric hub. Turn hub clockwise until all slack is taken up in chain. Then wind spiral spring one and one-half turns and insert end in nearest slot of stationary stud. Reassemble plain washer and insert cotter. The clearance between the cam and valve cap of all the valves should be set at .028 inch.

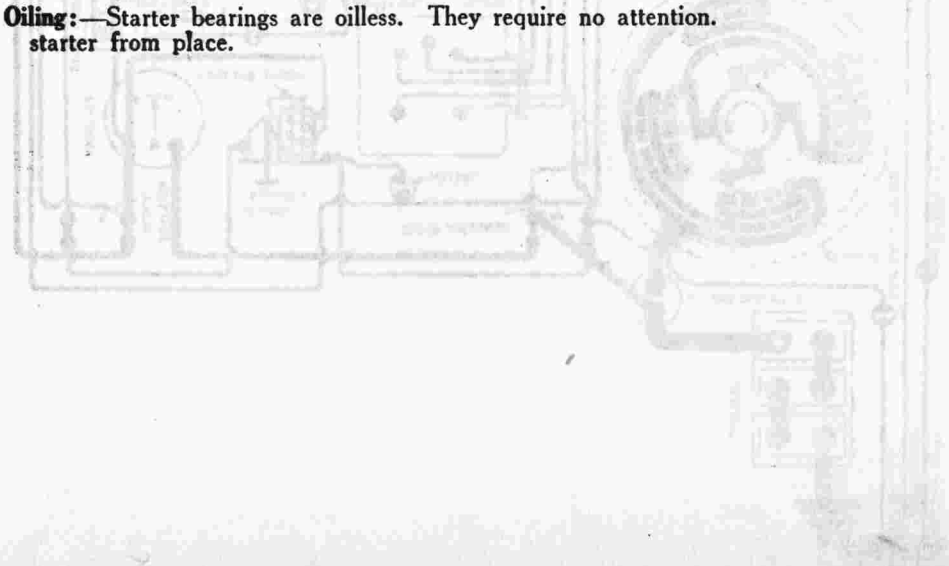
STARTER:—Model 334. Starter is connected to the engine through an overrunning clutch and a manual pinion shift interconnected with the starting switch. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush spring tension is 2¼-2½ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	4	60
11.5 "	Lock	2.75	500

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect starting pedal rod and pedal return spring. Then remove three flange mounting cap screws and slide starter forward. Lift starter from place.

Oiling:—Starter bearings are oilless. They require no attention.



GENERATOR:—Model 363. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen the screw on the generator end plate and shift the third brush by sliding the screw in the slot. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the nut after making the adjustment. The maximum charging rate of 16-18 amperes is reached at 1600 R.P.M. or 25 M.P.H.

Generator Data

Cold Test		Hot Test	
Amperes	R.P.M.	Amperes	R.P.M.
7	1050		
16-18	1600	12	1500

Mounting:—Generator is mounted by special flange on right of engine at rear of timing chain case. To remove generator, disconnect water pump drive coupling and remove three flange mounting cap screws. Then slide generator to rear and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every 750 miles.

RELAY:—Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-2 amperes. Relay contacts separate .025 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING:—Delco Switch Model 1283. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Auxiliary head lamps are 6-8 volt, 4 cp. S.C. Stop, backing and inspection lamps are each 6-8 volt, 21 cp. S.C. Dash and tail lamps are each 6-8 volt, 2 cp. S.C. Quarter lamps are 6-8 volt, 21 cp. D.C.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the switch. It begins to operate when the current reaches 25-30 amperes and continues with 10-15 amperes.

STUTZ

MODEL AA (LATE 1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 617-SHK. Starting capacity is 170 amperes for 20 minutes. Lighting capacity is 5 amperes for 32 hours. The negative (—) terminal is grounded. Battery is mounted under the left front seat.

IGNITION:—Coil Model 525-C (Two). Distributor Model 4028. Breaker contacts separate .015-.020 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 38° (engine). Automatic advance begins at 450 R.P.M. of the crankshaft. Maximum automatic advance is 20° at 2400 R.P.M. of the crankshaft. Breaker arm spring tension is 16-20 ounces. Breaker uses two sets of contacts on an eight sided cam. They must be synchronized for proper ignition (see Timing).

Mounting:—Ignition coils are mounted on hood ledge at right of engine. Distributor is mounted on right of engine at forward end. To remove distributor, disconnect primary leads and manual advance rod. Remove distributor head with high tension cables intact. Then remove two cap screws in distributor base mounting and lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every 750 miles. Put a small bit of vaseline on the face of the breaker cam every month.

Timing:—Check synchronization of contacts before setting timing. Breaker has two sets of contacts on an eight sided cam. Both sets of contacts must open at the same instant. Crank engine over slowly and watch dash ammeter. Ammeter should indicate 4 amperes discharge with contacts closed, decreasing to '0' as the contacts open. If the ammeter needle drops in two stages indicating 2 amperes discharge and then '0' the contacts are not opening together and must be synchronized. Use special dial which is Stutz part No. 21309 or connect six volt lamp in each primary line. Set contact opening at .017 inch with contact arm on lobe of cam. This is very important. Then loosen four mounting screws on mounting plate and shift plate toward front of car to make front contacts (nearest engine) open earlier and toward rear of car to make rear contacts (furtherest from engine) open earlier. Tighten the four screws. With correct synchronization the two lamps will go out at the same instant as the contacts open.

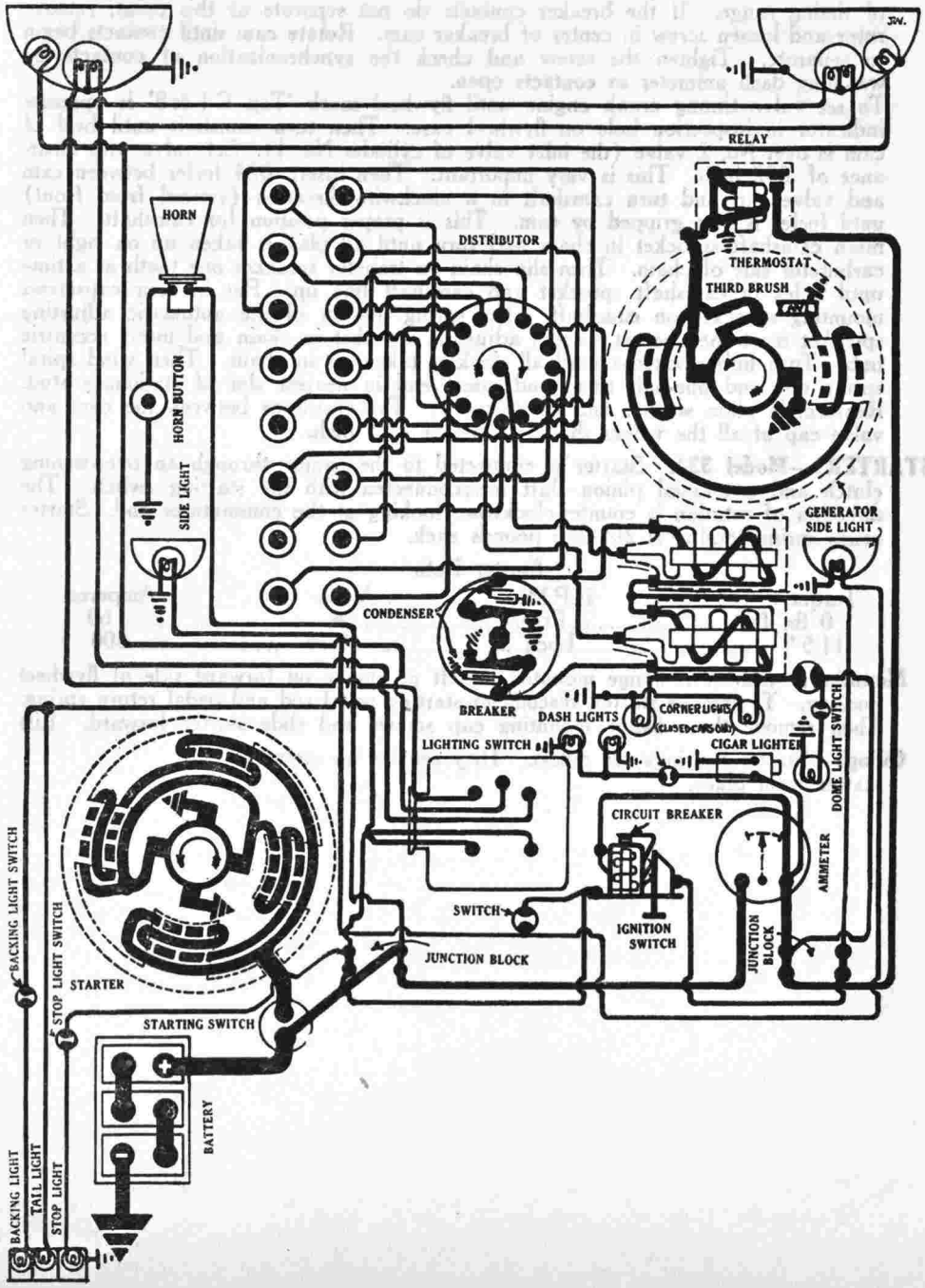
Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control lever advanced approximately 7/10 or in a position between the 'eight' and the 'nine o'clock' position on the steering wheel. To check timing, crank engine until piston No. 1 reaches top dead center on compression stroke. At this point the flywheel mark 'Top C 1 & 8' will be opposite the indicator in the inspection hole in the flywheel case. Then advance spark control lever 7/10 of timing range. If breaker contacts do not separate at this point, remove rotor and loosen screw in center of breaker cam. Rotate cam until contacts begin to separate. Tighten the screw and check synchronization of contacts by watching dash ammeter as contacts open.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 18 MM. metric. Gaps are .025 inch.

Valve Timing:—INLET VALVES:—Head diameter, 1 19/32 inches; stem diameter, 3/8 inch; stem length, 6 11/32 inches (over all); valve lift, 11/32 inch; spring pressure, 56 pounds valve closed and 102 pounds valve opened; tappet clearance, .028 inch. Inlet valves open 10° or 1 7/64 inches after top dead center and close 50° after lower dead center.

EXHAUST VALVES:—Head diameter, 1 19/32 inches; stem diameter, 3/8 inch;



STUTZ

MODEL AA (LATE 1927)
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

stem length, 6 11/32 inches (over all); valve lift, 11/32 inch; spring pressure, 56 pounds valve closed and 102 pounds valve open; tappet clearance, .028 inch. Exhaust valves open 46° before lower dead center and close 10° after top dead center. Valve stem guides are removable. Oversize valve stems are not made. Inlet opening and exhaust closing of cylinder No. 1 is marked on flywheel by mark 'IN OPEN'. This is 10° or 1 7/64 inches past the top dead center mark 'Top C 1 & 8'.

To set timing, crank engine until flywheel mark 'Top C 1 & 8' is opposite indicator in inspection hole in flywheel case. Then turn camshaft until heel of cam is over No. 2 valve which is the inlet valve of cylinder No. 1. Set backlash or clearance at .032 inch. This is very important. Then insert .004 feeler between cam and valve cap and turn camshaft in a clockwise direction (viewed from the front) until all play is taken up and the cam just grips the feeler. This is the proper position for the camshaft. Then mesh camshaft sprocket in chain and turn until all play is taken up in right or carburetor side of chain. Then slip chain on transfer sprocket one tooth at a time until camshaft sprocket holes line up with holes in camshaft flange so that capscrews can be inserted without disturbing relative positions of camshaft and crankshaft. Put in the four capscrews mounting sprocket on camshaft. The automatic adjusting sprocket must then be assembled. Mesh adjusting sprocket in chain and insert eccentric hub. Turn hub clockwise until all play is taken up in chain. Then wind spiral spring up one and one half turns and insert end in nearest slot of stationary hub. Put on plain washer and insert cotter. The clearance between the cam and the valve cap on all valves should be set at .028 inch with the camshaft turned so that the heel of the cam is over the valve cap.

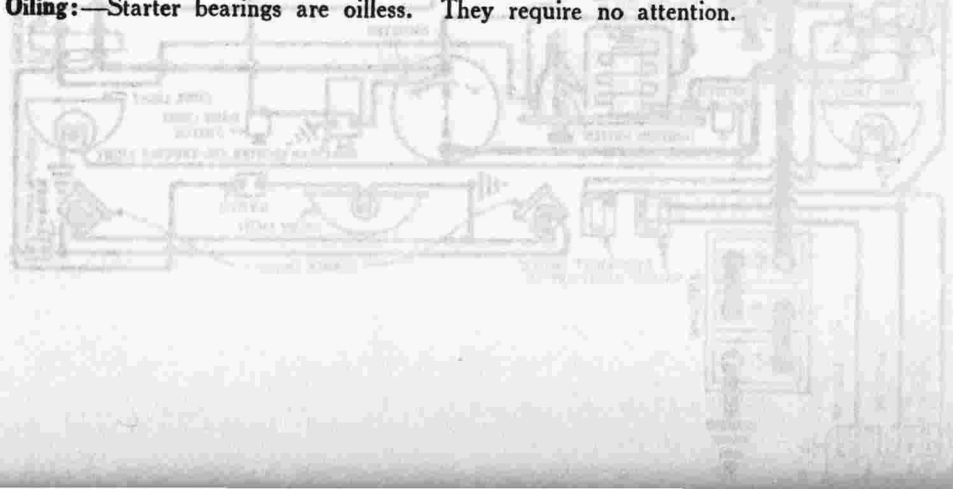
STARTER:—Model 726-C. Starter is connected to the engine through a disc clutch and a manually operated pinion shift interconnected with the starting switch. Starter brush spring tension is 24-28 ounces.

Starter Data

Torsue	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Mounting:—Starter is flange mounted on left of engine at forward side of flywheel housing. To remove starter, disconnect starter pedal rod and starter cable. Then remove three flange mounting cap screws and slide starter forward from place.

Oiling:—Starter bearings are oilless. They require no attention.



GENERATOR:—Model 949-H. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting a resistance in the field circuit and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator endplate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the nut after making the adjustment. The maximum charging rate is 21 amperes (cold) reached at 1450 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
21	8.5	1450	9-12	7.6	2000

Generator motoring draws 5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is mounted by special flange on right of engine at rear of timing chain case. To remove generator, disconnect water pump drive coupling and three flange mounting cap screws. Then slide generator to rear and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every 750 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay closes at 675 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is 2 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch, contacts closed.

LIGHTING:—Delco-Remy Switch Model 1308. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Auxiliary head lamps are 6-8 volt, 4 cp. S.C. Stop, backing and inspection lamps are each 6-8 volt, 21 cp. S.C. Dash and tail lamps are each 6-8 volt, 2 cp. S.C. Quarter lamps are 6-8 volt, 21 cp. D.C. Front compartment lamps are 6-8 volt, 3 cp. D.C.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the ignition switch. A current of 25-30 amperes causes this device to operate limiting the current to 10-15 amperes.

STUTZ

MODEL BB (1928)

SERIAL NOS. 87226 UP (131" WB) 70926 UP (145" WB)

DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM

DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type A-617-SH, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 170 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 32 hours. Battery has 17 plates per cell each 5¼ inches high, 5⅝ inches wide and ⅛ inch thick. Battery is mounted under the left front seat.

IGNITION:—Coil Model 527-A (2 used). Coils are mounted on hood at right of engine. Each coil fires one set of spark plugs and ignition circuit of each coil is entirely independent except that only one distributor is used. Ignition current is 2 amperes at 6 volts with engine running and 6 amperes at 6 volts with engine stopped per coil.

Distributor Model 4028. Breaker contact gap is .015-.020 inch with contacts fully open. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 40° (engine). Automatic advance begins at 400 R.P.M. (engine). Maximum automatic advance is 20° at 2600 R.P.M. There are two sets of breaker contacts operating on a single cam each controlling one coil and firing one set of plugs. The contacts must be synchronized for correct ignition. (See Timing.)

Mounting:—Distributor is mounted on special accessory bracket at right front of engine. To remove distributor, disconnect manual advance rod and primary leads. Remove head with high tension cables intact. Then remove manual advance stop screw and lift distributor straight up.

Oiling:—Put 8 or 10 drops of light oil in the oiler every 750 miles. Put a small amount of vaseline on the face of the breaker cam every 1000 miles.

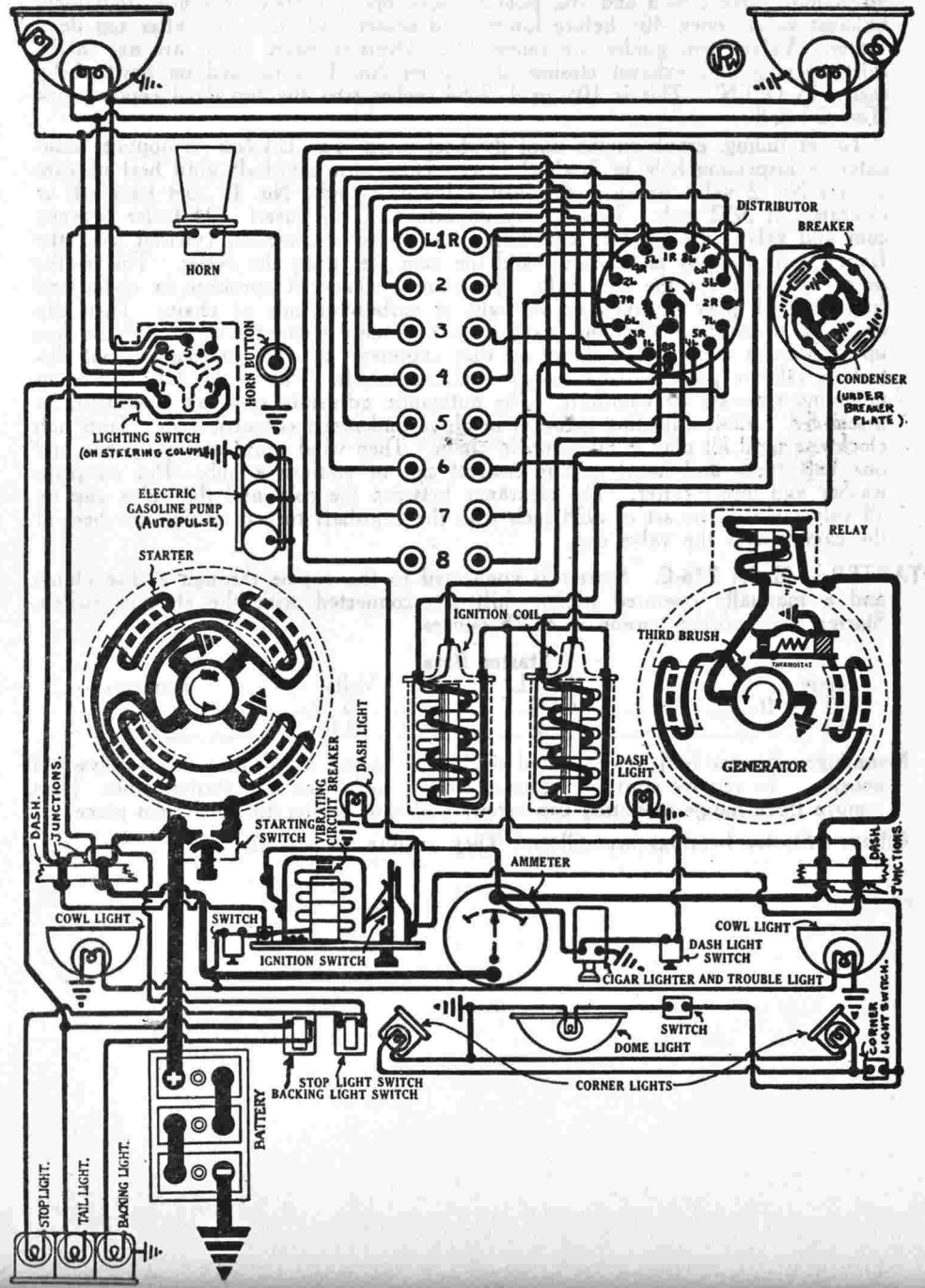
Timing:—Synchronization of Contacts. Synchronize contacts before setting timing. Two sets of contacts are used on a single cam. They must open at the same instant to fire both spark plugs in each cylinder simultaneously. Connect a six volt lamp in each primary circuit. Crank engine slowly. Both lamps should go out at the same instant. If they do not contacts must be synchronized. Loosen 4 lock screws on breaker plate and shift plate until correct adjustment is obtained. Tighten the lock screws and check contact gap. It must be within limits of .015-.020 inch. This is important to secure correct high speed performance of car.

Timing of Distributor:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark advance lever advanced approximately 7/10. To check timing, crank engine until piston No. 1 reaches top dead center on compression stroke with flywheel mark 'Top C 1&8' in center of inspection hole in upper flywheel housing. Then advance spark lever approximately 7/10 of range to a position similar to "8:30" on a clock dial. Breaker contacts should separate at this point with dash ammeter indicating 12 amperes discharge. If ammeter indicates 6 amperes discharge the contacts are not synchronized. To set timing, remove rotor and loosen screw in center of breaker cam. Rotate cam until contacts begin to separate and tighten lock screw. Make certain that segment over rotor brush is connected to spark plug in cylinder No. 1 and connect spark plugs in following order clockwise around distributor head: 1R-8L-6R-3L-2R-7L-5R-4L-8R-1L-3R-6L-7R-2L-4R-5L.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 18 MM. metric. Gaps are .022 inch.

VALVE TIMING:—Specifications:—Head diameter, 1 19/32 inches; stem diameter, ⅜ inch; valve length, 6 11/32 inches (over all). Valve stems threaded with ⅜-24 S.A.E. thread. Valve lift is 11/32 inch. Spring pressure, 56 pounds with



valve closed (spring length, 2 27/64 inches) and 102 pounds with valve open (spring length 2 5/64 inches). Tappet clearance or lash between valve cap and cam is .028 inch.

Valve Timing:—Inlet valves open 10° past top dead center and close 50° past lower dead center. Exhaust valves open 46° before lower dead center and close 10° past top dead center. The 10° point is 1 7/64 inches past top dead center.

To Set Valve Timing:—Cam shaft sprocket should be removed from camshaft and automatic adjusting sprocket in upper chain must be off the engine. Crank engine until flywheel mark 'EX CL 1 & 8 IN OP 1 & 8' is in exact center of inspection hole in upper flywheel housing. This mark is 1 7/64 inches on flywheel after top dead center mark and engine can be timed from piston position. Then turn camshaft until heel of cam is directly over No. 1 valve (exhaust valve in No. 1 cylinder) and set clearance between cam and valve cap at exactly .028 inch. This is very important. Then turn camshaft in direction of rotation (clockwise from front) until exhaust valve has just closed. This can be determined by oscillating valve back and forth by means of an adjusting rod inserted in the valve cap hole. The additional force required to oscillate the valve after it is seated is perceptible. Then mesh camshaft sprocket in chain and rotate sprocket counter-clockwise to take up all slack in driving side of chain. Line up holes in camshaft sprocket and camshaft flange by slipping the upper chain one tooth at a time on the transfer sprocket. Then install the four cap screws mounting sprocket on camshaft flange. Mesh automatic adjusting sprocket and insert eccentric adjusting hub. Wind up spiral spring 1½ turns to take up slack and insert spring tongue in nearest slot in stud. Assemble plain washer and insert cotter.

STARTER:—Model 726-C. Starter is connected to the engine through a clutch and manually operated pinion shift connected with the starting switch. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 200 R.P.M. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting switch rod. Remove 3 flange mounting cap screws and pull starter forward from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model 391. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush system combined with a thermostat. Thermostat contacts open at 165 dgrees F. inserting a resistance in the field circuit and reducing the output approximately 50%. To adjust generator output, remove commutator cover band and shift the third brush mounting plate. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The mounting plate is held in position by friction washers. The maximum charging rate is 18 amperes reached at 1600 R.P.M. or 30 miles per hour.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
22-24	8.4	1400	10-12	7.5	1600

Shunt field current is 1.8-2.3 amperes at 6 volts. Brush spring tension is 16-20 ounces.

Mounting:—Generator is mounted by special flange at rear of accessory bracket on right of engine. The water pump is driven by an extension of the generator shaft. To remove generator, disconnect water pump drive coupling and generator lead. Remove three flange mounting cap screws and pull generator to rear.

Oiling:—Put 4 or 5 drops of light oil in the oiler on the commutator end of the generator every 750 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay closes when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .015-.020 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Switch Model 1315. Switch is mounted on lower end of steering column head. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base) Mazda No. 1110. Auxiliary head and side lights are each 6-8 volt, 6 cp. S.C. Mazda No. 81. Stop, backing and corner lights are each 6-8 volt, 21 cp. S.C. Mazda No. 1129. Dash, tail and tonneau lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the back of the ignition switch. It begins to vibrate with a current flow of 25-30 amperes and continues with 10-15 amperes.

Sun

Light Six Model 17 (1917-18)
Remy Generating, Starting and Lighting System
Remy Ignition

Battery.—Battery is 6 volt, 85 ampere-hour: The negative (—) terminal is grounded.

Ignition.—Breaker contacts should separate .020 to .025 inch. If burned or pitted, affecting the ignition, resurface them with a very fine, flat jeweler's file or a strip of worn No. 00 sand paper.

Timing.—Breaker contacts should separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be .025 to .030 inch.

Oiling.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions should be given every 500 miles.

Starter.—Starter is connected to the engine through a Bendix drive.

STARTER DATA. MODEL 180-B

Torque	R. P. M.	Amperes	Volts
0 lb. ft	3600-4000	55- 65	6.0
4 lb. ft	1200-1450	200-220	4.6
6 lb. ft	900-1100	290-310	4.5
10 lb. ft	300- 450	460-600	3.6
14 lb. ft	Lock	550-600	3.2

Oiling.—Put 5 or 6 drops of light engine oil in the starter bearing oilers every month.

Generator.—Generator current regulation is by vibrating regulator.

GENERATOR DATA, No. 166-B

Amperes	R. P. M.	Volts
0	600- 650	6.0
7	780- 850	6.4
14.5	2500-3000	7.2

Operating freely as a motor, generator should run at 470 R. P. M., drawing 5.5 amperes at 5.8 volts. Shunt field winding should take 4 amperes at 6 volts.

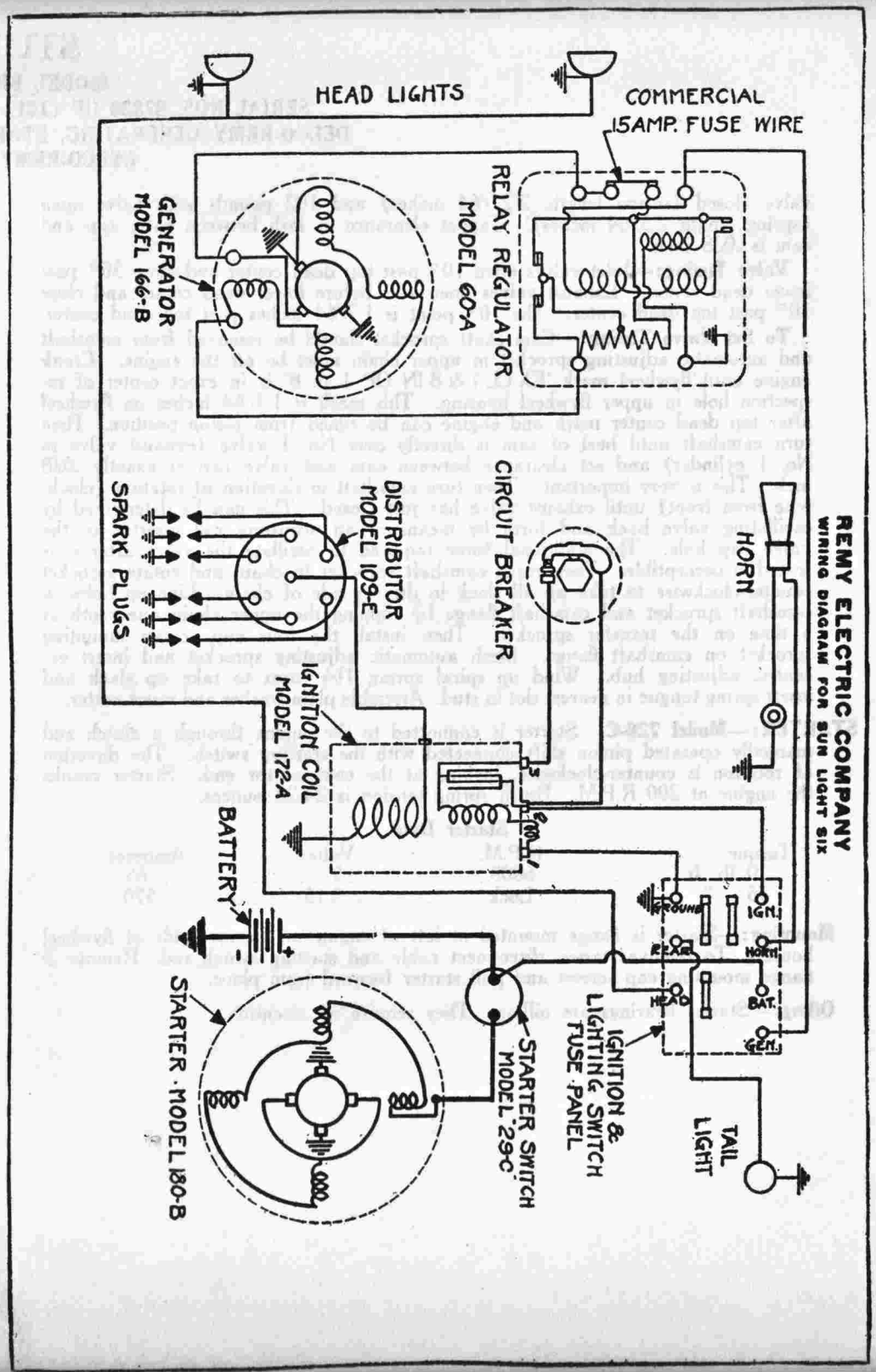
Oiling.—Put 5 or 6 drops of light engine oil in the oiler on commutator end of generator every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

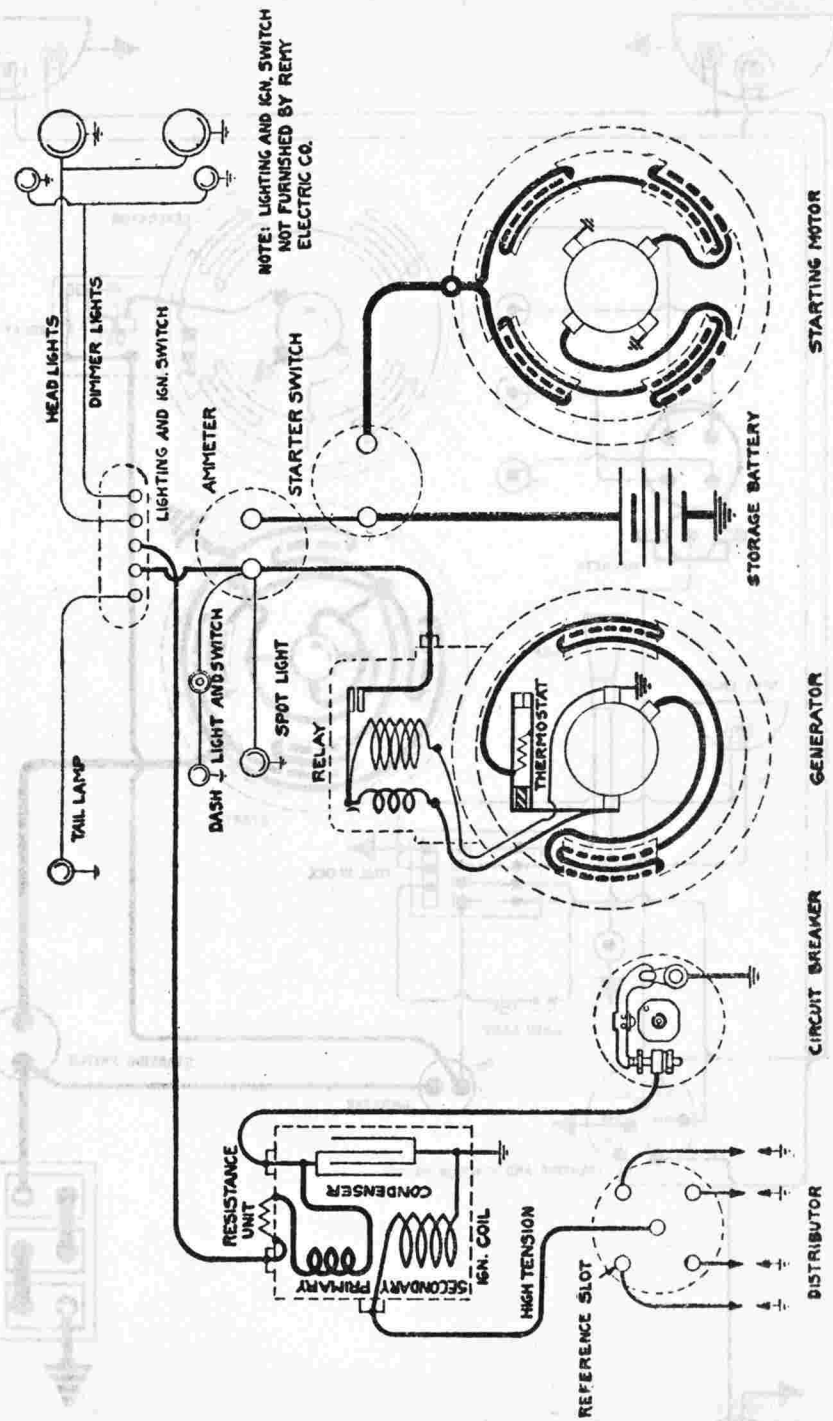
Relay-Regulator.—Relay is combined with regulator. Relay should close at 8-10 miles per hour and open at 6-8 miles per hour. The air gap between relay armature (moving member) and coil core should be .012 to .015 inch, contacts closed. Contacts should separate .012 to .015 inch. Clean relay and regulator contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a strip of well worn No. 00 sand paper, drawing a piece of unglazed paper between them to remove all grit and adjust before again putting into service. Increasing spring tension on regulator armature will increase the output. Decreasing the spring tension will decrease the output.

Lamps.—Head lamps are 6-8 volt, 20 cp. Tail lamp is 6-8 volt, 2 cp.

Fuses.—There is a 15 ampere fuse on relay-regulator base. Use 15 ampere commercial fuse wire in replacing it. Other fuses are 20 ampere.

Model Numbers.—Starter is No. 180-B. Generator is No. 166-B. Ignition coil is No. 172-A. Distributor is No. 109-D-E. Relay-regulator is Model 60-A.





TEMPLAR

MODEL 445 (1917-18)

Remy Starting and Lighting System
Remy or Bosch Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal of the battery is grounded.

Ignition.—Some cars are equipped with a Bosch magneto and some with a Remy battery ignition system, the equipment being optional.

Care.—Clean contacts with gasoline whenever necessary. Should they become badly burned or pitted, resurface them with a very fine, flat jeweler's file or a small strip of worn No. 00 sand paper. Further directions for the care of and the internal circuits of the magneto are given on Page No. 186. Battery timer contacts should open .020 inch to .023 inch. Magneto breaker contacts should open .014 inch to .016 inch.

Spark Plug Gaps.—The proper spark plug gap with battery ignition is .028 inch to .031 inch. The proper spark plug gap when magneto ignition is used is .018 inch to .023 inch.

Timing.—Contacts should just begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Starter.—The starter is connected to the engine by a Bendix drive. The following data applies to the Model 305-C starter used:

Torque (with 6" pulley)	R. P. M.	Amperes	Volts
4 lbs.	2500	110-130	5.4-5.6
8 lbs.	1900	165-175	5.1-5.4
12 lbs.	1500	215-225	4.8-5.2
16 lbs.	1000	265-275	4.6-4.9
20 lbs.	650	325-335	4.3-4.5
9 ft. lbs.	Lock torque	540-560	3.5-3.65

Put several drops of light engine oil in each of the motor oilers once every month.

Generator.—Voltage regulation is by third brush system. There is also a thermostat to reduce the charging rate when the high initial charging rate tends to overheat the battery. The following data applies to the generator (No. 234-B), all tests to be made with relay in circuit and thermostat contacts closed:

Amperes	R. P. M.	Volts
0	515	6.4
7	745	7.1
14	1000	7.9
22	1800	8.6
21	2000	8.6
17	2500	8.2

Spring tension on the main brushes should be 17 to 20 oz. Spring tension on the third brush should be 13 to 17 oz. Field draws 5 amperes at 6.4 volts, current flowing. Once every two weeks or every 500 miles put 4 or 5 drops of light engine oil in each of the generator oilers.

Lamps.—Head lamps are 6-8 volts, 18 cp. Dimmer lamps are 6-8 volts, 4 cp. Spot light is 6-8 volts, 36 cp. Tail lamp is 6-8 volts, 2 cp. Dash lamp is 6-8 volts, 2 cp. Inspection lamp is 6-8 volts, 2 cp.

TEMPLAR

MODEL 4-45 (1920-21-22)

BIJUR GENERATING, STARTING AND LIGHTING SYSTEM

SIMMS MAGNETO IGNITION

BATTERY.—(1920) Columbia, 6 volt, 100 ampere-hour. (1921-22) Prest-O-Lite, 6 volt, 115 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .015 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 4 or 5 drops of light machine oil in each of the magneto oilers every month. If the car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .020 inch.

STARTER.—Type ED-160, M-1390. Starter is connected to the engine through a Bijur automatic pinion shift. Starter cranks the engine at 140 R.P.M., armature revolving at 1800 R.P.M., taking 160 amperes. Lock torque is 16 pound-feet, current being 665 amperes at 3.6 volts. Running freely, starter takes 30 amperes at 5.6 volts, armature revolving at 6800 R.P.M. Pressure of brushes on commutator is 35 ounces.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

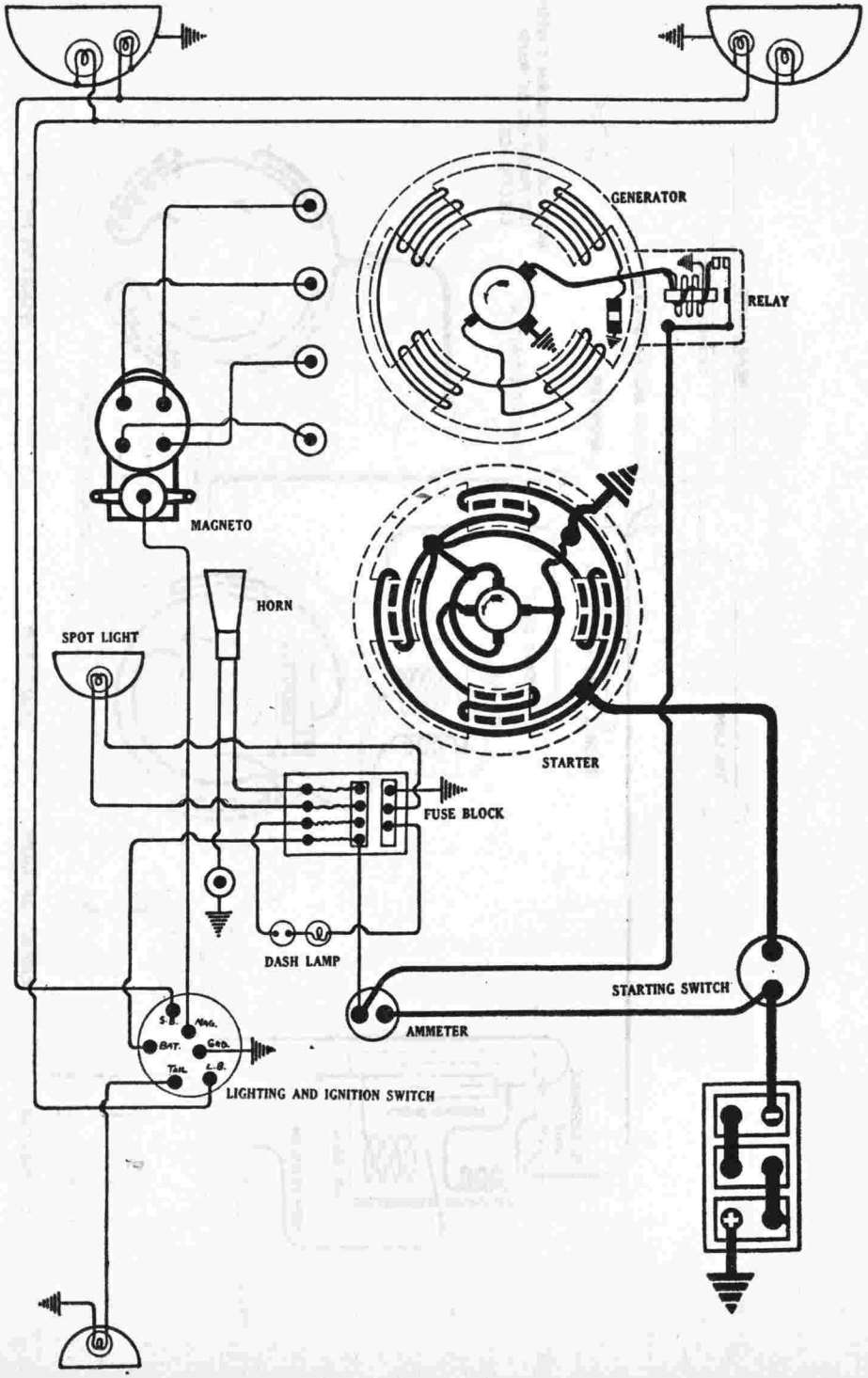
GENERATOR.—Type L-220, M-1376. Generator current regulation is by third brush system. The maximum current output is 15 amperes, reached at 15-20 miles per hour or 1000-1500 R.P.M. of the armature. Charging rate is varied by inserting a special toothed wrench in the adjusting hole in the commutator end plate and shifting the third brush assembly through a ratchet engagement. Turn the adjusting wrench to the right (facing the commutator end) to increase the charging rate, and to the left to decrease the charging rate. Maximum current output must not exceed 15 amperes at 1400 R.P.M. Pressure of brushes on commutator is 14 ounces. Shunt field current is 2.5-3 amperes at 3.4 volts.

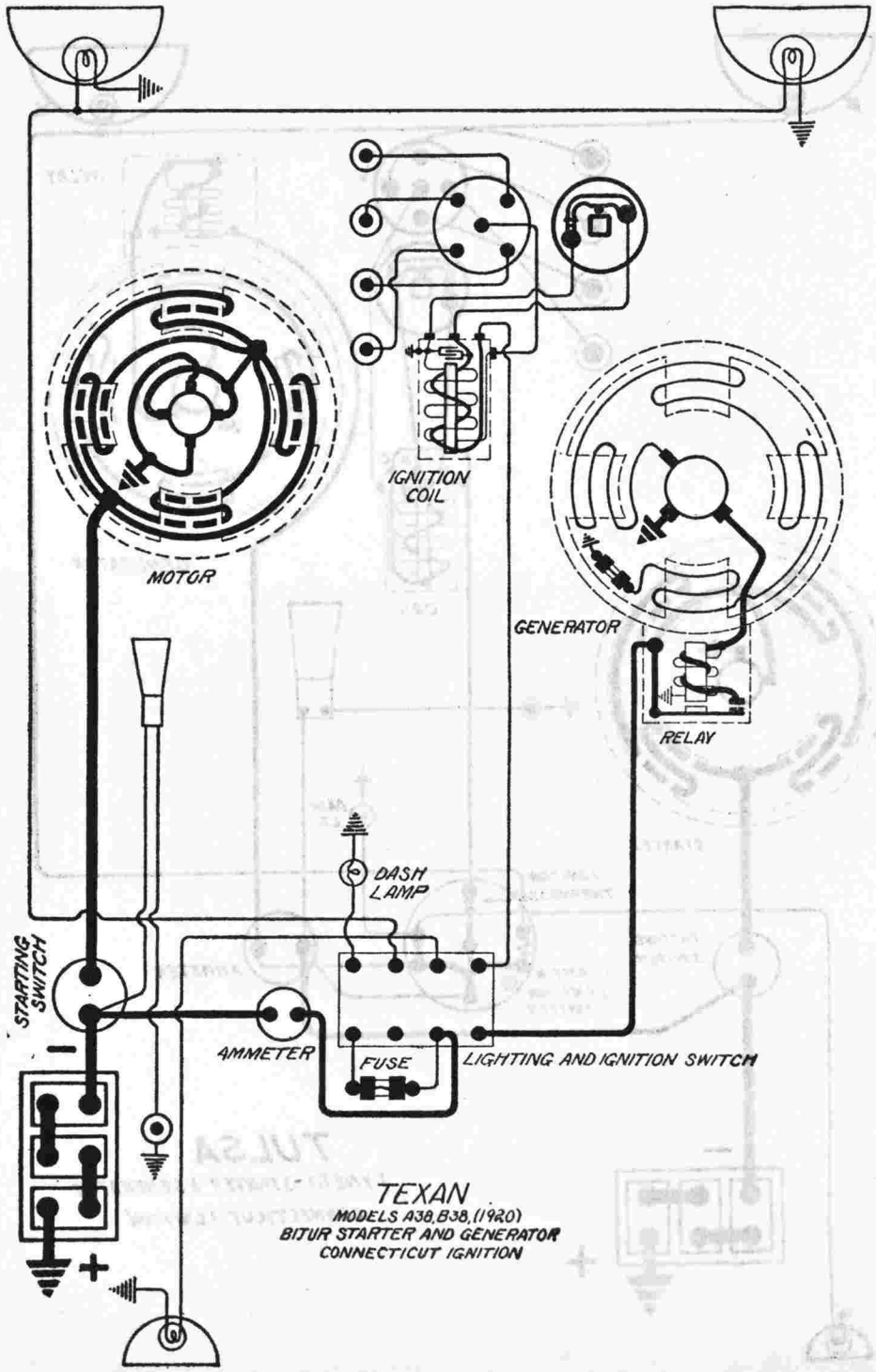
OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Type Z-7. Relay closes at 8-9 miles per hour or 550 R.P.M. of the armature and opens at 6-8 miles per hour or 450-550 R.P.M. of the armature. Relay contacts separate .015 inch. Air gap between relay armature (moving member) and coil core is .030 inch, with contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp. Spot light is 6-8 volt, 36 cp.

FUSES.—Fuses are 20 ampere.





TEXAN

MODELS A-38 AND B-38 (1919-20-21)
BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
DELCO OR CONNECTICUT IGNITION

BATTERY.—Prest-O-Lite, Type 611-KHNS, 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .018 inch. When the condition of the contacts affects the ignition, renew the inner breaker mechanism. For temporary service, resurface with fine emery cloth.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Type FD-140, M-1286. Starter is connected to the engine through a Bijur automatic pinion shift. Lock torque is 12.5 pound-feet, current being 375 amperes at 3.5 volts. Running freely, starter takes 35-45 amperes, armature revolving at 5000 R.P.M. Pressure of brushes on the commutator is 30 ounces.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR.—Type P-230, M-1329. Generator current regulation is by the third brush system. Maximum current output is 11-13 amperes, reached at 1700 R.P.M. of the armature or 25 miles per hour. Charging rate is varied by inserting a special toothed wrench in the adjusting hole in the commutator end plate and moving the third brush assembly through a ratchet engagement. Turn the adjusting wrench in a clockwise direction to increase the charging rate and in a counter-clockwise direction to decrease the charging rate.

RELAY.—Relay is mounted on the generator frame. Relay closes at 8-10 miles per hour or 750-800 R.P.M. of the armature and opens at 6-8 miles per hour or 700-750 R.P.M. of the armature. Relay contacts separate .015 inch. Air gap between relay armature (moving member) and coil core is .025 inch, contacts closed. Adjust the spring tension on relay armature so that contacts close when the voltage of the generator, measured across the main brushes, reaches 6.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before agan putting into service.

LAMPS.—Head lamps are 6-8 volt, 16 cp. Dash and tail lamps are 6-8 volt, 5 cp.

FUSES.—Fuses are 20 ampere.

TULSA

MODELS T, D, E (1918-19-20-21-22)

DYNETO GENERATING, STARTING AND LIGHTING SYSTEM

CONNECTICUT IGNITION

BATTERY.—Exide, Type 3-XC-15-1, 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .018 to .024 inch. They are made of tungsten When the condition of the contacts affects the ignition, renew the inner breaker mechism. For temporary service, resurface contacts with fine emery cloth.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is ¾ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUGS.—Diameter, ⅞ inch. Spark gaps are .025 inch.

STARTER.—Model No. D-162. Starter is connected to the engine through a Bendix drive. When cranking engine, starter takes 130 amperes, armature revolving at 1500 R.P.M.

Starter Data

Torque	R.P.M.	Amperes	Volts
0.0 lb. ft.	5600	25	6.4
2.5 lb. ft.	1400	150	5.8
5.0 lb. ft.	850	250	5.3
10.0 lb. ft.	250	420	4.6
14.0 lb. ft.	Lock	530	4.0

OILING.—Put several drops of light engine oil in the starter oilers every month.

GENERATOR.—Model No. C-162. Generator current regulation is by the third brush system. Maximum current output is 12-15 amperes, reached at 1200 R.P.M. of the armature or 20-25 miles per hour.

Generator Data

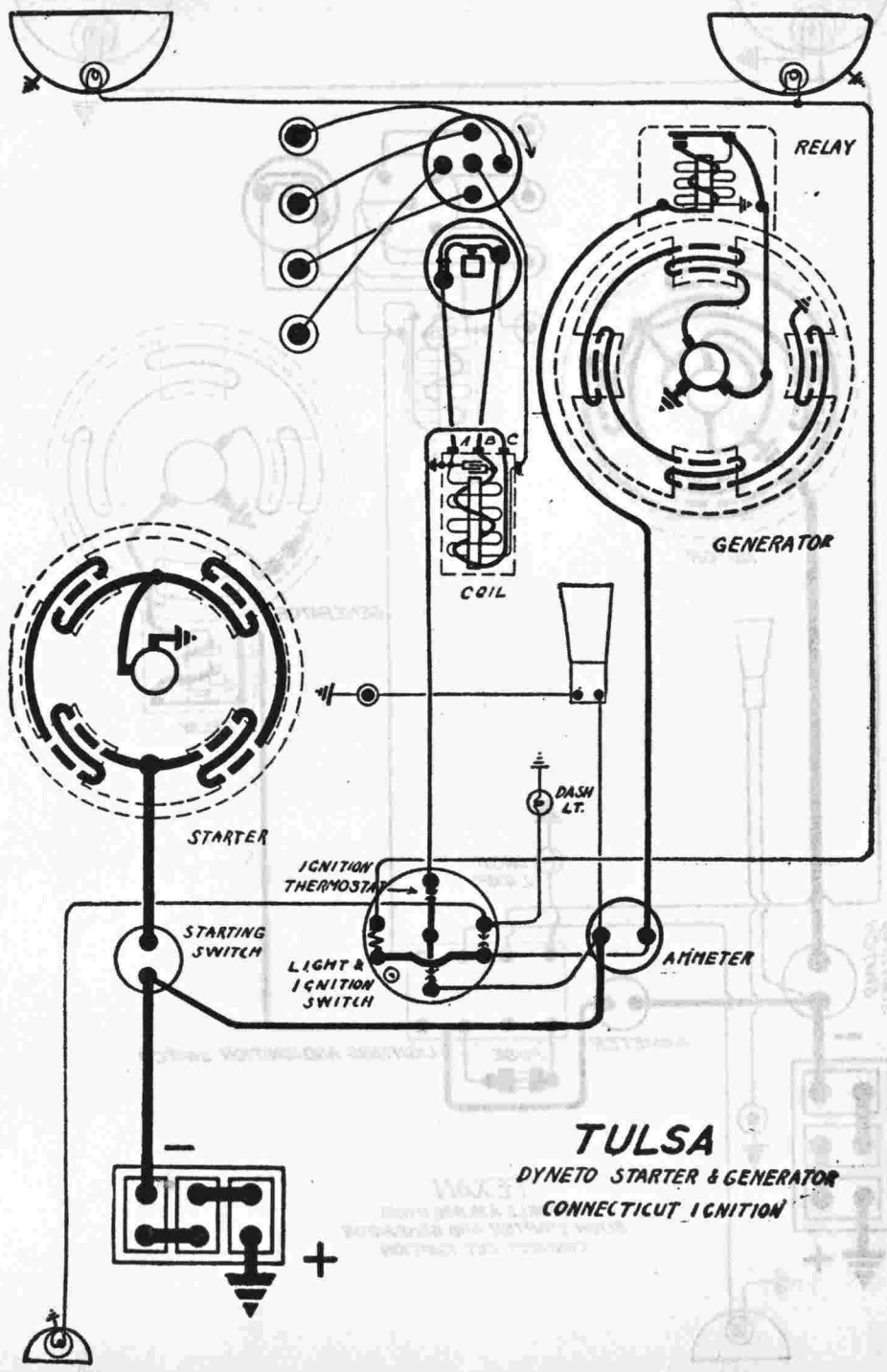
Amperes	Cold Test	R.P.M.	Amperes	Hot Test	R.P.M.
6		600	5		600
13		900	10		900
15		1200	12		1200
13.5		1600	11.5		1600
11.5		2000	10		2000

Shunt field current is 3.5 amperes at 6.5 volts. Charging rate is varied by adjustment of the third brush setting. Remove the leather plug in the commutator end of the generator, loosen the screw exposed and move in the direction of armature rotation to increase the charging rate. Move in the opposite direction to decrease the charging rate. Tighten the adjusting screw and replace the leather plug after adjustment is made.

OILING.—Put 4 or 5 drops of light engine oil in the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 8-10 miles per hour or 450-500 R.P.M. of armature, and opens at 6-8 miles per hour or 400-450 R.P.M. of armature. Relay contacts separate 3/32 inch. Air gap between relay armature and coil core is ⅛ inch. Clean relay contacts by drawing unglazed paper beween them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dash and tail lamps are 6-8 volt, 2 cp.

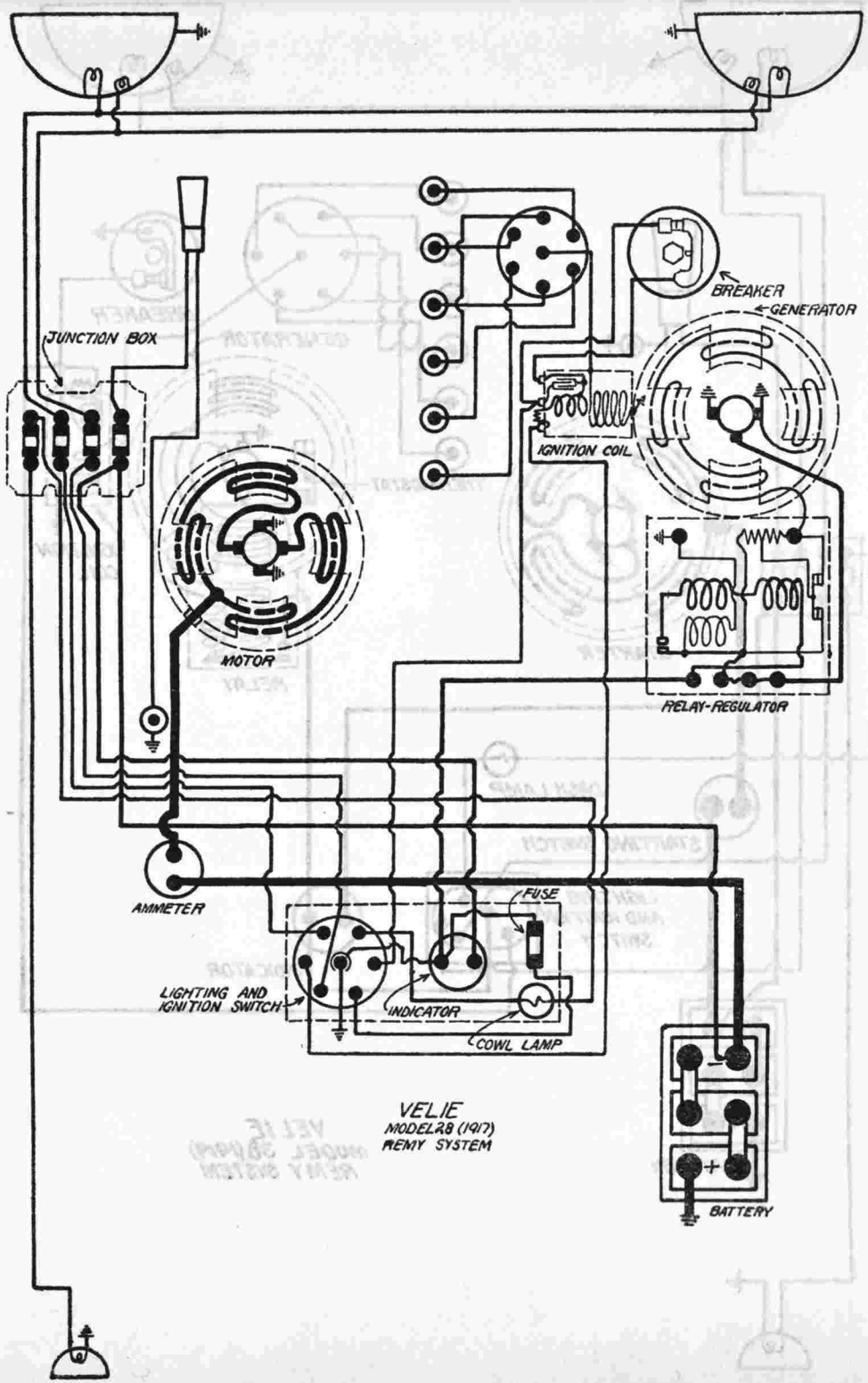


VELIE

MODELS 24, 27 (1916-17), 28 (1917), 38, 39 (1918)

Remy Generating, Starting and Lighting System

Remy Ignition



Battery.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

Ignition.—Breaker contacts separate .025 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper.

Oiling.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions should be given every 500 miles.

Timing.—Breaker contacts begin to separate when the dead center mark on the flywheel is $\frac{3}{8}$ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—The spark plug gaps are .025 to .030 inch.

Starter.—Starter is connected to the engine through a Bendix drive.

STARTER DATA, MODEL NO. 180-A

Torque	R. P. M.	Amperes	Volts
0	3600-4000	55- 65	6.0
4	1200-1450	200-220	4.6
6	900-1100	290-310	4.5
10	300- 450	460-600	3.6
14	Lock	550-600	3.2

Oiling.—Put 4 or 5 drops of light engine oil in each of starter bearing oilers every month.

Generator.—Generator current regulation is by vibrating regulator.

GENERATOR DATA, MODEL NO. 161-B-C

Amperes	R. P. M.	Volts
0	600- 650	6.0
7	780- 850	6.6
14.5	2500-3000	7.2

Operating freely as a motor, generator takes 4.5 to 5 amperes at 5.8 volts. Shunt field takes 3.5 to 4 amperes at 5.9 volts.

Oiling.—Put 3 or 4 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay-Regulator.—Relay closes at 7-9 miles per hour and opens at 5-7 miles per hour. The air gap between relay armature (moving member) and coil core is .012 to .015 inch, with contacts closed. Contacts separate .012 to .015 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service. Increasing spring tension on regulator armature will increase the output, and decreasing the spring tension will decrease the output.

Lamps.—Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash lamp is 6-8 volt, 2 cp. Tail lamp is 6-8 volt, 2 cp.

Fuses.—Fuses are 20 ampere. There is a 15 ampere fuse on relay-regulator base.

Model Numbers.—Starter is No. 180-A. Generator is No. 161-B-C. Relay-regulator is No. 60-A. Ignition coil is No. 172-A.

VELIE

MODELS 38, 39 (1918-19-20)

MODELS 39-7 AND 39 SPORT (1918)

REMY GENERATING, STARTING AND LIGHTING SYSTEM.

REMY IGNITION.

BATTERY.—Battery is 6 volt, 80 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Breaker contacts separate .015 to .018 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when dead center mark on flywheel is ½ inch past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER:—Starter is connected to the engine through a Bendix drive. Starter Nos. 303-A and C are used on the Model 38. Model No. 303-B is used on Model 39 cars having Continental 7 N. engine and No. 299-C is used on cars having the 9 N. engine.

Starter Data

	No.303 B and C.				No. 299 C.		
Torque	R. P. M.	Amperes	Volts	Torque	R. P. M.	Amperes	Volts
1 lb. ft.	1850	110-115	5.3-5.5	1 lb. ft.	1850	95-100	5.4-5.6
2 lb. ft.	1400	158-165	5.1-5.3	2 lb. ft.	1350	132-138	5.2-5.4
3 lb. ft.	1150	200-210	4.9-5.1	3 lb. ft.	1050	165-172	4.9-5.0
4 lb. ft.	850	238-250	4.6-4.8	4 lb. ft.	850	195-205	4.7-4.9
5 lb. ft.	700	275-285	4.4-4.6	5 lb. ft.	750	220-230	4.5-4.7
15 lb. ft.	Lock	550-575	3.3-3.4	19 lb. ft.	Lock	550-575	3.3-3.4

OILING.—Put 5 or 6 drops of light engine oil in each of starter bearing oilers every month.

GENERATOR.—Generator current regulation is by third brush system. A thermostat, located in the brush rigging of the generator, cuts in a resistance at a temperature of 175° F., reducing the maximum charging rate 6 amperes. Resistance also acts as a shunt field fuse. The thermostat is intended to change the charging rate as demand of seasons or car operations repuires. Never touch the thermostat points. Generator No. 230-A is used on the Model No. 38, and No. 231-A-B on the Model No. 39-7 and 39 Sport.

Generator Test Data

Amperes	R.P.M	Volts	Amperes	R.P.M.	Volts
0.00	515	6.4	0.00	442	6.4
7.00	745	7.1	7.00	630	7.1
14.00	1000	7.9	14.00	870	7.8
22.00	1800	8.6	21.5	1700	8.6
17.00	2500	8.2	13.72	2500	7.45
12.25	3000	7.8	7.5	3000	7.2

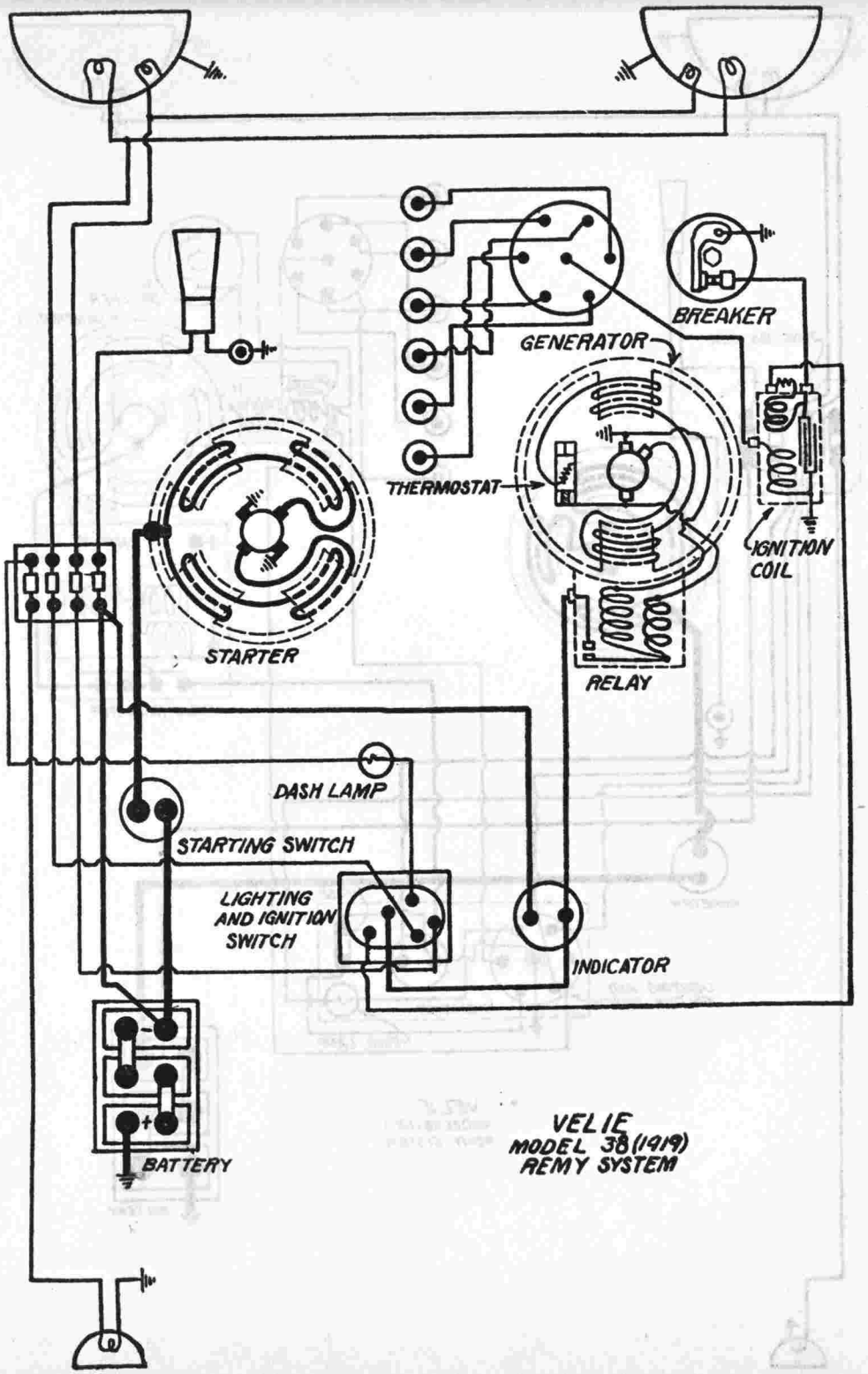
The above tests are to be made with relay in circuit and thermostat closed, but without ignition. Brush tension on main brushes is 17 to 20 ounces, and 13 to 17 ounces on third brush. Shunt field takes 5 amperes at 6.4 volts.

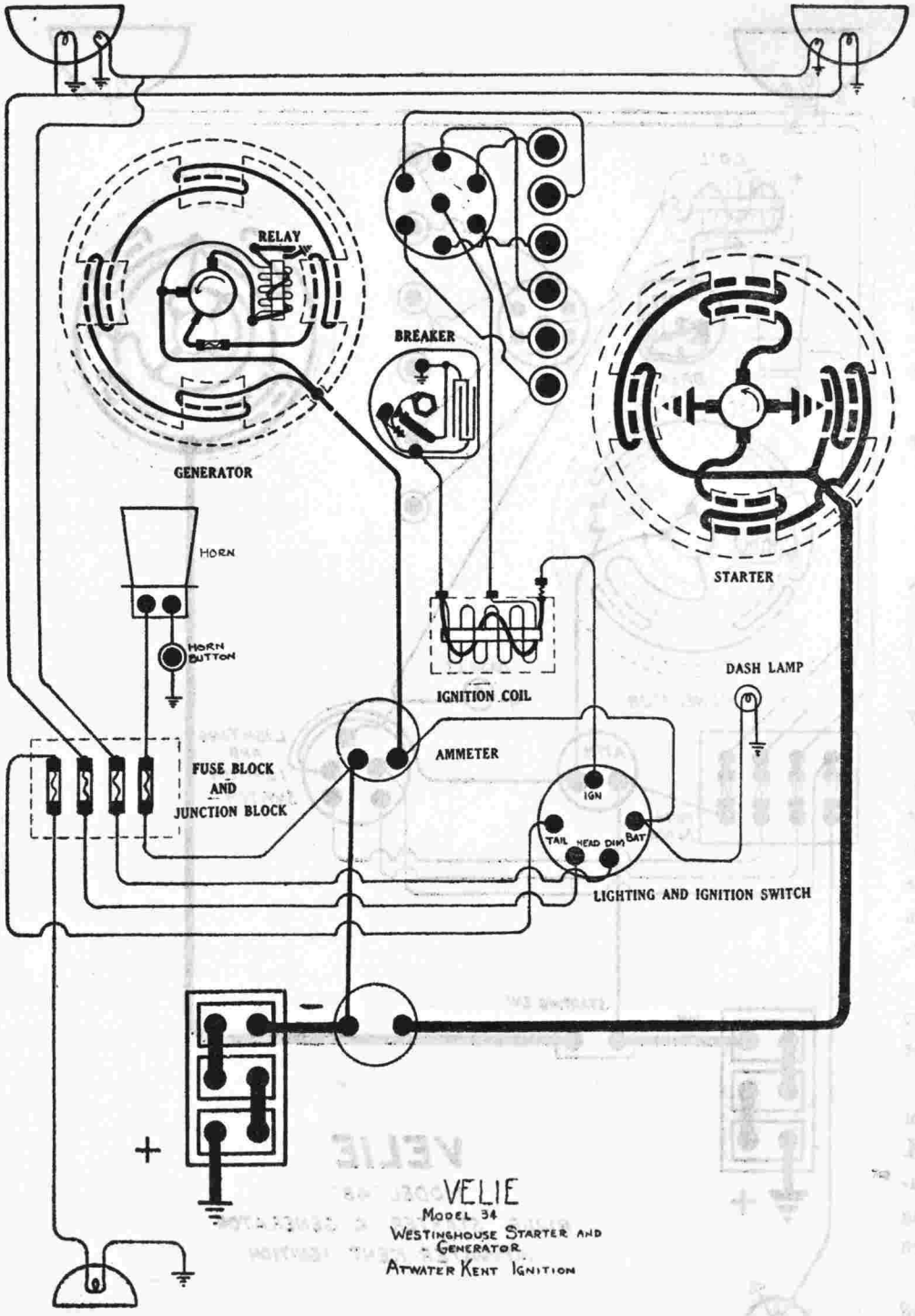
OILING.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Relay closes at 6-8 miles per hour and opens at 5-7 miles per hour. Gap between relay contacts is .012 to .015 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are connected in series and are each 3-4 volt, 2 cp.

FUSES.—Fuses are 15 ampere.





VELIE

MODEL 34 (1920-21)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER KENT IGNITION

BATTERY.—Willard, Type SJRN-3, 6 volt, 90 ampere-hour. The positive (+) terminal is grounded.

IGNITION,—Type CC or CA. Breaker contacts separate .006 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oilstone.

Oiling.—Remove the distributor cap every two weeks, and put 4 or 5 drops of light engine oil in the oil hole exposed. Put a small amount of vaseline on the cam, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Firing Order.—The firing order is 1, 4, 2, 6, 3, 5.

Spark Plug Gaps.—Spark plug gaps are .025 inch.

STARTER.—Frame No. 100, connected to the engine through a Bendix drive. Lock torque is 12 pound-feet, current being 475 amperes at 5.5 volts. Running freely starter takes 75 amperes, armature revolving at 4100 R.P.M. Brush pressure should be 1¼ to 1½ pounds.

Oiling.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

GENERATOR.—Frame No. 150. Generator current regulation is by the third brush system.

Generator Data. Frame No. 150

Amperes	R.P.M.	Volts
0	575	6.5
8.5-10.5	1000	7.-7.5
15. -16.	1450-1750	7.5
9.5-12.5	2500	7. -7.5

Shunt field takes 3.25 to 4 amperes at 6 to 6.3 volts. Move the third brush in the direction of armature rotation to increase the charging rate, and against rotation to decrease the charging rate.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oilng must be done every 500 miles.

RELAY.—Relay is mounted in the generator frame. Relay closes at 7 miles per hour or 575-600 R. P. M. of the armature and opens at 5 miles per hour or 525-575 R.P.M. of the armature. Adjust the spring tension on the relay armature so that the contacts open with a discharge current of 0-3 amperes. Adjust the air gap between the relay armature and coil core so that the contacts close when the vltage of the generator reaches 6.2 to 6.5 volts. Air gap between relay armature and coil core is .005 inch, contacts closed. Contacts separate .030 to .035 inch. Resistance of the shunt coil is 68 ohms. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp., single contact. Dimmer lamps are 6-8 volt, 2 cp., double contact. Dash and tail lamps are 6-8 volt, 2 cp., double contact.

FUSES.—Generator fuse is 5amperes. Lighting circuit fuses are 20 amperes.

VELIE

MODEL 48 (1919-20-21)
BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
ATWATER-KENT IGNITION

BATTERY.—Willard. Type SJRN-4, 6 volt, 120 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type CC. Breaker contacts separate .006 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Remove the distributor cap every two weeks, and put 4 or 5 drops of light engine oil in the oil hole exposed. Put a small amount of vaseline on the cam, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Type ED-160, M-1316. Starter is connected to the engine through a Bendix drive. Lock torque is 16.5 pound-feet, taking 665 amperes at 3.6 volts. Running freely, starter takes 30 amperes, armature revolving at 6800 R.P.M. Pressure of brushes on commutator is 25 ounces.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter bearing oilers every month.

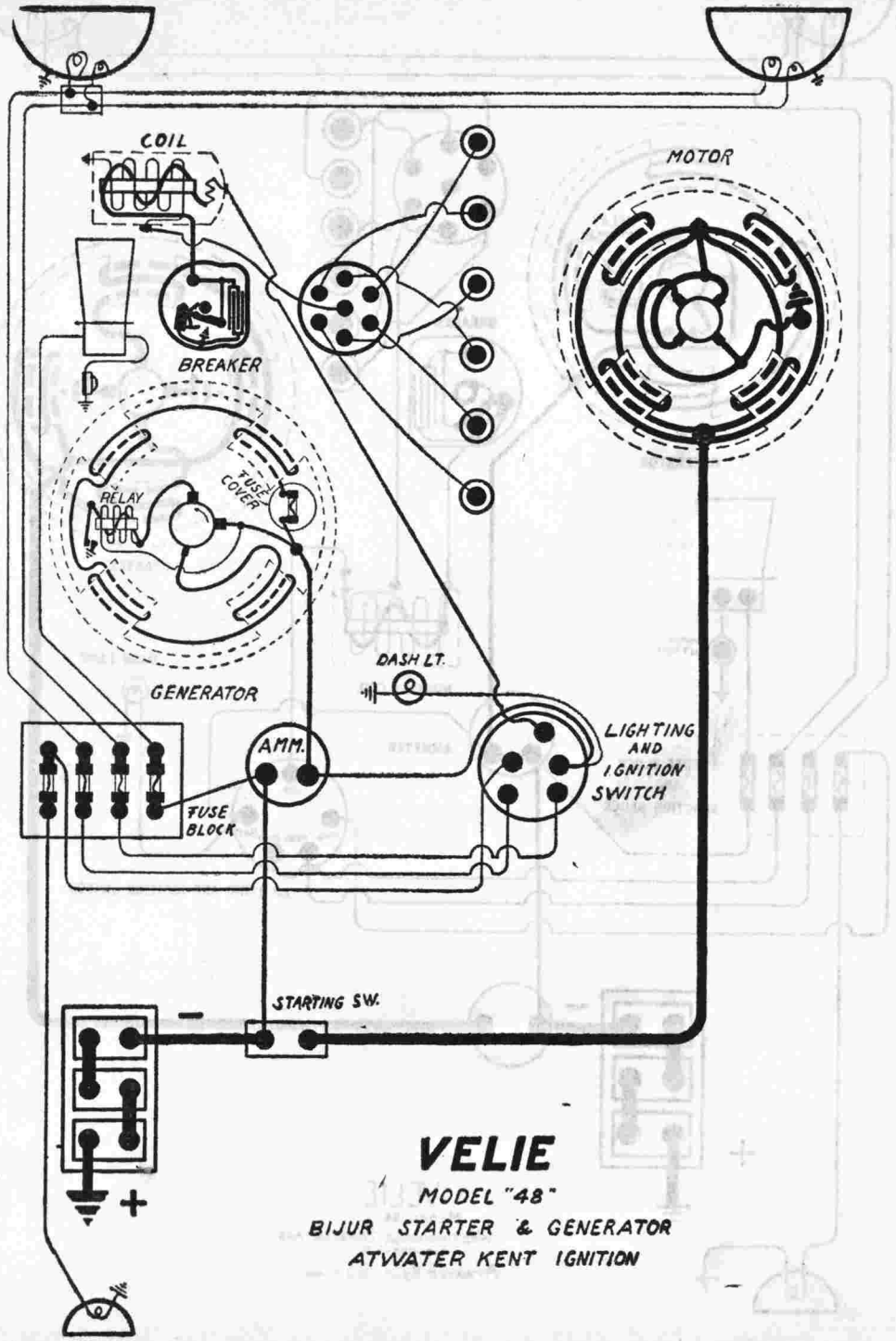
GENERATOR.—Type L-61, M-1287. Generator current regulation is by third brush system. Maximum current output is 15 amperes, reached at 1400-1600 R.P.M. of the armature, or 15-20 miles per hour. Charging rate is varied by inserting a special toothed wrench in the adjusting hole in the commutator end plate and moving the third brush assembly through a ratchet engagement. Turn the adjusting wrench in a clockwise direction to increase the charging rate and in a counter-clockwise direction to decrease the charging rate.

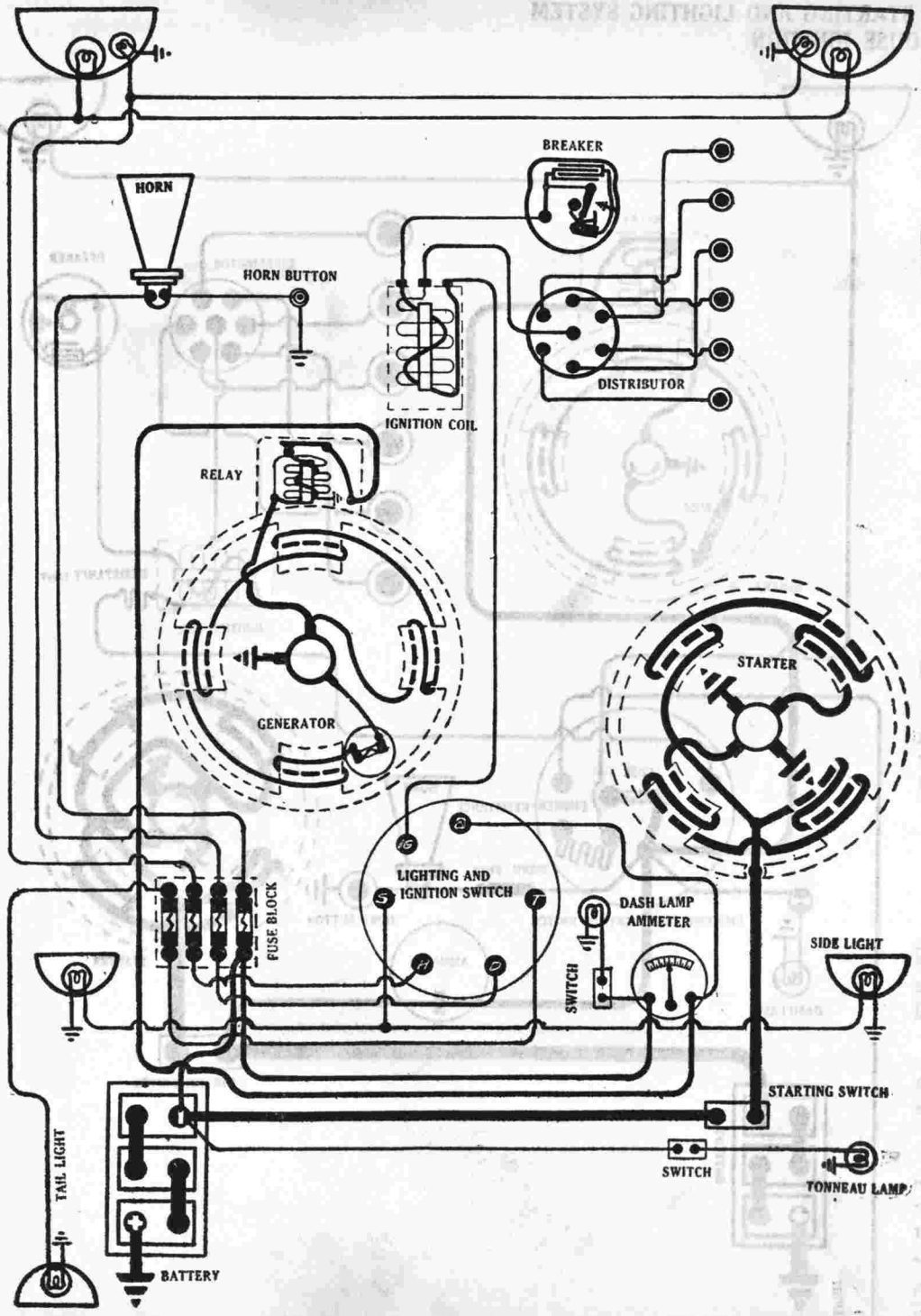
OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driver more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted in generator frame. Relay closes at 8-10 miles per hour or 550-600 R.P.M. of the armature and opens at 6-8 miles per hour or 500-550 R.P.M. of the armature. Relay contacts separate .045 inch. Air gap between relay armature and coil core is .030 inch, contacts closed. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No.00 candpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 4 cp.

FUSE.—Fuses are 15 ampere.





VELIE

MODEL 58 (1922-23-24)

WESTINGHOUSE GENERATING, STARTING, AND LIGHTING SYSTEM

ATWATER-KENT IGNITION

BATTERY.—Willard, Type SJRN-3, 6 volts, 80 ampere-hour capacity. The starting capacity is 104 amperes for 20 minutes, and the lighting capacity is 5 amperes for 18 hours. The positive (+) terminal is grounded.

IGNITION.—Atwater-Kent Battery Ignition Distributor, Type RA. Coil, Type N-3. Breaker contacts separate .006 inch. If the condition of the contact points affect the ignition, remove and resurface on a medium hard oilstone, as the contacts are made of tungsten.

Oiling.—Remove the distributor cap and put 4 or 5 drops of light engine oil into the exposed oil hole. Apply, with a toothpick, a very small amount of vaseline on cam. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 drive.

Breaker.—Breaker contact begins to separate when piston No. 1 is at top dead center, on compression stroke, spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plugs.—The spark plug diameters are 7/8 inch, and the gaps are .025 inch.

STARTER.—Frame No. 711. The starter is connected to the engine by a Bendix drive. The direction of rotation is counter-clockwise, looking at commutator end. Cranks the engine at 125-145 R.P.M. taking a current of 125-150 amperes at 5.4 volts.

Starter Test Data

Amperes	Volts	Torque	R.P.M.
30-40	5.8	0	3500-6000
525	4	17 lb.-ft.	Lock

Oiling.—Put 5 or 6 drops of light engine oil into each of the starter oilers once a month. If the car is driven more than 1000 miles in a month this care must be given every 1000 miles.

GENERATOR.—Frame No. 35-AT. The direction of rotation is counter-clockwise, looking at commutator end. The third brush system is used for current regulation. To adjust the charging rate, remove the fibre plate in front of generator housing and loosen the brass nut, move the third brush in the direction of rotation (counter-clockwise) to increase the charging rate, and to decrease the same, move the third brush in the opposite direction (clockwise). The maximum charging rate is 12-14 amperes reached at 1250-1500 R.P.M. of the armature or 20 M.P.H.

Generator Test Data

Amperes (Hot)	R.P.M.
0	500- 550
12-14	1250-1500

Generator motoring freely, takes a current of 5-7 amperes, at 6 volts. The field test draws a current of 2-4 amperes, at 6 volts.

OILING: — Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every two weeks or each 500 miles.

REALY:—Type 301,210B. Relay contacts close at 450 R.P.M. of the generator armature or 7 M.P.H. with a generator voltage of 7-7.5 volts and open at 400 R.P.M. of the armature at 6 M.P.H with a discharge current of 0-2 amperes. Relay contacts separate .045 inch and the air gap between the relay armature and coil core is .005 inch, contacts closed.

LIGHTING.—The head lamps are each 6-8 volts, 21 cp. Dimmer lamps are 6-8 volts, 4 cp. The dash, side, and tail lamps are each 6-8 volts, 2 cp. All lamps are of the single contact type.

FUSES.—All fuses are 10 amperes. Generator field fuse is 5 amperes.

MODELS 58 (1924), 56 (1924-25), 60 (1925)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WESTINGHOUSE IGNITION

BATTERY:—Willard, Type SJRN-3. 6 volt. 80 ampere-hour capacity. The starting capacity is 104 amperes for 20 minutes, and the lighting capacity is 5 amperes for 18 hours. The positive (+) terminal is grounded.

IGNITION.—Distributor Type JA. Coil Type SC. Breaker contacts separate .012 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone or with a fine, flat jeweler's file.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every two weeks. If the car is driven more than 500 miles in two weeks, this oiling must be done every 500 miles. At the same time apply a small amount of vaseline on the interrupter cam.

Timing:—Breaker contacts begin to separate when piston No. 1 is at top dead center, on compression stroke, spark control lever and breaker assembly fully retarded.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—The spark plug diameters are 7/8 inch, and the gaps are .025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1 5/16 inches; stem diameter, 5/16 inch; stem length, 5 1/16 inches. Tappet clearance is .006 inch (hot). Spring pressure is 42 pounds. Inlet valves open at 7 degrees after top dead center and close at 47 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 5/16 inches; stem diameter, 5/16 inch; stem length, 5 1/16 inches. Tappet clearance is .006 inch (hot). Spring pressure is 42 pounds. Exhaust valves open 45 degrees before lower dead center and close at 5 degrees after top dead center.

STARTER:—Frame No. 711. The starter is connected to the engine by a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Cranks the engine at 125-145 R.P.M. taking a current of 125-150 amperes at 5.4 volts.

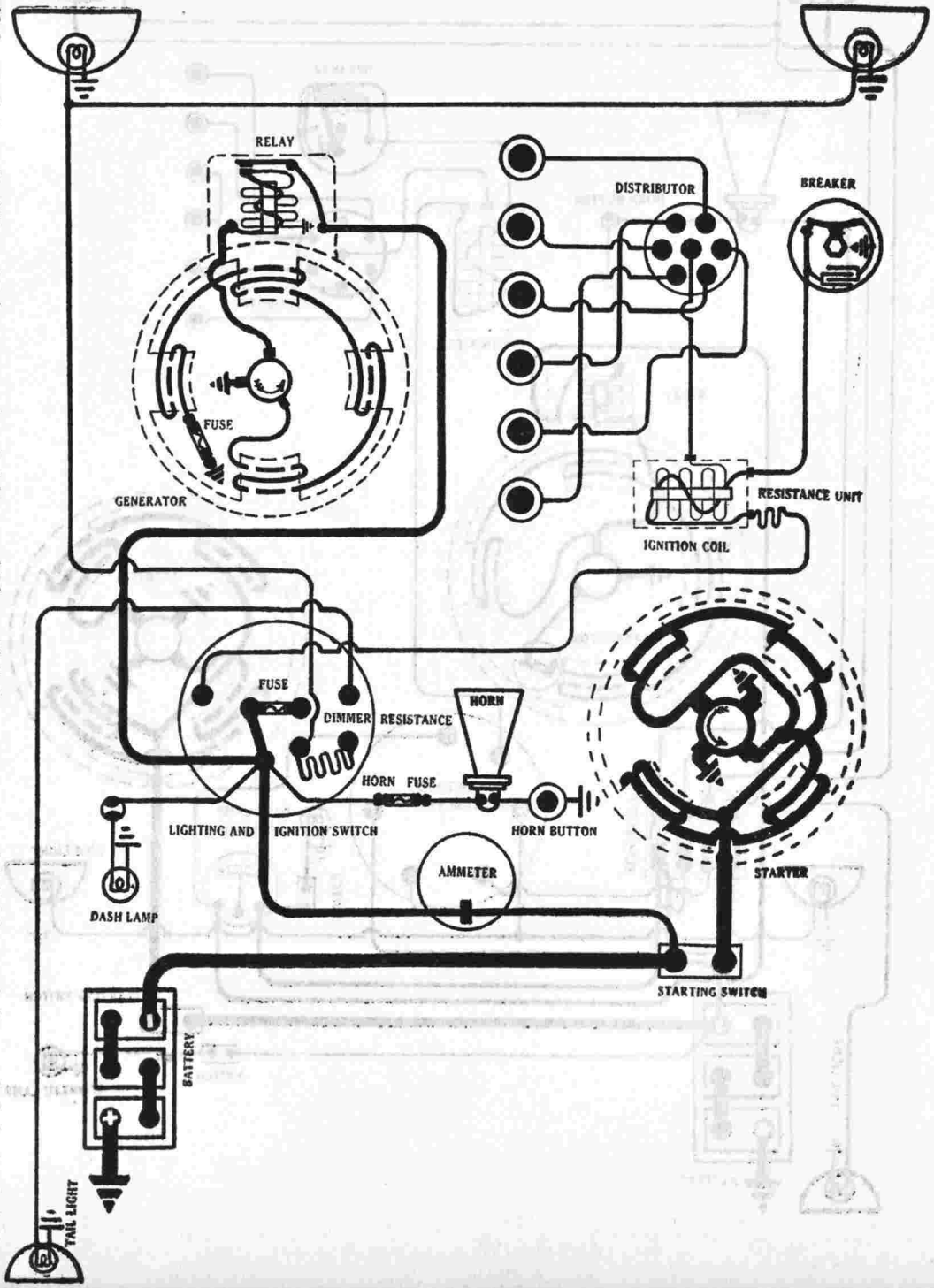
Starter Data

Amperes	Volts	Torque	R.P.M.
30-40	5.8	0	3500-6000
525	4	17 lb. ft.	Lock

Mounting:—Starter is sleeve mounted at the right of the engine on the forward side of the flywheel housing. To remove starter, disconnect cable and remove large pilot mounting screw directly above starter sleeve. Then pull starter forward and lift from place.

Oiling:—Put 5 or 6 drops of light engine oil into each of the starter oilers once a month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles.

GENERATOR:—Frame No. 36-DT. The direction of rotation is counter-clockwise, looking at the commutator end. The third brush system is used for current regulation. To adjust the charging rate, remove the fibre plate in front of generator housing and loosen the brass nut, move the third brush in the direction of rotation (counter-clockwise) to increase the charging rate, and to decrease the same, move the third brush in the opposite direction (clockwise). The maximum charging rate is 12-14 amperes reached at 1250-1500 R.P.M. of the armature or 20 M.P.H.



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MODELS 58 (1924), 56 (1924-25), 60 (1925)
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WESTINGHOUSE IGNITION

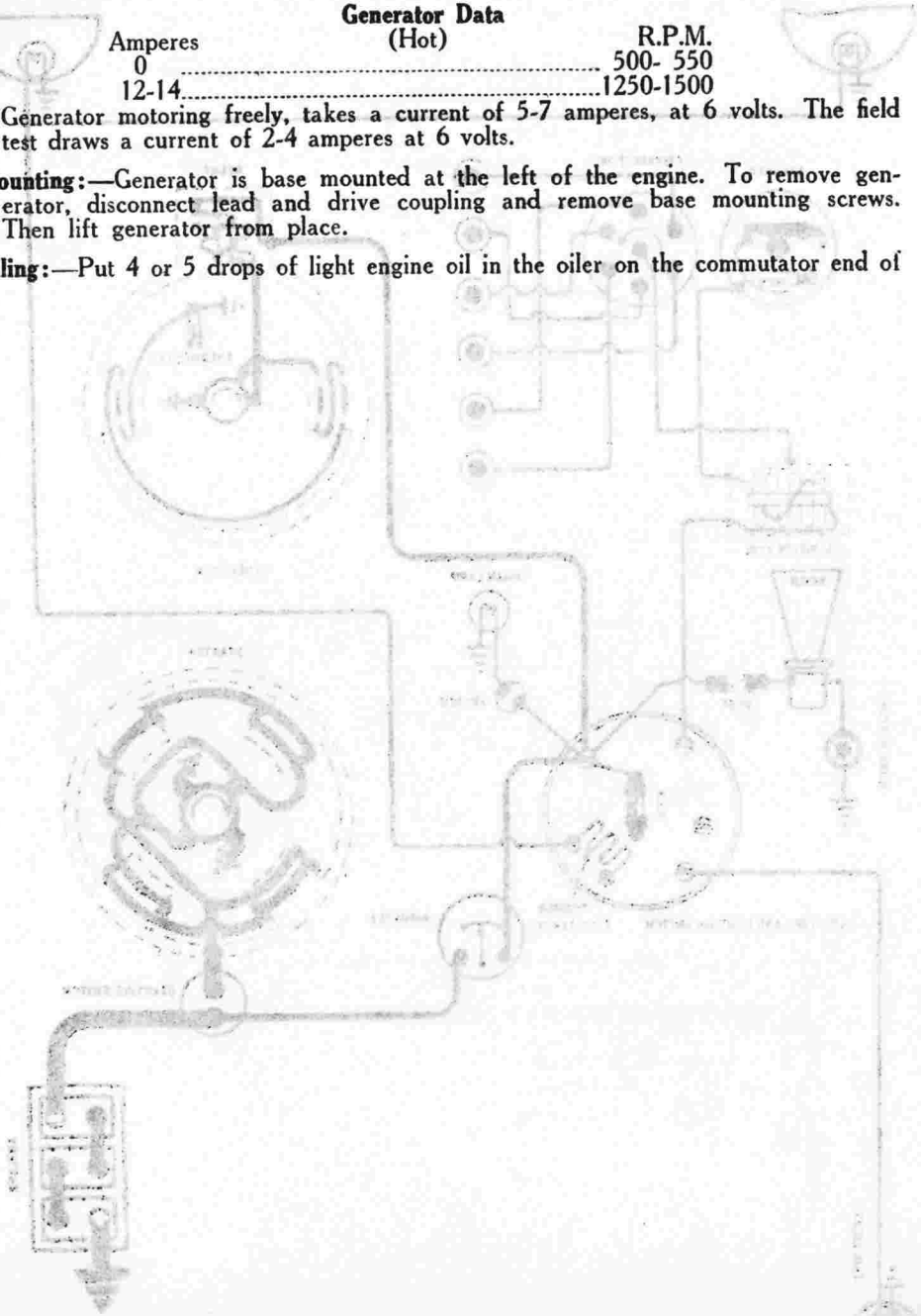
Generator Data

Amperes (Hot)	R.P.M.
0	500- 550
12-14	1250-1500

Generator motoring freely, takes a current of 5-7 amperes, at 6 volts. The field test draws a current of 2-4 amperes at 6 volts.

Mounting:—Generator is base mounted at the left of the engine. To remove generator, disconnect lead and drive coupling and remove base mounting screws. Then lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every two weeks or each 500 miles.



RELAY:—Type 301210B. Relay contacts close at 450 R.P.M. of the generator armature or 7 M.P.H. with a generator voltage of 7-7.5 volts and open at 400 R.P.M. of the armature at 6 M.P.H. with a discharge current of 0-2 amperes. Relay contacts separate .045 inch and the air gap between the relay armature and coil core is .005 inch, contacts closed.

LIGHTING.—Head lamps are each 6-8 volt, 21 cp. Dash, side and tail lamps are each 6-8 volt, 2 cp. All lamps are of the single contact type.

FUSES:—All fuses are 10 amperes. Generator field fuse is 5 amperes.

VELIE

MODEL 60 (1925-26)
REMY GENERATING, STARTING AND LIGHTING SYSTEM
REMY IGNITION

BATTERY.—Prest-O-Lite, Type 613-SHK. 6 volt, 112.5 ampere hour. The starting capacity is 130 amperes for 20 minutes. The lighting capacity is 5 amperes for 22.5 hours. The positive (—) terminal is grounded.

IGNITION.—Coil Model 284-P. Distributor Model 636-D. Breaker contacts separate .020-.028 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine, flat jeweler's file or on a medium hard oilstone. The distributor is of the combined manual and automatic type. Manual advance is 15°. Automatic advance reaches a maximum of 30° at 2000 R.P.M. The tension of the contact arm spring should be 17-21 ounces.

Oiling.—Fill the grease cup on the side of the distributor shaft with heavy cup grease and turn down two turns every month or each 1000 miles if the car is driven more than 1000 miles in a month. Every 5000 miles put a small bit of vaseline on the face of the breaker cam and oil the wick in the oiler on the distributor shaft under the rotor with light engine oil.

Timing.—Breaker contacts begin to separate 7° before the point at which the piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER.—Model 720-G. Starter is connected to the engine by means of an outboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 125-145 R.P.M. taking 150-175 amperes at 4.9 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
1.9 "	1800	5.3	150
15 "	Lock	3.2	575

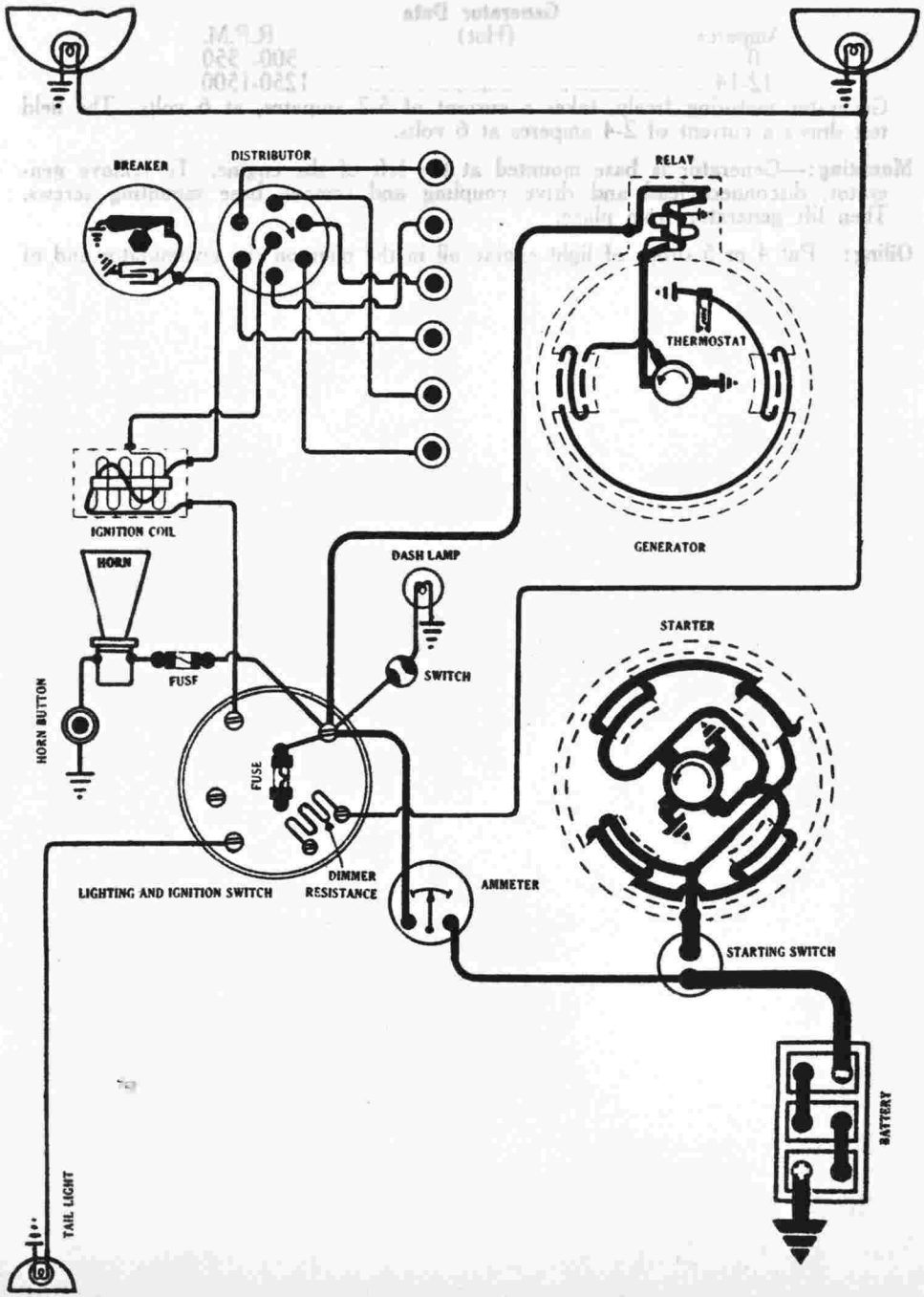
Starter brush tension should be 20-28 ounces each. Starter switch is Model 405-D.

Oiling.—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles if the car is driven more than 1000 miles in a month. The drive end bearing is of the oilless type.

GENERATOR.—Model 917-W. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system, combined with a thermostat located in the shunt field circuit. Thermostat contacts open at approximately 160° F. cutting a resistance into the shunt field and reducing the output 50 per cent. To adjust the generator output, loosen the clamp screw on the generator end plate and shift the third brush mounting bracket. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. The maximum charging rate is 18-20 amperes reached at 1800 R.P.M. of the generator or 23 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0		550	0		700
7	7.1	850	10.6	7.5	1800
18.5	8.5	1800	11	7.5	3000
14	8	2500			



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MODEL 60 (1925-26)

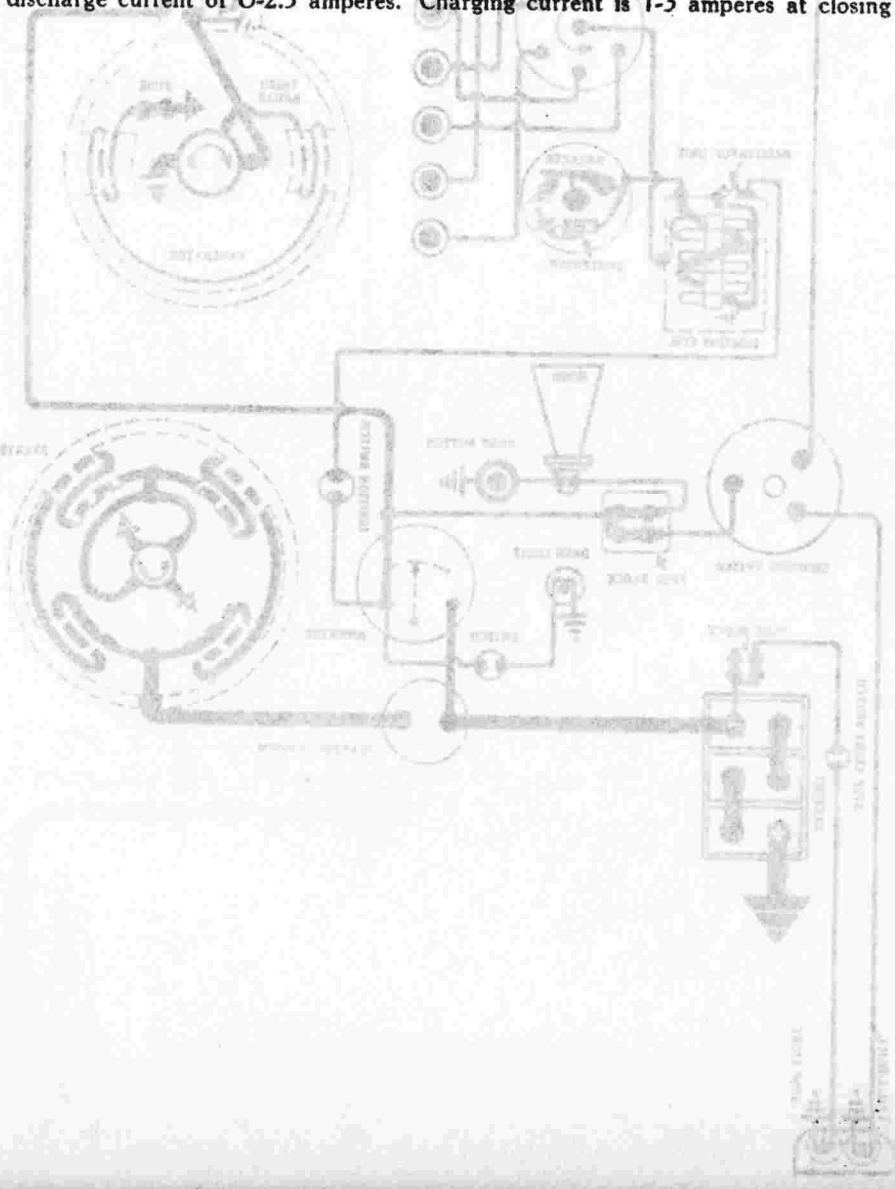
REMY GENERATING, STARTING AND LIGHTING SYSTEM

REMY IGNITION

The shunt field current is 4-6 amperes at 6 volts. Thermostat resistance is one ohm. Generator brush tension should be 22-28 ounces each.

Oiling.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY.—Model 265-B. Relay is mounted on the generator. Relay contacts close at 675 R.P.M. of the generator when the voltage reaches 7.25 volts and open with a discharge current of 0-2.5 amperes. Charging current is 1-3 amperes at closing of contacts. Relay contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed. Adjust relay by bending the brass post which the relay arm spring bears against. Clean relay contacts by drawing unglazed paper between them. Resurface with well worn No. 00 sandpaper. Remove all grit and adjust before again putting into service.



LIGHTING.—Switch Model 420-G.—Head lamps are 6-8 volt, 21 cp. S.C. dash, dome and tail lamps are each 6-8 volt, 2 cp. S.C.

FUSES.—Lighting and horn fuses are 10 amperes.

VELIE

MODEL 50—STANDARD SIX (1927)
SERIAL NOS. 160101
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—Prest-O-Lite, Type 613-JFK. Starting capacity is 123 amperes for 20 minutes. Lighting capacity is 5 amperes for 17 hours. The positive (+) terminal is grounded. Battery is mounted under the driver's seat.

IGNITION:—Coil Model IG-4064. Distributor Model IG-4146. Breaker contacts separate .018-.020 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine flat contact file. Ignition current is 1-3 amperes with engine running and 3.4-5 amperes with engine stopped.

Mounting:—Ignition coil is mounted at front of engine on left side. Distributor is mounted at left of engine near front. To remove distributor, disconnect high tension coil lead and breaker lead. Then remove head or disconnect spark plug leads. Loosen set screw on side of distributor bracket and lift distributor from place.

Oiling:—Turn grease cup on side of distributor down one-half turn every 250 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 5° after top dead center (measured on the flywheel) with the breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

Valve Timing:—INLET VALVES:—Head diameter, 1 7/16 inches; stem diameter, 5/16 inch; stem length, 5 9/32 inches; tappet clearance, .008 inch; spring pressure, 42 pounds; valve lift, 5/16 inch; intake opens at 7° past top dead center and closes at 47° past lower dead center.
EXHAUST VALVES:—Head diameter, 1 7/16 inches; stem diameter, 5/16 inch; stem length, 5 9/32 inches; tappet clearance, .008 inch; spring pressure, 42 pounds; valve lift, 5/16 inch; exhaust opens at 45° before lower dead center and closes at 5° past top dead center. Stem guides are removable. No oversize valve stems are made.

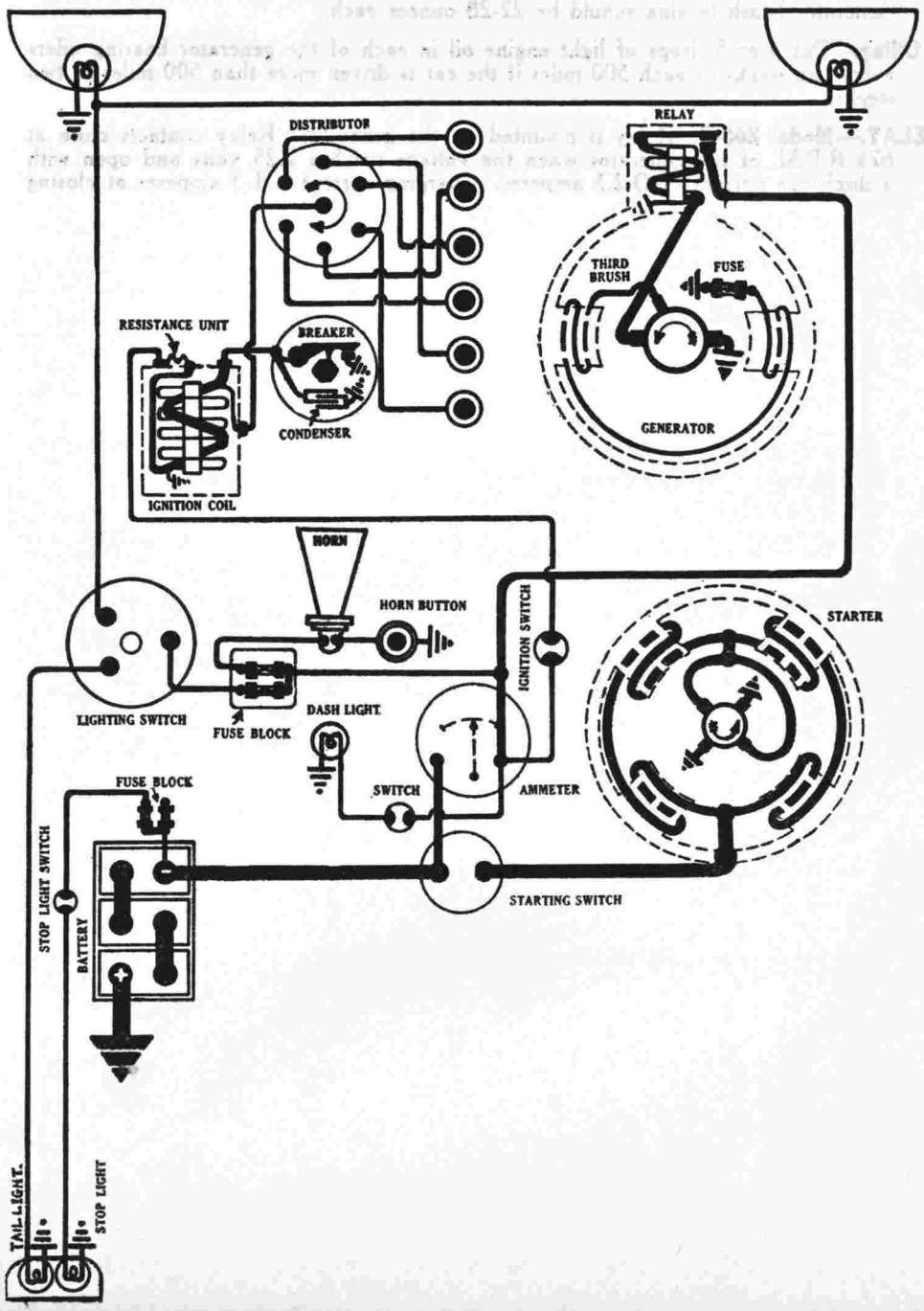
STARTER:—Model MN-4119. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter brush tension should be 1¼-1½ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	Free	5.5	45	(Without Bendix)
0 "	Free	5.5	50	(With Bendix)
0.6 "	2800	5.5	100	
2.9 "	1500	5.0	200	
5.5 "	850	4.5	300	
8.2 "	420	4.	400	
12.25 "	Lock	3.	550	

Mounting:—Starter is mounted on right side of engine at the rear. To remove starter, disconnect starter cable and remove set screw on top of housing. Then slide starter forward and lift from place.

Oiling:—Starter bearings are of the oilless type. They require no attention.



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MODEL 50—STANDARD SIX (1927)

SERIAL NOS. 160101

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

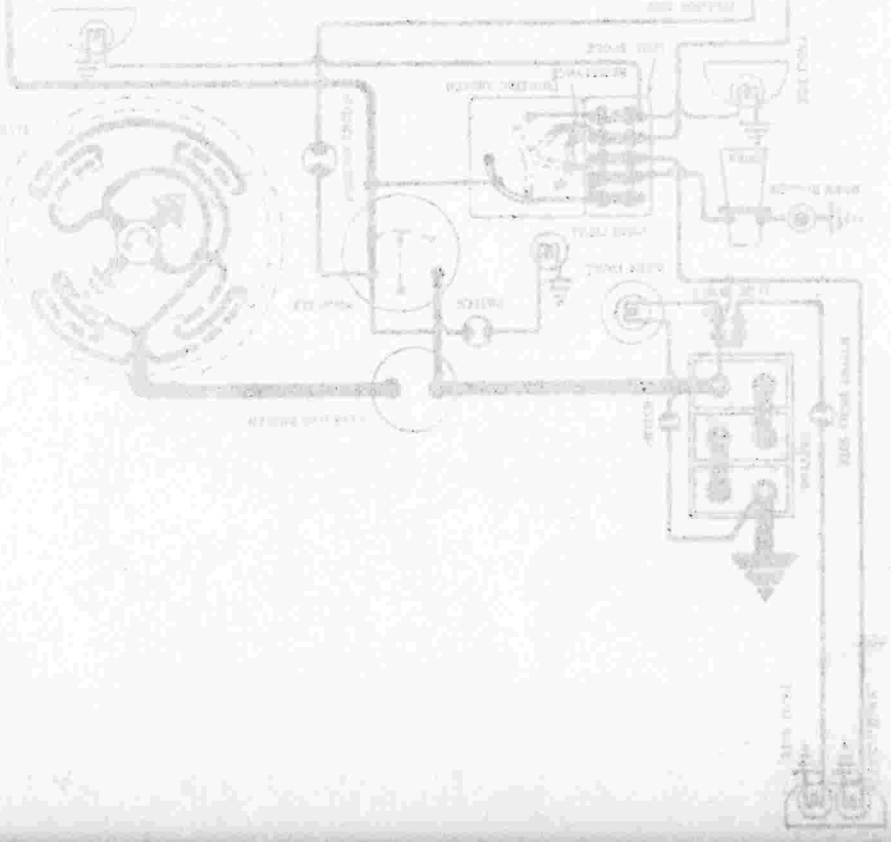
AUTO-LITE IGNITION

GENERATOR:—Model GTB-4201. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, remove cover band and loosen nut holding third brush mounting bracket. Then shift third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The maximum charging rate of 15 amperes is reached at 1800 R.P.M. or 21 miles per hour.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	700	0	6.5	825
4	6.9	850	4	6.9	1025
10	7.5	1200	9	7.45	1450
15	7.9	1800	11	8.0	1800
10	7.7	2900	8	7.5	2800

Motoring freely at 525 R.P.M. generator draws 3.9 amperes at 6.3 volts. Shunt-field current is 3.2 amperes at 6 volts.



Mounting:—Generator is mounted at left of engine near the front. To remove generator, disconnect generator lead and drive coupling. Then remove three base mounting screws and lift generator from place.

Oiling:—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Model CB-4007. Relay is mounted on top of the generator. Relay contacts close at 650 R.P.M. of the generator armature or approximately 8 M.P.H. when the voltage reaches 6.5 volts and open at 570 R.P.M. or 7 M.P.H. with a discharge current of 0-1 amperes. Charging current at closing of contacts is 1-2 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING:—Soreng-Manigold Lighting Switch. Switch is mounted at base of steering column. Head lamps are 6-8 volt, 21 cp. S.C. Stop lamp is 6-8 volt, 5 cp. S.C. Dash, dome and tail lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Generator field fuse is 5 amperes.

VELIE

MODEL 60 SPECIAL SIX (1926-27)
SERIAL NOS. 150990 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 615-JFK. Starting capacity is 143 amperes for 20 minutes. Lighting capacity is 5 amperes for 20 hours. The positive (+) terminal is grounded. Battery is mounted under driver's seat.

IGNITION:—Coil Model 525-A. Distributor Model 637-H. Breaker contacts separate .018-.025 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine, flat contact file. Stationary contact is mounted on plate and is held in position by small locking screw back of the contact. To adjust contact opening, loosen this locking screw and turn eccentric adjusting screw on plate until proper setting is obtained. Then tighten lock screw. Breaker arm spring tension is 15-20 ounces. Distributor is of the semi-automatic type. Manual advance is 15° engine. Automatic advance begins at 400 engine R.P.M. and reaches maximum of 28° at 1800 engine R.P.M. Total advance is 43° engine.

Mounting:—Ignition coil is mounted at front of engine on left side. Distributor is mounted at left of engine near front. To remove distributor, loosen clamp screw and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor head with medium cup grease and turn down one turn every two weeks or each 500 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 5° after top dead center (measured on the flywheel) with the breaker assembly in the fully retarded position. To set timing, crank engine until piston No. 1 reaches this position. Then loosen clamp screw and rotate distributor housing until contacts begin to separate. Then tighten the clamp screw.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

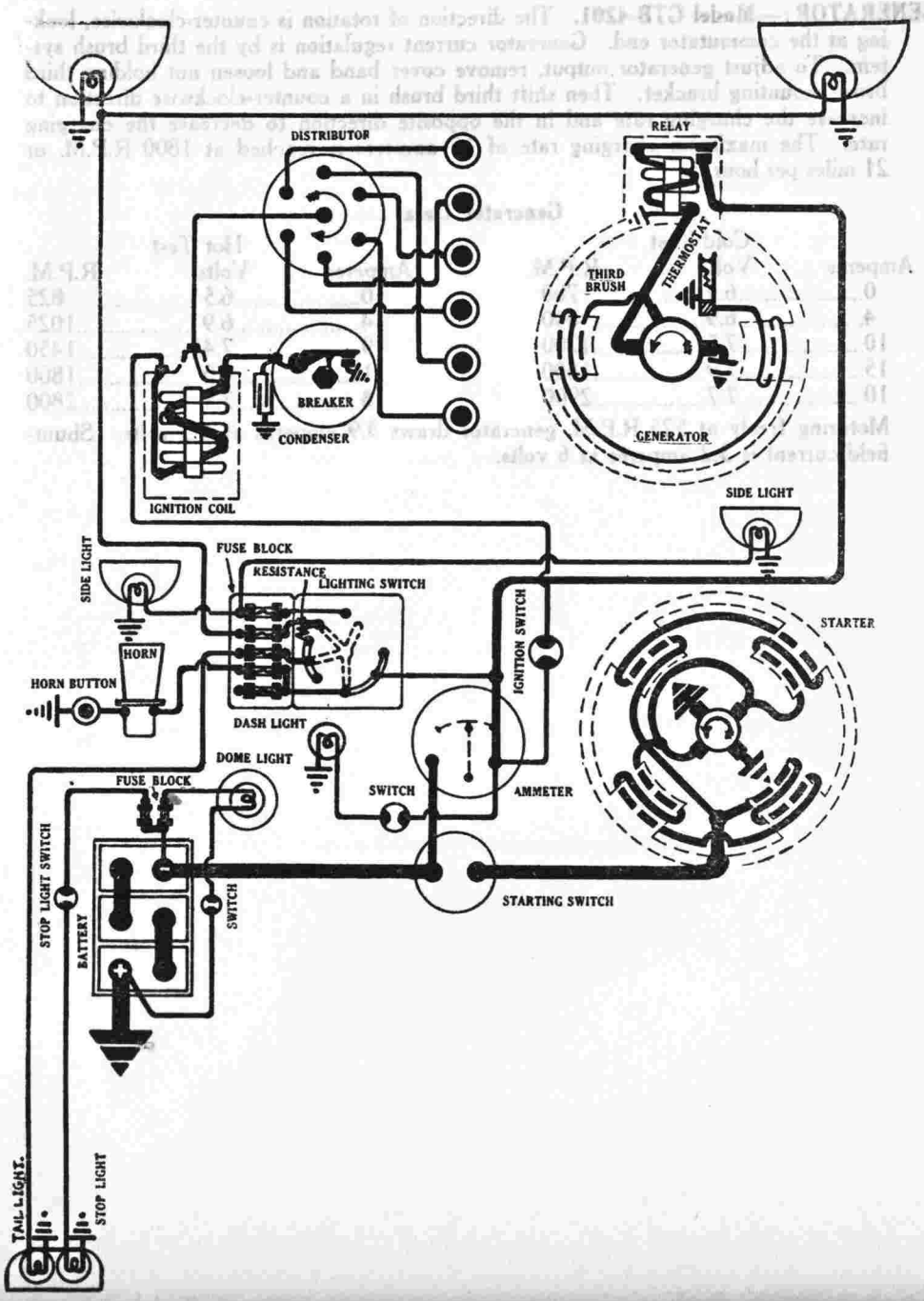
Valve Timing:—INLET VALVES:—Head diameter, 1 11/16 inches; stem diameter, 3/8 inch; stem length, 5 7/16 inches; tappet clearance, .008 inch; spring pressure, 55 pounds; valve lift, 5/16 inch; intake opens at 7° past top dead center and closes at 47° past lower dead center.

EXHAUST VALVES:—Head diameter, 1 9/16 inches; stem diameter, 3/8 inch; stem length, 5 7/16 inches; tappet clearance, .008 inch; spring pressure, 55 pounds; valve lift, 5/16 inch; exhaust opens at 45° before lower dead center and closes at 5° past top dead center. Stem guides are removable. Oversize valve stems are not made.

STARTER:—Model 720-P. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 125-145 R.P.M. taking 150-175 amperes at 4.9 volts. Starter brush tension should be 24-28 ounces. Starter switch is Model 405-D.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570



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MODEL 60 SPECIAL SIX (1926-1927)
SERIAL NOS. 150990 UP
DELCO-REMY GENERATING, STARTING AND LIGHTING SYSTEM
DELCO-REMY IGNITION

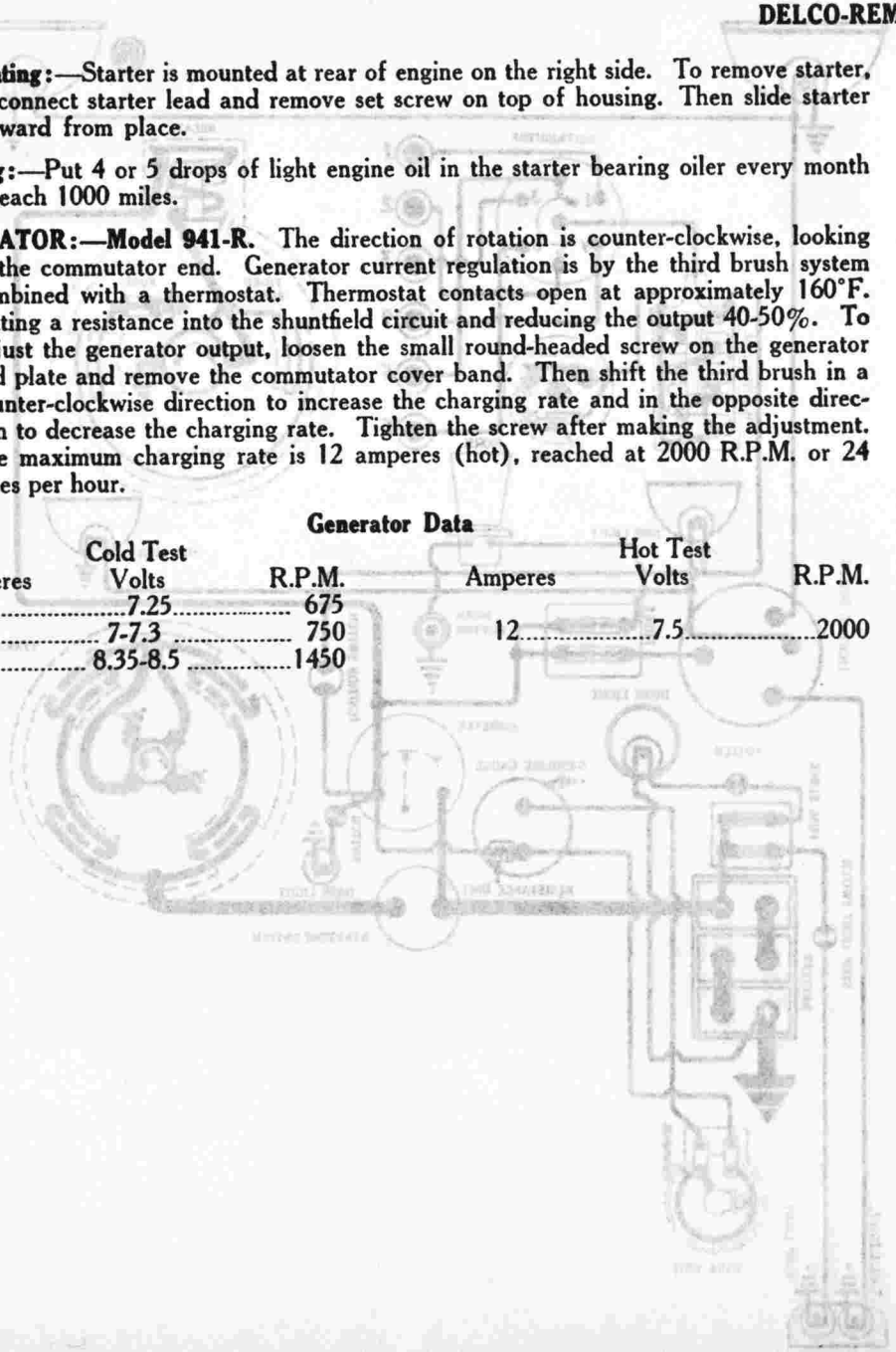
Mounting:—Starter is mounted at rear of engine on the right side. To remove starter, disconnect starter lead and remove set screw on top of housing. Then slide starter forward from place.

Oiling:—Put 4 or 5 drops of light engine oil in the starter bearing oiler every month or each 1000 miles.

GENERATOR:—Model 941-R. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system combined with a thermostat. Thermostat contacts open at approximately 160°F. cutting a resistance into the shuntfield circuit and reducing the output 40-50%. To adjust the generator output, loosen the small round-headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. The maximum charging rate is 12 amperes (hot), reached at 2000 R.P.M. or 24 miles per hour.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
2	7.25	675			
7	7-7.3	750	12	7.5	2000
21	8.35-8.5	1450			



The shuntfield current is 5 amperes at 6 volts. Generator brush tension should be 24-28 ounces each.

Mounting:—Generator is mounted on left side of engine near the front. To remove generator, disconnect generator lead and drive coupling. Then remove three base mounting screws and lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in the generator oilers every two weeks or each 500 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay contacts close at 675 R.P.M. of the generator or approximately 9 M.P.H. when the generator voltage reaches 7.25 volts. Relay opens when the discharge current reaches 0-2.5 amperes. Contacts separate .020 inch. Air gap between relay armature and coil core is .016 inch, contacts closed.

LIGHTING:—Lighting Switch Model 420-G. Switch is mounted at base of steering column. Head lamps are 6-8 volt, 21 cp. S.C. Stop lamp is 6-8 volt, 5 cp. S.C. Dash, tail and dome lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—There are five fuses mounted on back of switch. They are 10 amperes.

VELIE

MODEL 66, STANDARD SIX (1928)
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—Prest-O-Lite, Type 613-JFK, 6 volt, 13 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 102 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted under the driver's seat.

IGNITION:—Coil Model IG-4064. Coil is mounted at left of engine near front. Ignition current is 4 amperes at 6 volts with engine stopped and 2 amperes at 6 volts with engine running.

Distributor Model IG-4146. Breaker contacts separate .020-.024 inch new and .018-.020 inch in service with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-20 ounces. Distributor is semi-automatic. Manual advance is 10 degrees (engine). Maximum automatic advance is 15 degrees (engine).

Mounting:—Distributor is mounted on left of engine. To remove distributor, disconnect primary lead and manual advance rod and remove head with cables intact. Then loosen lock screw on side of bracket and lift distributor from place.

Oiling:—Fill grease cup on side of distributor shaft with medium cup grease and turn down one half turn every week or each 250 miles. Every 500 miles remove distributor head and rotor and put 3 or 4 drops of oil in the wick oiler in the center of the shaft and put one drop of oil on the breaker arm pivot pin. Eevry 5000 miles put a small amount of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 5 degrees after top dead center (on the flywheel) with the manual advance lever fully retarded. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully retard spark lever. Continue to crank engine until exhaust valve in cylinder No. 6 closes. This point is 5 degrees after top dead center and is the firing position for cylinder No. 1. Loosen advance arm clamp screw and rotate distributor until contacts begin to separate. Tighten the clamp screw and connect the segment opposite the rotor with the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

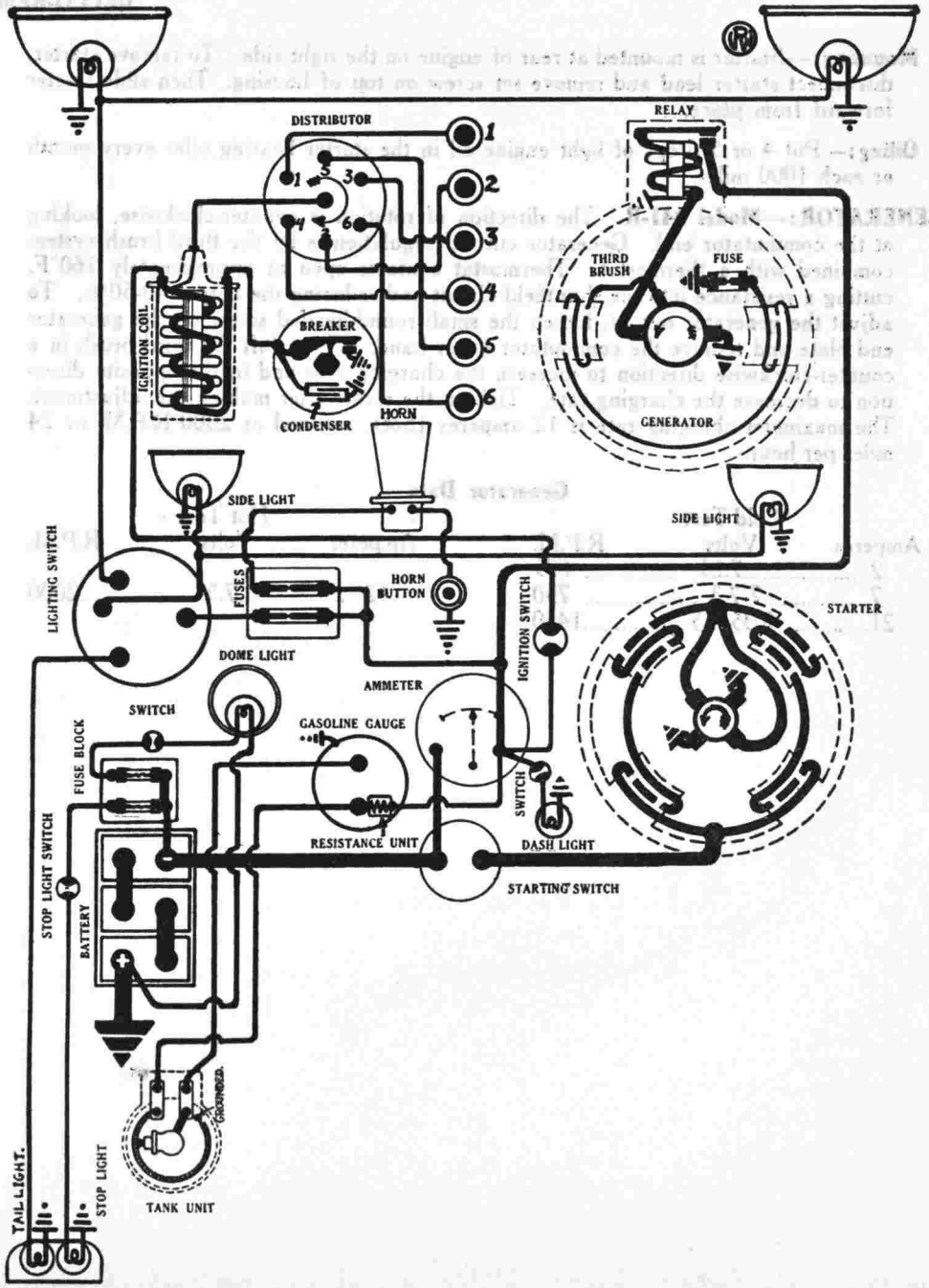
VALVE TIMING:—Specifications:—Head diameter, 1 7/16 inches; stem diameter, 5/16 inch; stem length, 5 9/32 inches. Spring pressure, 42 pounds. Valve lift, 5/16 inch. Tappet clearance, .008 inch (hot). Valve stem guides are removable. Oversize valve stems are not made.

Timing:—Inlet valves open 7 degrees after top dead center and close 47 degrees after lower dead center. Exhaust valves open 45 degrees before lower dead center and close 5 degrees after top dead center.

STARTER:—Model MN-4119. Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 1¼-1½ pounds each. Starter switch is Model SW-4001. Starter cranks the engine at 150 R.P.M. drawing 175 amperes at 5.2 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	Free	5.5	45	(No Bendix)
0 "	Free	5.5	50	(With Bendix)
.5 "	2800	5.5	100	
2.4 "	1450	5.0	200	
4.8 "	950	4.5	300	
7.2 "	650	4.0	400	
13.5 "	Lock	3.0	540	



VELIE

MODEL 66, STANDARD SIX (1928)
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

Mounting:—Starter is sleeve mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove large mounting screw from housing directly above starter sleeve. Then slide starter forward and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GTB-4201. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove commutator cover band and shift third brush by prying on the mounting bracket stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush and mounting bracket are held in any position by friction between the stud and the end plate. With maximum car setting the charging rate is 18 amperes at 8 volts. With standard car setting, the maximum charging rate is 15 amperes (cold) reached at 1800 R.P.M. or 21 miles per hour.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	700	0	6.5	825
4	6.9	850	4	6.9	1025
10	7.5	1200	9	7.45	1450
15	7.9	1800	11	8.0	1800
10	7.7	2900	8	7.5	2800

Generator motors at 525 R.P.M drawing 3.9 amperes at 6.3 volts. Shunt field current is 3.2 amperes at 6 volts. Brush spring tension is 1¼-1½ pounds each. A five ampere field fuse is mounted on the generator end plate.

Mounting:—Generator is base mounted at left of engine. To remove generator, disconnect lead and drive coupling. Then remove three base mounting screws and lift generator from place.

Oiling:—Put 5 or 6 drops of light oil in each of the generator bearing oilers every two weeks or each 500 miles.

RELAY:—Model CB-4007. Relay is mounted on the generator. Relay contacts close at approximately 8 M.P.H. or 650 R.P.M. of the armature when the generator voltage reaches 6.5-7 volts and open at 570 R.P.M. or 7 M.P.H. with a discharge current of 0-1.5 amperes. Maximum charging current at closing of contacts is 2 amperes. Relay contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Soreng-Manigold Lighting Switch. Switch is mounted on lower end of steering column. Head lights are 6-8 volt, 21 cp. S.C. Mazda No. 1129. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dash, dome and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Generator field fuse is 5 amperes. Lighting fuses are 10 amperes capacity.

VELIE

MODEL 77 SPECIAL SIX (1928)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 615-JFK, 6 volt, 15 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 120 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted under the driver's seat.

IGNITION:—Coil Model 525-C. Coil is mounted at front of engine on right side. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

Distributor Model 637-H-P. Breaker contacts separate .020-.028 inch. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw. Breaker arm spring tension is 15-20 ounces. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 28 degrees at 1800 R.P.M.

Mounting:—Distributor is mounted at left of engine. To remove distributor, disconnect primary lead and advance rod and remove distributor head with cables intact. Then loosen clamp screw and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one turn every two weeks or each 500 miles. Every 5000 miles remove the distributor head and rotor and put light oil in the wick oiler on the shaft. Put a small amount of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 8 degrees (on the flywheel) before top dead center with the manual advance lever fully advanced. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance spark control lever. Continue to crank engine until the dead center mark on the flywheel is 7/8 inch (8 degrees) before the indicator on the flywheel case. Then loosen advance arm clamp screw and rotate distributor until contacts begin to separate. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head.

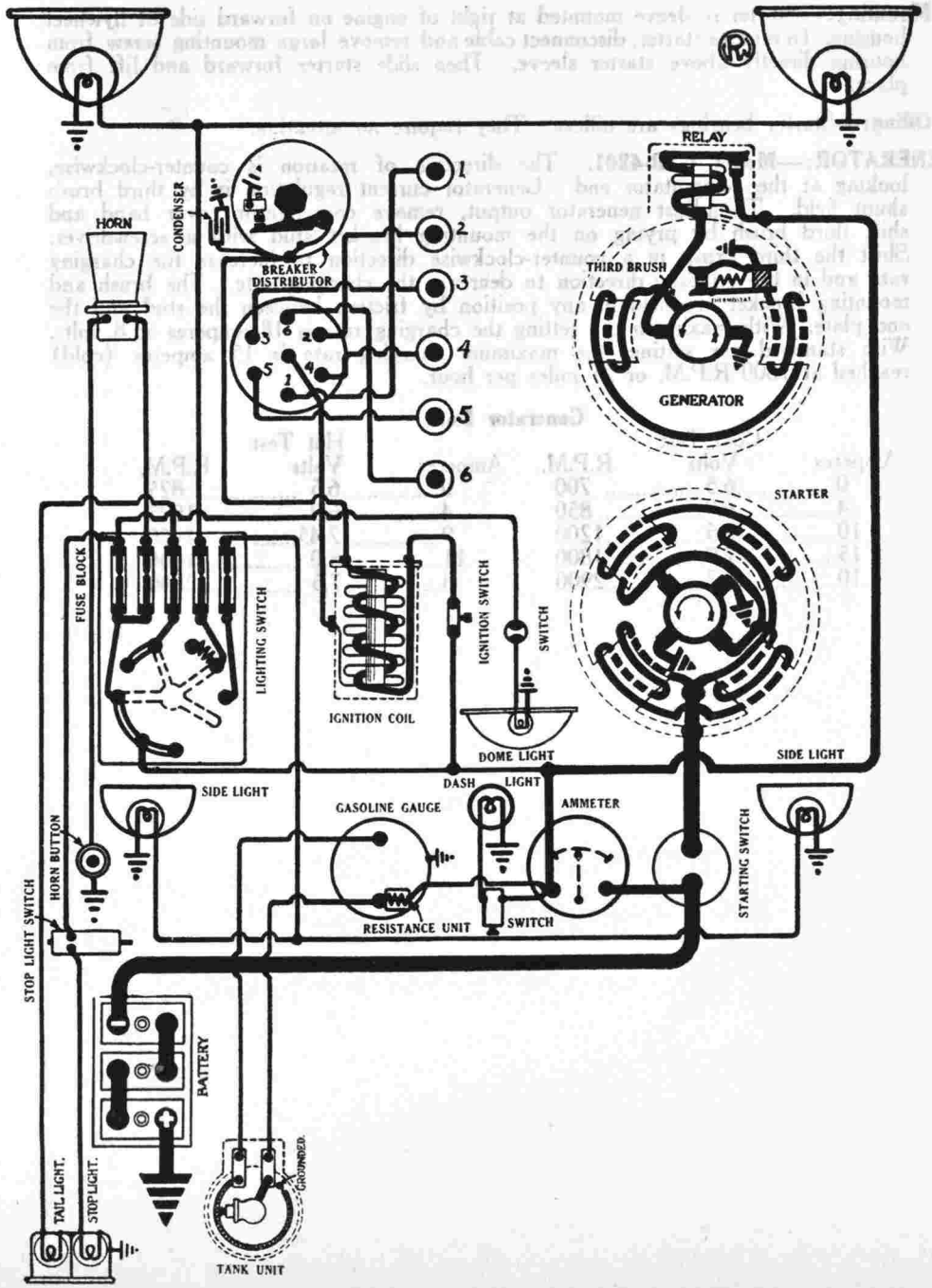
Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1 11/16 inches; stem diameter, 3/8 inch; stem length, 5.5 inches. Valve lift, .4 inch. Spring pressure, 55 pounds. Tappet clearance, .008 inch (hot). Inlet valves open 7 degrees after top dead center and close 47 degrees past lower dead center. The inlet opening point is marked on the flywheel by mark 'IO'.

EXHAUST VALVES:—Head diameter, 1 9/16 inches; stem diameter, 3/8 inch; stem length, 5.5 inches. Valve lift, .4 inch. Spring pressure, 55 pounds. Tappet clearance, .008 inch (hot). Exhaust valves open 45 degrees before lower dead center and close 5 degrees after top dead center. Closing point is marked by flywheel mark 'EC'. Valve stem guides are removable. Oversize valve stems are not made.

STARTER:—Model 720-P. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 125-145 R.P.M. drawing 150-175 amperes at 4.9 volts. Brush spring tension is 24-28 ounces. Starter switch is Model 405-D.



VELIE

MODEL 77 SPECIAL SIX (1928)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

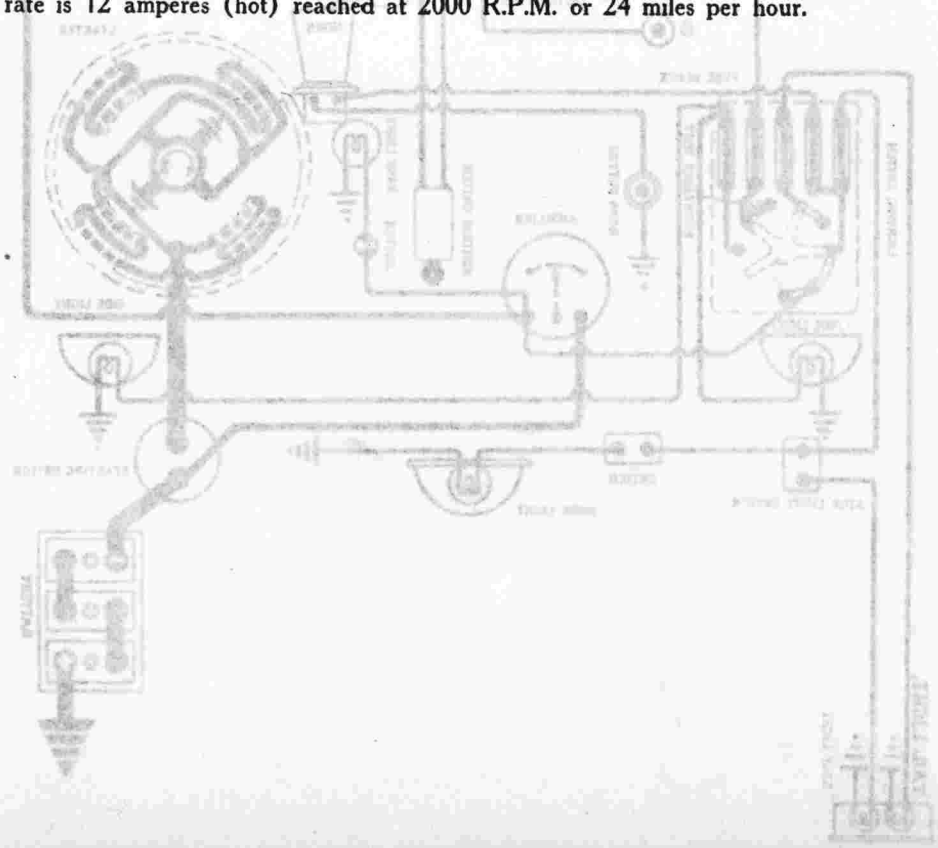
Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Mounting:—Starter is mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove large pilot mounting screw from housing directly above starter. Then pull starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless.

GENERATOR:—Model 941-R. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 12 amperes (hot) reached at 2000 R.P.M. or 24 miles per hour.



Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
2	7.25	675			
7	7-7.3	750	12	7.5	2000
21	8.35-8.5	1450			

Motoring generator draws 6 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 24-28 ounces.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 9 M.P.H. or approximately 675 R.P.M. of the armature when the generator voltage reaches 7.25 volts and open at 8 M.P.H. with a discharge current of 0-2.5 amperes. Charging current at closing of contacts must not exceed 3 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 420-G. Switch is mounted at lower end of steering column. Head lights are 6-8 volt, 21 cp. S.C. Mazda No. 1129. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dash, dome and tail lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Lighting fuses mounted on switch and fuse block are 10 amperes.

VELIE

MODEL 88 (1927-28)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 615-JFK, 6 volts, 15 plates. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 120 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours.

IGNITION:—Coil Model 525-A. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

Distributor Model 658-A. Breaker contacts separate .022 inch. Adjust contact opening by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw to secure proper contact gap. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 15°. Automatic advance begins at 300 R.P.M. Maximum automatic advance is 17° reached at 1800 R.P.M. Breaker uses two sets of contacts on a single cam. Contacts open alternately at intervals of 45° correpsonding to 90° of crankshaft rotation. This firing interval is very important and must be correctly set. See Timing.

Mounting:—Distributor is mounted on cylinder head in center of block. To remove distributor, disconect manual advance rod and primary lead and remove distributor head with high tension cables intact. Then loosen clamp screw under distributor and lift distributor from place.

Oiling:—Fill the grease cup on the side of the shaft with medium grease and turn down one turn every 500 miles. Every 1000 miles saturate the wick in the oiler in the center of the shaft with light oil and put a small amount of vaseline on the face of the breaker cam.

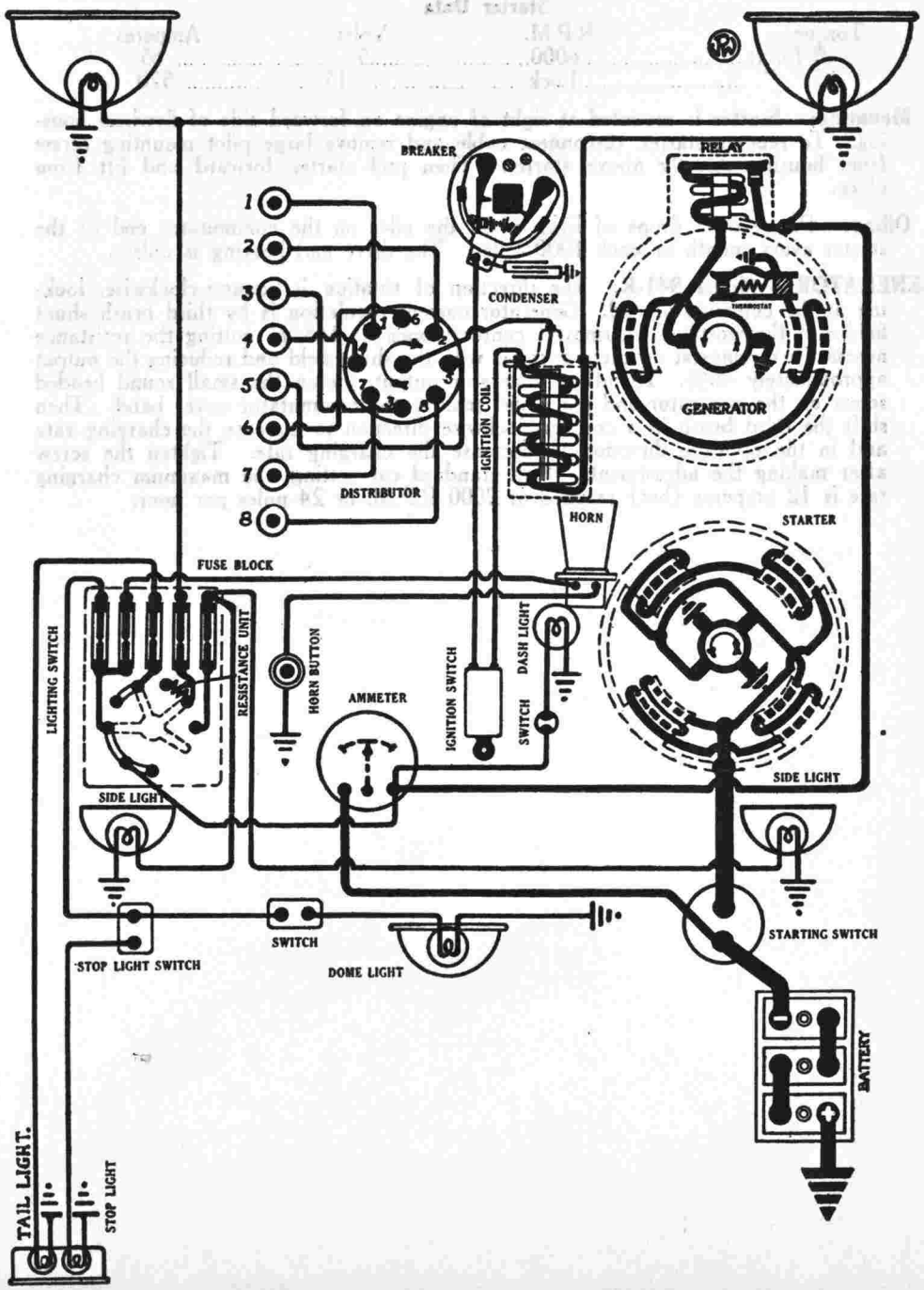
Timing:—Synchronization of Contacts:—Contacts must be synchronized to secure proper firing interval of 45° between opening of each set of contacts. Use Delco-Remy Tool, Part No. 820738, and follow directions on Page S-2 on synchronizing these breakers. Contacts can be synchronized without tool after distributor is timed to engine. With one set of contacts adjusted to open with piston No. 1 on top dead center, crank engine over 90° until piston No. 6 reaches top dead center. The second set of contacts should begin to open at this point. Adjust by loosening two lock screws on breaker plate and turning eccentric adjusting screw until contacts begin to separate. Tighten the lock screws and check contact opening. If it is outside limits of .018-.024 inch reset contact opening and repeat synchronizing operation.

Timing Distributor to Engine:—One set of breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark lever fully retarded. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully retard spark lever and continue to crank engine until piston reaches top dead center. Contacts mounted on stationary breaker plate should begin to separate at this point. If they do not, loosen advance arm clamp screw and rotate distributor until the contacts open. Tighten the clamp screw. Connect the segment opposite the rotor to the spark plug in cylinder No. 1 and connect the remaining plugs in order 6-2-5-8-3-7-4 clockwise around the distributor head. The second set of breaker contacts open 90° after this point when piston No. 6 reaches top dead center.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E Standard. Gaps are .025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1 5/8 inches; stem diameter, .3425-.341 inch; stem length, 5 19/32 inches (over all). Valve lift, 5/16 inch. Spring pressure, 34-38 pounds (closed). Tappet clearance, .006 inch (hot). Inlet valves open at top dead center and close 35° after lower dead center.



VELIE

MODEL 88 (1927-28)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

EXHAUST VALVES:—Head diameter, 1 19/32 inches; stem diameter, .342-.341 inch; stem length, 5 9/16 inches (over all). Valve lift, 5/16 inch. Spring pressure, 34-38 pounds (closed). Tappet clearance, .008 inch (hot). Exhaust valves open 42° before lower dead center and close 5° after top dead center. Valve stem guides are removable. Oversize valve stems are made.

STARTER:—Model 720-Q. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 24-28 ounces. Starter switch is Model 406-A.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove 3 flange mounting cap screws. Pull starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the starter oilers every 1000 miles.

GENERATOR:—Model 949-A. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. placing the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, maximum charging rate is 19 amperes (cold) reached at 1450 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.5	1450	9-12	7.5	2000

Motoring generator draws 5 amperes at 6 volts. Shunt field current is 4 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and remove 3 flange mounting cap screws. Then pull generator to rear and lift from place.

Oiling:—Put 4 or 5 drops of light oil in the generator bearing oilers every 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Contacts close at 675 R.P.M. of the generator when the voltage reaches 6.75-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed. Set contact opening by bending brass stop over relay armature. Set air gap after loosening two screws in base of relay armature and inserting feeler between armature and coil core by closing relay contacts by hand and tightening screws.

LIGHTING:—Delco-Remy Switch Model 420-G. Switch is mounted at base of steering column. Head lights are 6-8 volt, 21 cp. S.C. Mazda No. 1129. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Side, dash, tail and dome lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Lighting fuses are 10 amperes capacity.

Westcott

Model 0-35 and U-6 (1915)

Delco Generating, Starting and Lighting System

Delco Ignition

Battery.—Battery is 6 volt, 120 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts separate .010 inch. When contacts are closed, contact blade and clip separate .015 inch. See that pigtail conducting current to the contact blade is not disconnected. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper.

Timing.—Breaker contacts begin to separate when the top dead center mark on flywheel is 1½ inches past indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .027 to .030 inch.

Oiling.—Put 4 or 5 drops of light engine oil in timer bearing oiler every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Starter.—Starter is connected to the engine through a set of reduction gears meshed by the operator. Two overrunning clutches are provided. In connection with the ignition switch, a circuit is closed allowing current to flow through the generator windings, causing the armature to revolve slowly, aiding the meshing of the reduction gears. One clutch permits this rotation, and also permits a relatively high speed of the armature, necessary when operating as a starter. The second overrunning clutch prevents the engine from driving the armature through the reduction gears. Depressing the starting pedal meshes the reduction gears, opens the generator circuit, and allows the motor brush to come in contact with the commutator, closing the starter circuit and cranking the engine. When the pedal is released, a spring reverses these operations.

Generator.—Generator voltage regulation is by automatic field rheostat operated from the governor on the distributor shaft, in series with shunt field. Charging rate is varied by changing the resistance spool. There are six different spools available namely, Nos. 633, 703, 702, 701, 817 and 955. No. 633 is wound with the largest wire, the size reducing in the order named. Installing a larger wire spool increases the output. The spools have a wide brass cap at one end and a narrower cap at the other end. Minimum charging rate with each spool is obtained with the narrow cap at the bottom. Generator begins to supply current at 7-10 miles per hour, or 350-400 R. P. M. of armature. Maximum charging rate of 16-18 amperes is reached at 20-25 miles per hour.

GENERATOR DATA, MODELS 59 AND 65

Model 59		Model 65	
Amperes	R. P. M.	Amperes	R. P. M.
Neutral	350	Neutral	350
13-16	1500	6-11	500
		16-20	900-1050
		9-14.5	1500

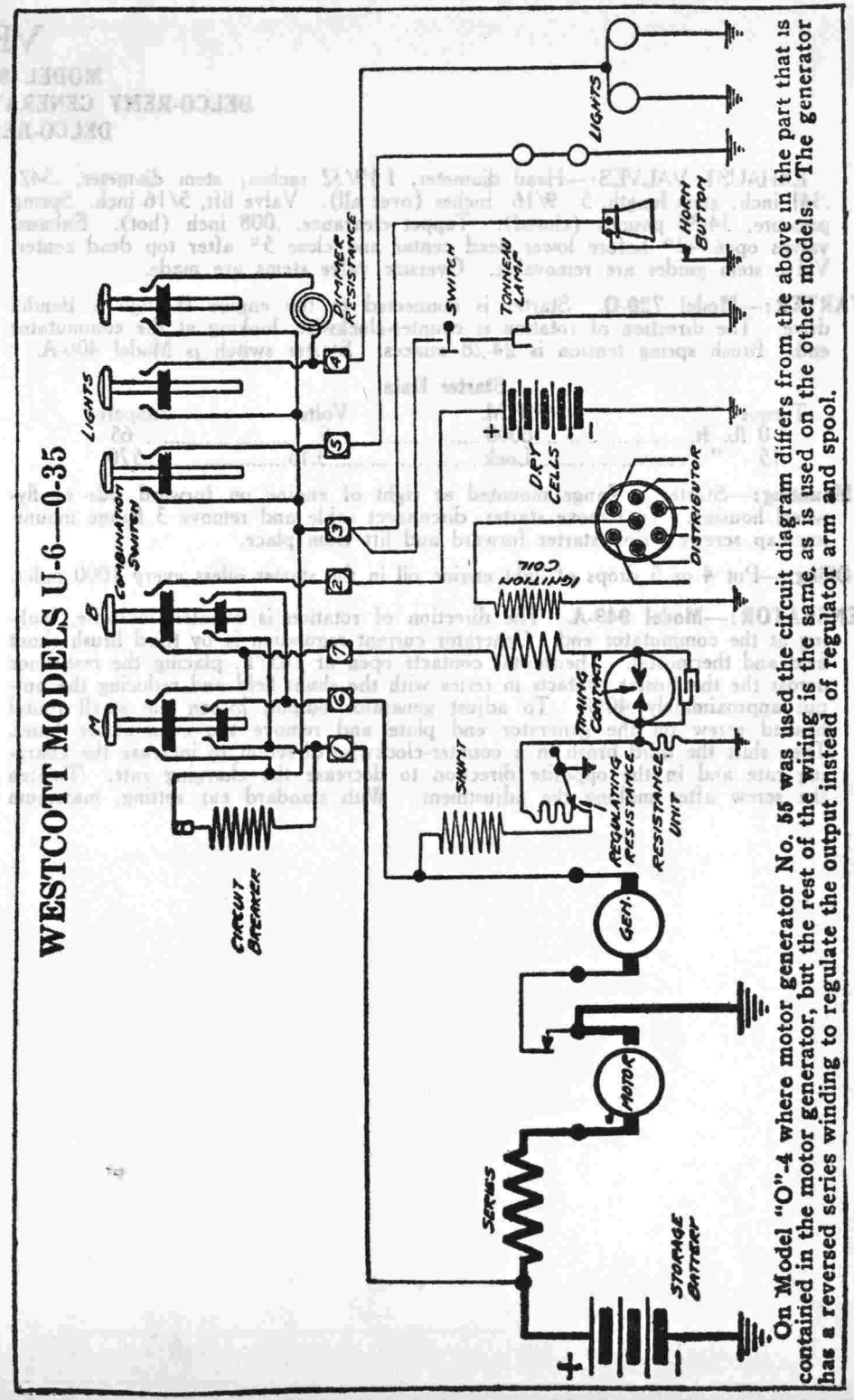
When operating freely as a motor, clutch at driving end the only retarding force, generator takes 4.5 amperes. The contact arm bears on resistance spool with a pressure of 6 ounces. A poor contact between arm and spool causes generator to operate at a higher rate of speed when ignition switch is closed.

Oiling.—Put several drops of light engine oil in each of generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done very 500 miles. Refill grease cup at end of idler shaft and turn down every month. Fill distributor driving gear case with soft cup grease every three months. Inject grease through lower front opening.

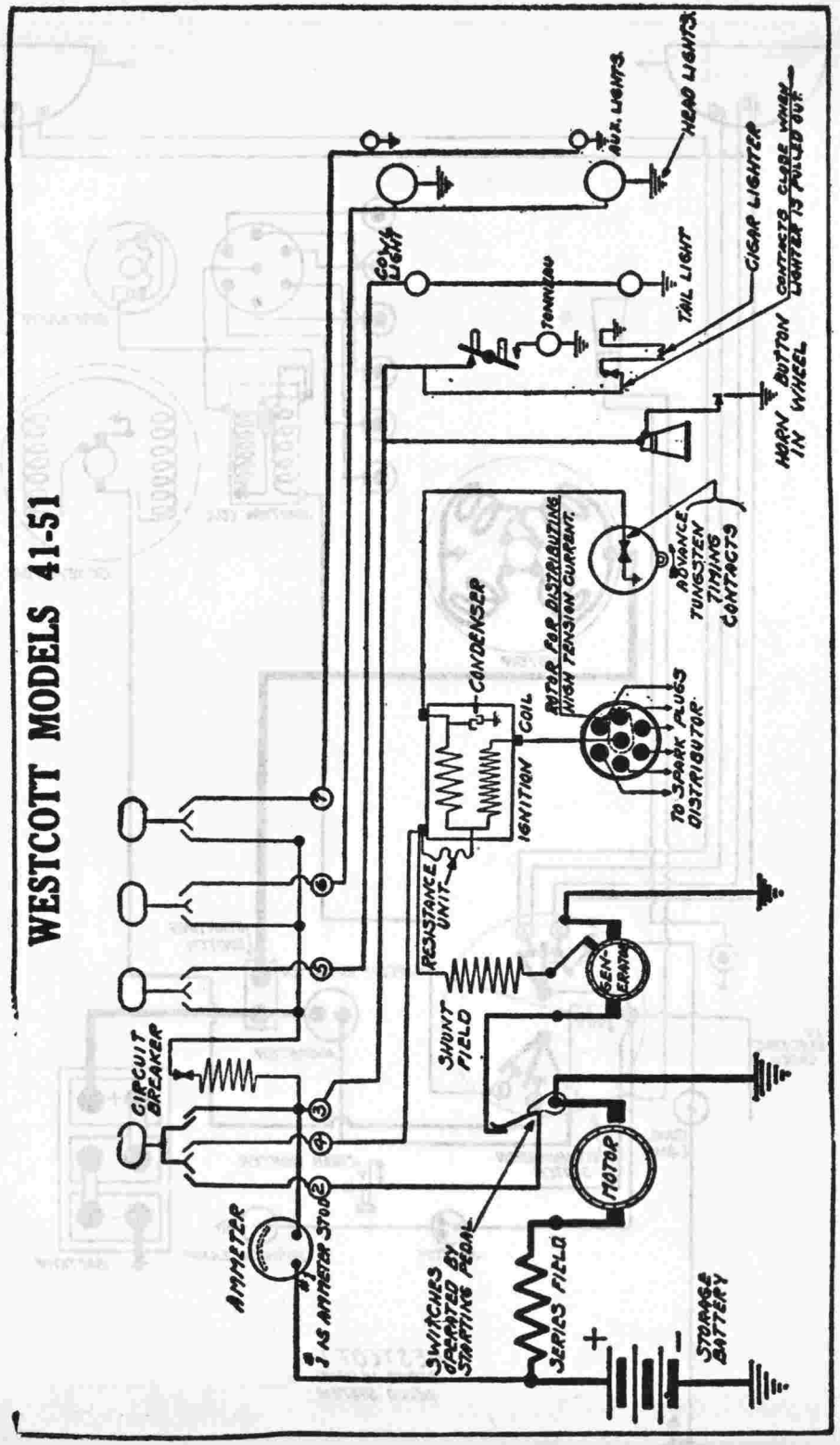
Lamps.—Head lamps are 6-8 volt, 21 cp. Dash and tail lamps are in series. They are each 3-4 volt, 2 cp.

Circuit Breaker.—There is a vibrating type circuit breaker to take the place of fuses. It requires 25 amperes to start this device vibrating, but when vibrating 3 to 5 amperes will cause it to continue.

Model Numbers.—On Motor No. 0-35 cars starter-generator is No. 64. Combination switch is No. 1048. Ignition coil is No. 2111. Battery is Exide 3-X-155-1. On



On Model "O"-4 where motor generator No. 55 was used the circuit diagram differs from the above in the part that is contained in the motor generator, but the rest of the wiring is the same, as is used on the other models. The generator has a reversed series winding to regulate the output instead of regulator arm and spool.



Westcott

Model 41-51 (1916)

Delco Generating, Starting and Lighting System

Delco Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded

Ignition.—Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Timing.—Breaker contacts begin to separate when the top dead center mark on flywheel is 1½ inches past indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .027 to .030 inch.

Oiling.—Put 4 or 5 drops of light engine oil in oiler at side of distributor housing every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Starter-Generator.—Starter is connected to engine through a set of reduction gears meshed by operator. Two overrunning clutches are provided. In connection with the ignition switch a circuit is closed allowing current to flow through the generator windings, causing the armature to revolve slowly, aiding the meshing of the reduction gears. One clutch permits this rotation, and also permits a relatively high speed of the armature, necessary when operating as a starter. The second overrunning clutch prevents the engine driving the armature through the reduction gears. Depressing the starting pedal meshes the reduction gears, opens the generator circuit and allows the motor brush to come in contact with the commutator, closing the starter circuit and cranking the engine. When the pedal is released, a spring reverses these operations.

Generator.—Generator current regulation is by third brush system. Generator begins to supply current at 7-9 miles per hour or 400-450 R. P. M. of armature. Maximum charging rate of 16-18 amperes is reached at 20-25 miles per hour.

GENERATOR DATA, MOTOR-GENERATOR NOS. 73, 83 AND 93

Amperes	R. P. M.
Neutral	400
6-10	600
16-20	1000
10-15	1500
9-13	1800

Oiling.—Put several drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Tonneau lamp is 6-8 volt, 4 cp. Dash and tail lamps are in series. They are each 3-4 volts, 2 cp.

Circuit Breaker.—There is a vibrating circuit breaker to take the place of fuses. It takes 25 amperes to start this device vibrating, but when vibrating 3 to 5 amperes will cause it to continue.

Model Numbers.—Motor-generator is Nos. 73, 83 or 93. Combination switch is No. 1057 or 1065. Ignition coil is Nos. 2120, 2124 2125, 2140, 2141 or 2142.

WESTCOTT

SERIES 17 (1917) AND 18 (1918)

Delco Generating, Starting and Lighting System

Delco Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The negative (—) terminal is grounded.

Ignition.—Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with a fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

Timing.—Breaker contacts begin to separate when the top dead center mark on flywheel is two inches past indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4 .

Spark Plug Gaps.—Spark plug gaps are .027 inch.

Oiling.—Put 4 or 5 drops of light engine oil in oiler at side of timer unit every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Starter.—Starter Model No. 102 is used. Starter is connected to the engine through a Bendix drive. Lock torque is 16 pound-feet. Running freely, starter takes 40 amperes.

Oiling.—Put 2 or 3 drops of light engine oil in each of starter oilers every month.

Generator.—Generator current regulation is by third brush system. Generator begins to supply current at 8-10 miles per hour, or 500-550 R. P. M. of armature. Maximum charging rate of 14-17 amperes is reached at 25 miles per hour.

GENERATOR DATA, MODEL 101

Hot Test		Cold Test	
Amperes	R. P. M.	Amperes	R. P. M.
Neutral	500	Neutral	500
10-12	900	10.5-12.5	900
14-16	1400	15.5-18.0	1400
11-13	2000	13-0-17.0	2000

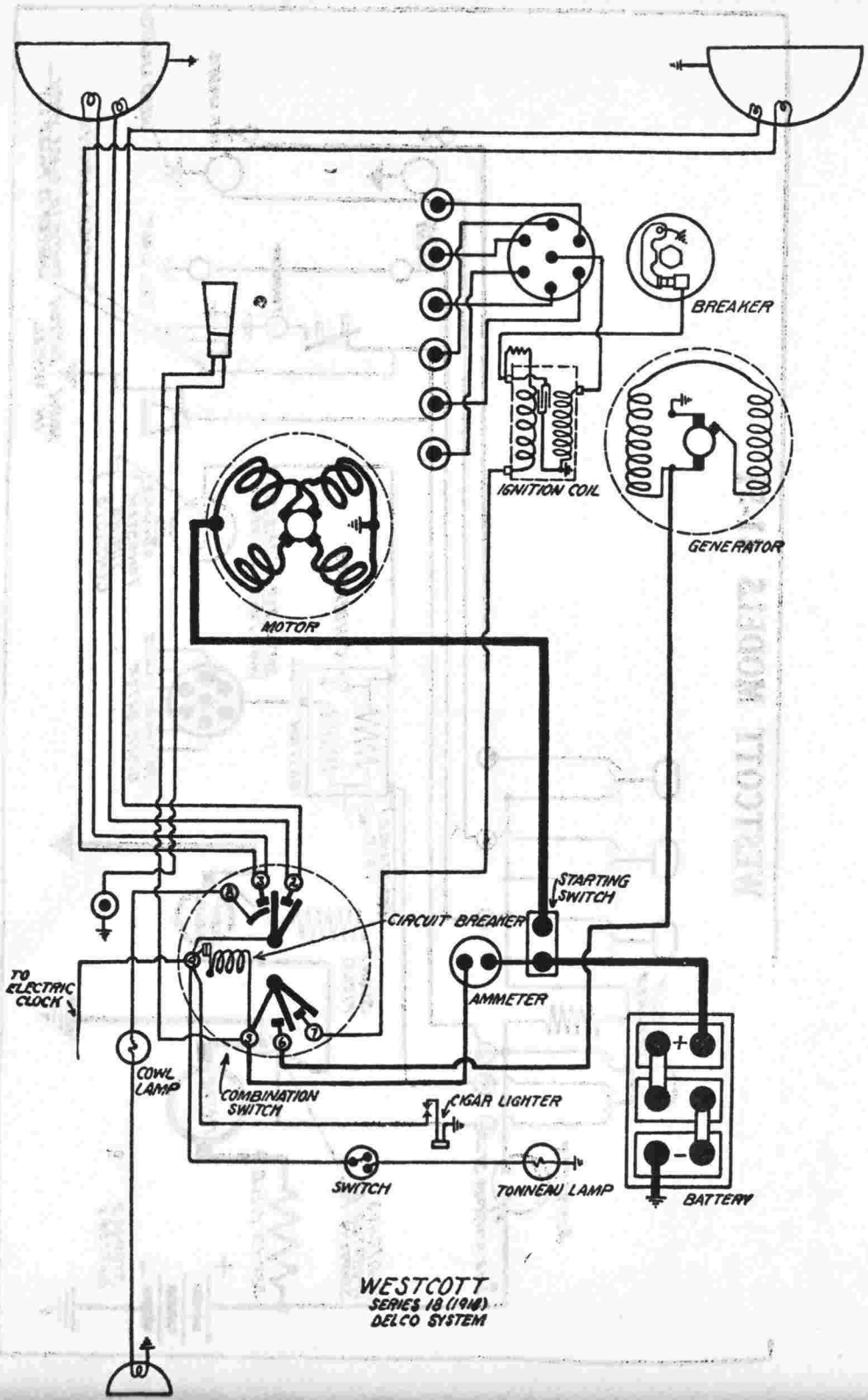
Oiling.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

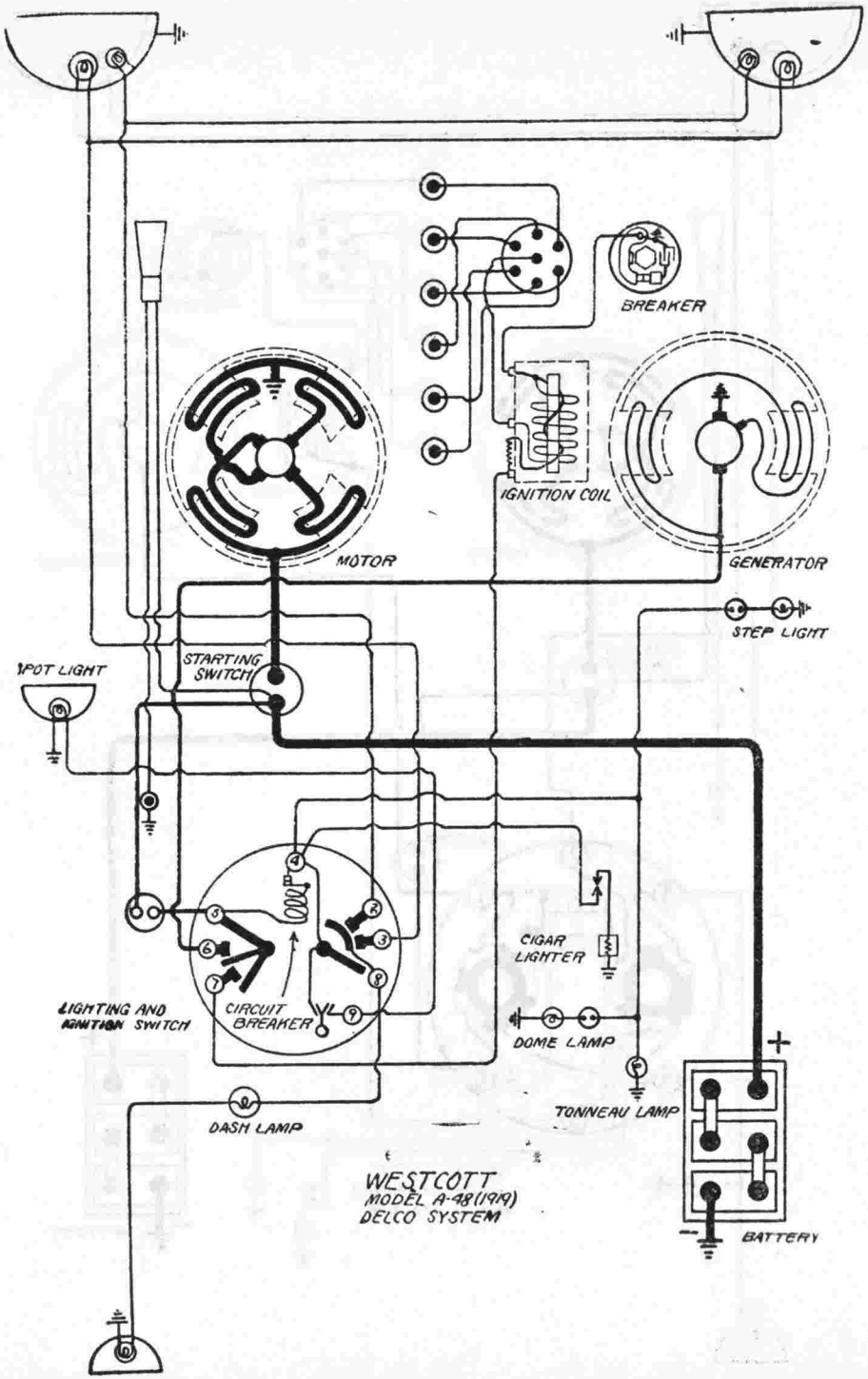
Relay.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch. The overrunning clutch at driving end allows generator to operate as a motor when battery's pressure is above that of generator. If the engine is killed when stopping the noise made by the clutch serves to attract the operator's attention to open the ignition switch. The opening and closing of the generator-battery circuit by the operator takes the place of the relay.

Lamps.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Tonneau lamp is 6-8 volt, 2 cp. Dash and tail lamps are in series. They are each 3-4 volt, 2 cp.

Circuit Breaker.—A vibrating type circuit breaker takes the place of fuses. It takes 25 amperes to start this device vibrating, but when vibrating, 3 to 5 amperes wil cause it to continue.

Model Numbers.—Generator is Model 101. Starter is Model 102. Starter switch is Model 1964. Combination switch is Model 1079. Ignition coil is Model 2139. Ammeter is Model 6058.





WESTCOTT

MODELS 18A (1918-19), A-48, B-48 (1919-20)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type LBA-6-6, 6 volt, 108.5 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2159. Distributor Model No. 5157. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 4 or 5 drops of light engine oil in the oiler at side of breaker unit every two weeks. If rotor button and its track are not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control advanced one-third.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model No. 136. Starter is connected to the engine through a Bendix drive. Running freely, starter armature revolves at 4500 R.P.M., current 35 amperes at 3.5 volts.

OILING.—Starter bearings are of the oilless type.

GENERATOR.—Model No. 135. Generator current regulation is by third brush system. Generator begins to supply current at 7 miles per hour or 500-550 R.P.M. of armature, and reaches its maximum current output of 14-16 amperes at 18-25 miles per hour, or 1400 R.P.M. of armature.

Generator Data

Hot Test		Cold Test	
Amperes	R.P.M.	Amperes	R.P.M.
Neutral	500	Neutral	500
10-12	900	10.5-12.5	900
14-16	1400	15.5-18.0	1400
11-13	2000	13.0-17.0	2000

To increase the charging rate, loosen the two screws holding the third brush arm and move the third brush in a counter-clockwise direction (looking at commutator end). To decrease the charging rate move the third brush in a clockwise direction. Brush must be reseated after adjusting position.

OILING.—Put 5 or 6 drops of light engine oil in each of generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start this device vibrating. While vibrating, the current is 3-5 amperes.

COMBINATION SWITCH.—Model No. 1142.

WESTCOTT

MODEL A-38 (1919) (SERIAL NOS. 10001-10402)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Willard, Type LBA-6-6, 6 volt, 108.5 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2158. Breaker contacts separate .020 inch. They are made of tungsten. When the condition of the points affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Distributor shaft bearings are of the oilless type. If the rotor button and its track are not well polished, apply a small amount of vaseline with a soft cloth.

TIMING.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control advanced one-third.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model No. 106. Starter is connected to the engine through a Bendix drive. Lock torque is 16 pound-feet, at 3.5-3.8 volts. Running freely, starter current is 40 amperes.

OILING.—Starter bearings are of the oilless type.

GENERATOR.—Model No. 105. Generator current regulation is by third brush system. Generator begins to supply current at 7 miles per hour or 500-550 R.P.M. of armature, and reaches its maximum current output of 14-16 amperes at 18-25 miles per hour, or 1400 R.P.M. of armature.

Generator Data

Amperes	R.P.M.	Amperes	R.P.M.
Neutral	500	Neutral	500
10-12	900	10.5-12.5	900
14-16	1400	15.5-18.0	1400
11-13	2000	13.0-17.0	2000

To increase the charging rate, loosen the two screws holding the third brush arm and move the third brush in a counter-clockwise direction (looking at commutator end.) To decrease the charging rate move the third brush in a clockwise direction. Brush must be reseated after adjusting position.

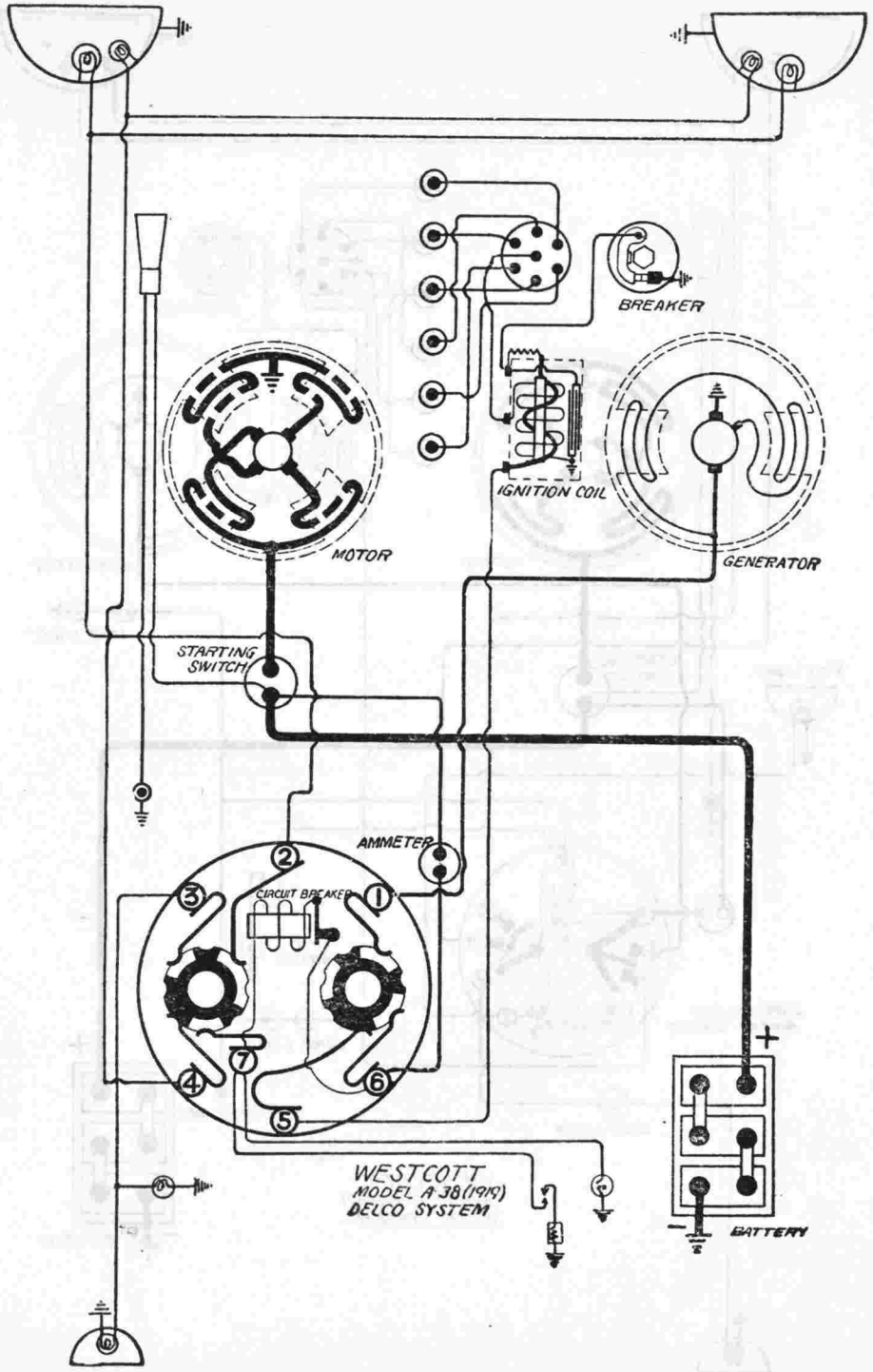
OILING.—Put 5 or 6 drops of light engine oil in each of generator bearing oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

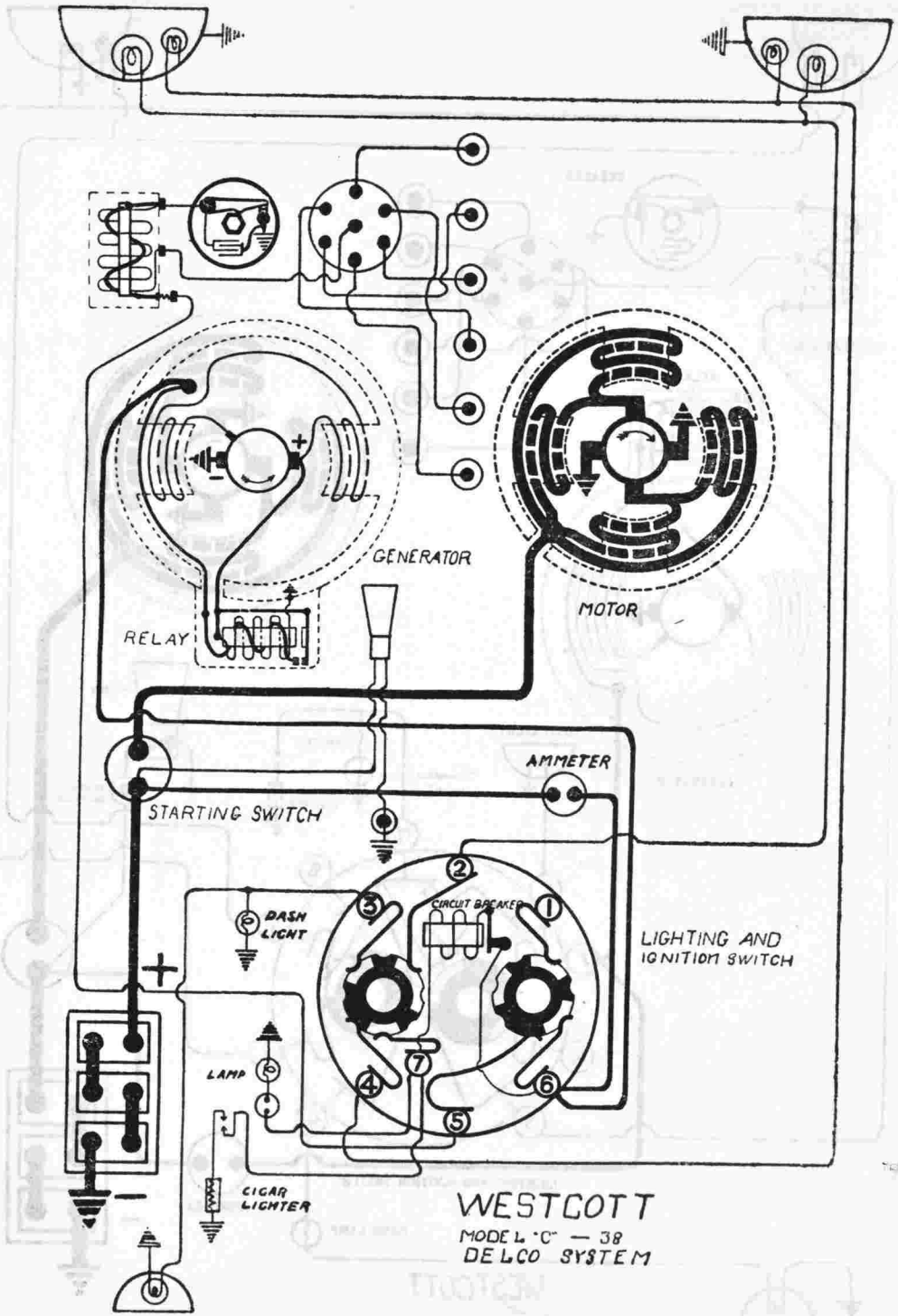
RELAY.—There is no relay. The circuit between the generator and the battery is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start this device vibrating. While vibrating the current is 3-5 amperes.

COMBINATION SWITCH.—Model No. 1145.





WESTCOTT

MODELS B-38, C-38 (1920)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SJW -4, 6 volt, 117.5 ampere-hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2159... Distributor Model No. 5208. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 4 or 5 drops of light engine oil in the distributor unit oilers every two weeks If the track of the rotor button in the distributor head in not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1⅜ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The hring order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model No. 181. Starter is connected to the engine through a set of reduction gears and a Bendix drive. Lock torque is 28 pound-feet at 4 volts, the current being 525 amperes. Starter running free takes 30 amperes at 6 volts. The brush tension should be from 2¼ to 2¾ pounds for each brush. The direction of rotation is clockwise, looking at the commutator end.

OILING.—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month. Remove the grease plug in the reduction gear housing and inject soft cup grease every six months. Saturate the wick oiler in the end of the Bendix gear case with light engine oil every year.

GENERATOR.—Model No. 165. Rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Maximum charging rate is 11-15 amperes, reached at 1200 R.P.M. of the armature or 16-20 miles per hour.

Amperes	Generator Data	R.P.M.
Neutral		550
4		800
8		1000
11-15		1200
11-14		2000

Charging rate is varied by the adjustment of the third brush setting. To move the third brush, loosen the three screws holding the bearing retainer plate on the commutator end and shift the plate. Move in a counter-clockwise direction to increase the charging rate, or in the opposite direction to decrease the charging rate. Tighten the adjusting screws and reseat the brush after making the adjustment. Maximum charging rate must not exceed 16 amperes.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on the generator frame. Relay closes at 550-600 R.P.M. of the armature or 7-8 miles per hour, and opens at 500-550 R.P.M. of the armature or 5-6 miles per hour. Relay contacts separate .046 to .062 inch. Air gap between the relay armature and coil core is .020 to .035 inch, contacts closed. To adjust relay connect a voltmeter between the positive (+) generator brush and ground. Then slowly speed up the generator and adjust the relay spring tension by turning the thumb nut until the contacts close when the voltmeter indicates 7.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash, tail, step and tonneau lamps are 6-8 volt, 2 cp. Dome lamp is 6-8 volt, 5 cp.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start the vibrator. While vibrating the current is 3.5 amperes.

WESTCOTT

MODEL C-38 (1921-22), A-44 (1922), B-44 (1923)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Willard, (1921) Type SJW-4 (1922) Type SJWR-4, 6 volt, 117.5 ampere hour. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. 2159. Distributor Model No. 5208. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oilstone.

Oiling:—Put 4 or 5 drops of light engine oil in the distributor unit oilers every two weeks. If the track of the rotor button in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Timing:—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1⅜ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plug Gaps:—Spark plugs gaps are .030 inch.

STARTER:—Model No. 181. Starter is connected to the engine through a set of reduction gears and a Bendix drive. Lock torque is 28 pound-feet at 4 volts, the current being 525 amperes. Starter running free takes 30 amperes at 6 volts. The brush tension should be from 2¼ to 2¾ pounds for each brush. The direction of rotation is clockwise, looking at the commutator end.

Oiling:—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every month. Remove the grease plug in the reduction gear housing and inject soft cup grease every six months. Saturate the wick oiler in the end of the Bendix gear case with light engine oil every year.

GENERATOR:—Model No. 165. Rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. Maximum charging rate is 11-15 amperes, reached at 1200 R.P.M. of the armature or 16-20 M.P.H.

Generator Data

Amperes	R.P.M.
Neutral	550
4	800
8	1000
11-15	1200
11-14	2000

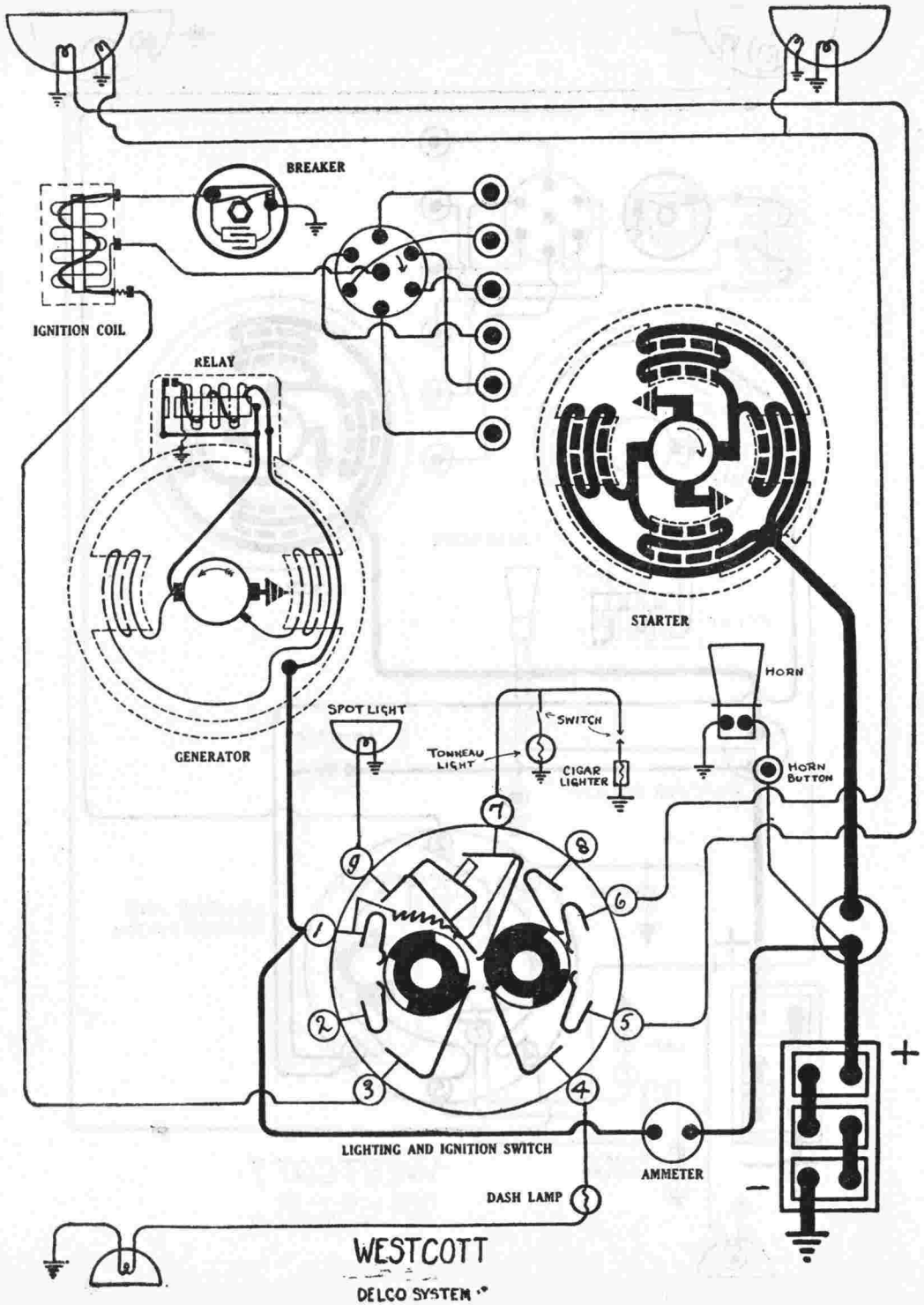
Charging rate is varied by the adjustment of the third brush setting. To move the third brush, loosen the three screws holding the bearing retainer plate on the commutator end and shift the plate. Move in a counter-clockwise direction to increase the charging rate, or in the opposite direction to decrease the charging rate. Tighten the adjusting screws and reseat the brush after making the adjustment. Maximum charging rate must not exceed 16 amperes.

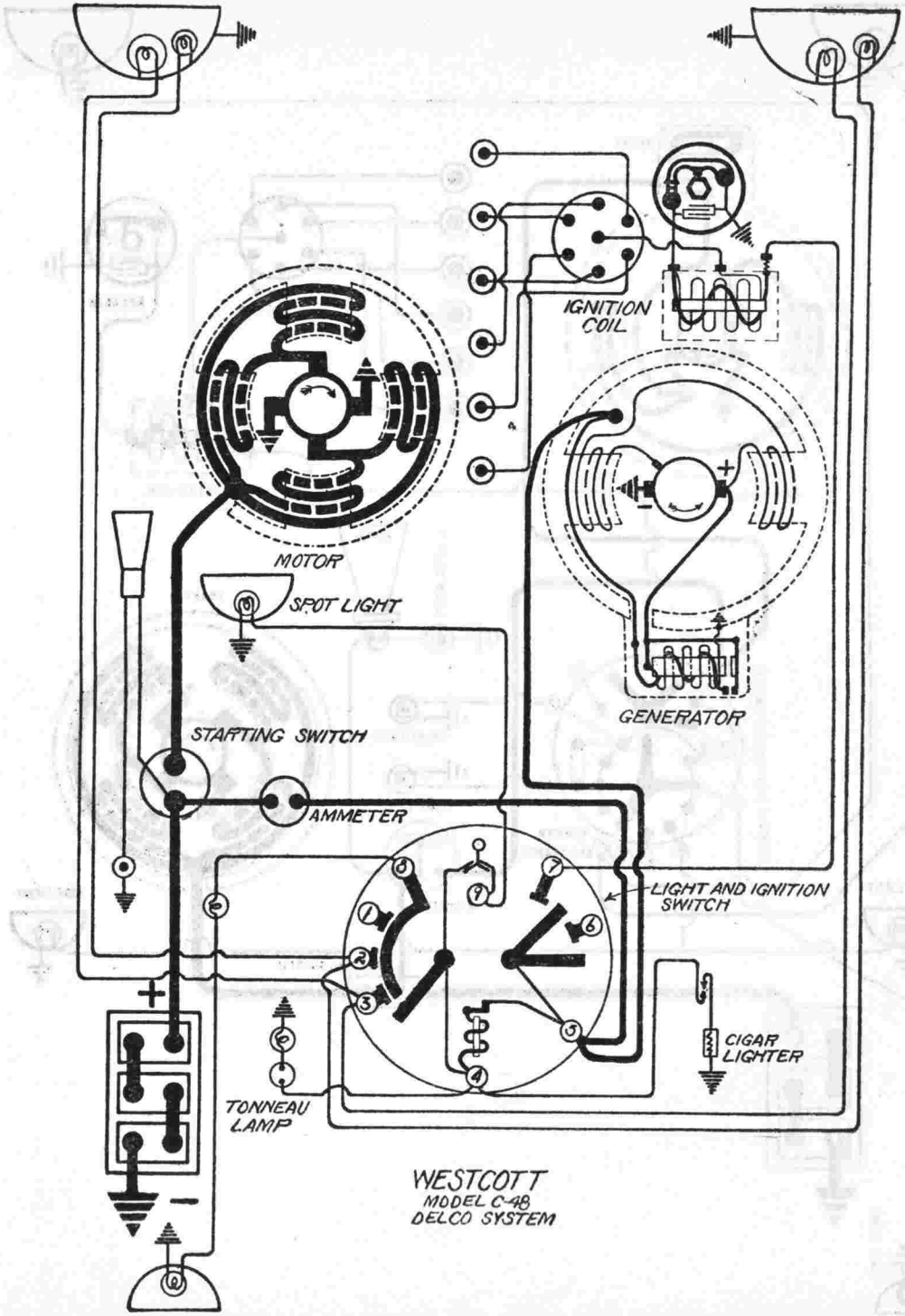
Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY:—Relay is mounted on the generator frame. Relay closes at 550-600 R.P.M. of the armature or 7-8 miles per hour, and opens at 500-550 R.P.M. of the armature or 5-6 miles per hour. Relay contacts separate .046 to .062 inch. Air gap between the relay armature and coil core is .020 to .035 inch, contacts closed.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 3-4 volt, 2 cp. Dome lamp is 6-8 volt 5 cp. On 1921 cars, head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 5 cp.

CIRCUIT BREAKER:—A vibrating circuit breaker takes the place of fuses. It requires 25 amperes to start the vibrator. While vibrating the current is 3-5 amperes.





WESTCOTT

MODEL C-48 (1920-21-22)
MODELS C-48, D-48 (1922-23)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Willard, (1920-21) SJW-4, (1922) Type SJWR-4 6 volt, 117.5 ampere hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2159. Distributor Model No. 5157. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone.

OILING.—Put 4 or 5 drops of light engine oil in each of the distributor head oilers every two weeks. If the track of the rotor button is not well polished, apply a small amount of vaseline with a soft cloth. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the top dead center mark on the flywheel is 1⅜ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .030 inch.

STARTER.—Model No. 179. Starter is connected to the engine through a Bendix drive.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month. Remove the grease plug in the reduction gear housing and inject soft cup grease every six months.

GENERATOR.—Model No. 180. Generator current regulation is by the third brush system. Maximum current output of 11-15 amperes is reached at 1200 R.P.M. of the armature or 18-24 miles per hour.

Amperes	Hot Test	R.P.M.
4		800
8		1000
11-15		1200
11-14		2000
8-12		2300

Charging rate is varied by adjusting third brush setting. Loosen the three screws holding the third brush plate, and move the third brush in a counter-clockwise direction (looking at the commutator end) to increase the charging rate. Move the brush in the opposite direction to decrease the charging rate. Tighten the screws and reseat the brush after adjusting position.

OILING.—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay is mounted on generator frame. Relay closes at 8-9 and opens at 5-7 miles per hour. Relay contacts separate .046 to .062 inch. Air gap between relay armature (moving member) and coil core is .020 to .035 inch, contacts closed. To adjust relay, connect a voltmeter between the positive generator brush and ground. Then slowly speed up the generator and adjust the relay spring tension by turning the thumb screw until the relay contacts close when the voltmeter indicates 7.5 volts. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 3-4 volt, 2 cp. Dome lamp is 6-8 volt, 5cp. Dash, dome and step lamps have double contact base. All other lamps have single contact base. On 1920-21 cars, head lamps are 6-8 volt, 18 cp. Dimmer lamps are 6-8 volt, 5 cp.

CIRCUIT BREAKER.—A vibrating circuit-breaker takes the place of fuses. It requires 25 amperes to start the vibrator, but 3-5 amperes will cause it to continue.

WESTCOTT

MODEL 60 (1924)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Willard, Type SW-15. 6 volt, 120 ampere hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2178. Distributor Model No. 5257. Breaker contacts separate .020 to .025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine flat jeweler's file, finishing on a hard oilstone.

Oiling.—Put 8 or 10 drops of light engine oil in each of the distributor oilers every two weeks. If the track of the rotor in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. Place a bit of medium heavy cup grease on the face of the breaker cam. These attentions should be given every 500 miles or each two weeks.

Timing.—Breaker contacts begin to separate when the piston entering power stroke is 1 inch past top dead center (measured on the flywheel), spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .030 inch.

STARTER.—Model No. 278... The starter is connected to the engine by a Bendix drive. Lock torque is 20 pound feet at 3.1 volts. Starter running free takes 65 amperes at 6 volts. The direction of rotation is clockwise, looking at the commutator end. The brush tension should be from 2¼ to 2¾ pounds on each brush.

Oiling.—Oilless bearings are used. They require no attention. Remove the grease plugs and repack the reduction gear housing with medium heavy cup grease twice a year.

GENERATOR.—Model No. 258. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. The maximum charging rate is 17 amperes, reached at 1600 R.P.M. of the armature.

Generator Data

Amperes	R.P.M.
4	800
8	1000
17	1600
15	2000

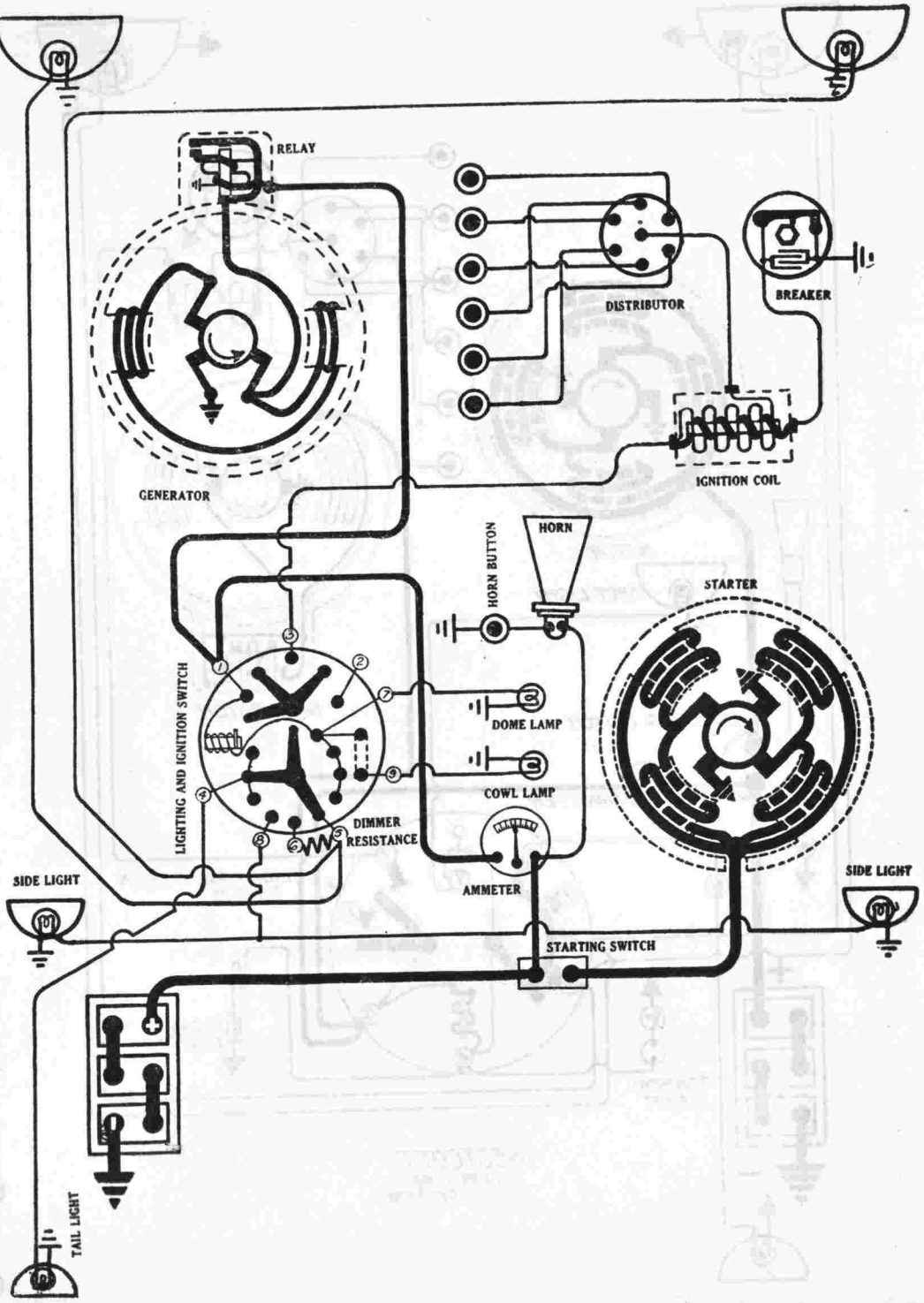
To adjust the charging rate, loosen the generator cover band and shift the third brush mounting plate by means of the handle. Moving the third brush in the direction of armature rotation (counter-clockwise) increases the charging rate and in the opposite (clockwise) direction decreases the charging rate. The brush tension of the generator brushes should be from 1¼ to 1¾ pounds each.

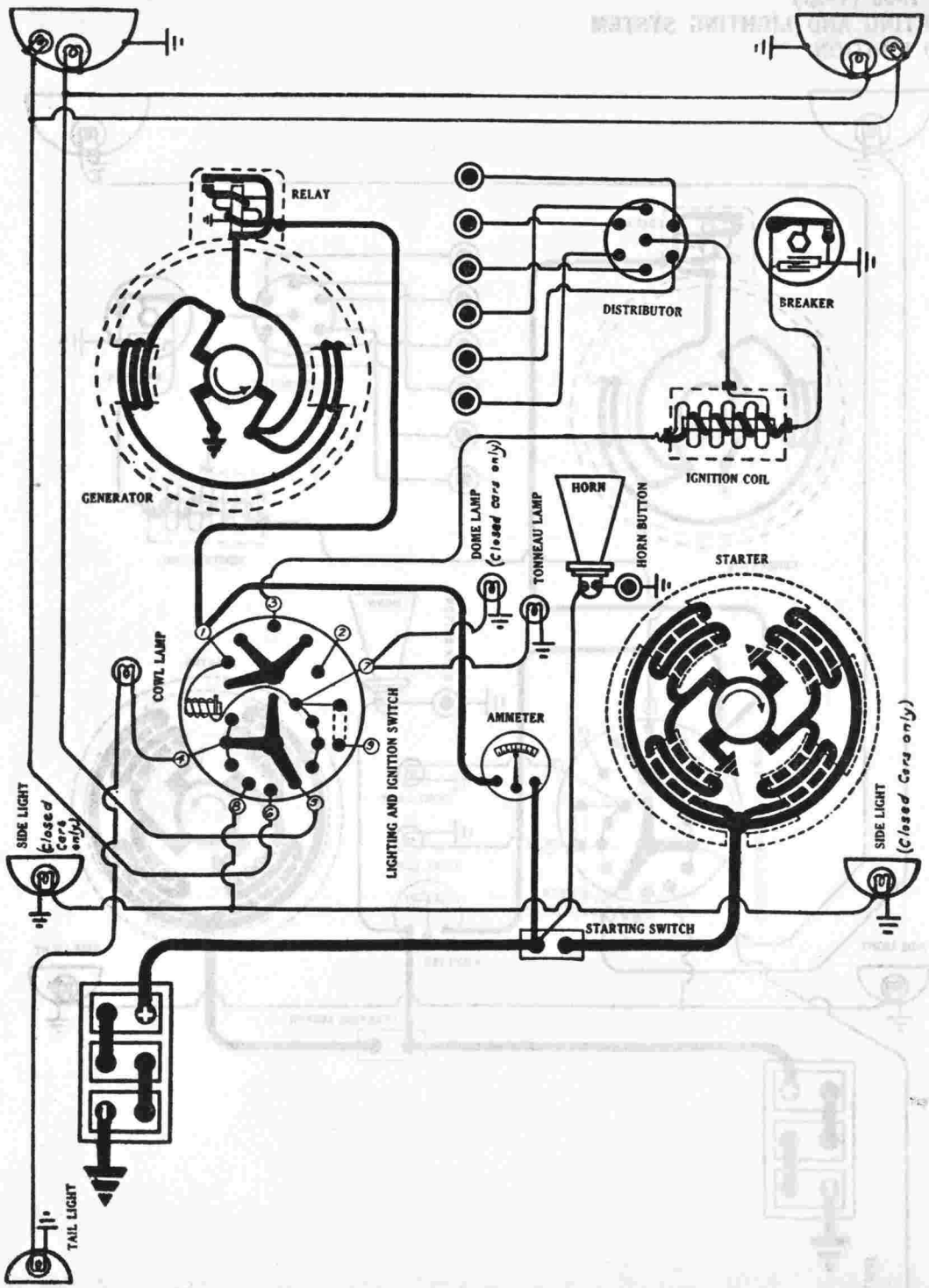
Oiling:—Put 8 or 10 drops of light engine oil in each of the generator oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY.—The relay is mounted on the generator frame. The relay contacts close at 6.75 to 7.5 volts and open with a discharge current of 0 to 3 amperes. The gap between the relay armature and the coil core is .015 to .020 inch. To raise tthe cut-in voltage, increase the spring tension by bending the long brasss stop or increase the gap by bending the short brass stop. To lower the cut-in voltage, decrease the gap or the spring tension.

LAMPS:—Combination Switch No. 1244. Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

CIRCUIT-BREAKER.—A vibrating circuit breaker mounted on the back of the switch takes the place of fuses. It requires a current of 25 to 30 amperes to start it vibrating. While vibrating the current is 3-5 amperes.





WESTCOTT

MODEL C-44 (1923-24), H-44 (1925)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY:—Willard, Type SJR-4. 6 volt, 110 ampere hour. The negative (—) terminal is grounded.

IGNITION.—Coil Model No. 2178. Distributor Model No. 5256. Breaker contacts separate .020 to .025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine flat jeweler's file, finishing on a hard oilstone.

Oiling:—Put 8 or 10 drops of light engine oil in each of the distributor oilers every two weeks. If the track of the rotor in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. Place a bit of medium heavy cup grease on the face of the breaker cam. These attentions should be given every 500 miles or each two weeks.

Timing.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plug Gaps:—Spark plug gaps are .030 inch.

STARTER.—Model No. 181. The starter is connected to the engine by a Bendix drive. Lock torque is 27 pound feet at 2.75 volts. Starter running free takes 36 amperes at 6 volts. The direction of rotation is clockwise, looking at the commutator end. The brush tension should be from 2¼ to 2¾ pounds on each brush.

Oiling.—Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every 1000 miles or each month. Remove the grease plug and repack the reduction gear housing with medium heavy cup grease every six months. Saturate the wick oiler in the end of the Bendix gear case with light engine oil once each year.

GENERATOR:—Model No. 258. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. The maximum charging rate is 17 amperes, reached at 1600 R.P.M. of the armature.

Generator Data

Amperes	R.P.M.
4	800
8	1000
17	1600
15	2000

To adjust the charging rate, loosen the generator cover band and shift the third brush mounting plate by means of the handle. Moving the third brush in the direction of armature rotation (counter-clockwise) increases the charging rate and in the opposite (clockwise) direction decreases the charging rate. The brush tension of the generator brushes should be from 1¼ to 1¾ pounds each.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, this oiling must be done every 500 miles.

RELAY:—The relay is mounted on the generator frame. The relay contacts close at 6.75 to 7.5 volts and open with a discharge current of 0 to 3 amperes. The gap between the relay armature and the coil core is .015 to .020 inch. To raise the cut-in voltage, increase the spring tension by bending the long brass stop or increase the gap by bending the short brass stop. To lower the cut-in voltage decrease the gap or the spring tension.

LAMPS.—Combination Switch No. 1246. Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 3-4 volt, 2 cp. Dome lamp is 6-8 volt, 5 cp.

CIRCUIT-BREAKER:—A vibrating circuit breaker mounted on the back of the switch takes the place of fuses. It requires a current of 25 to 30 amperes to start it vibrating. While vibrating the current is 3-5 amperes.

WESTCOTT

MODEL H-60 (1925)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY:—Willard, Type SW-15. 6 volt. 120 ampere hour. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. 2178. Distributor Model No. 5256. Breaker contacts separate .020 to .025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with a fine flat jeweler's file, finishing on a hard oilstone. Distributor is semi-automatic. Manual advance is 30 degrees. Automatic advance begins at 600 R.P.M. Maximum automatic advance is 17-21 degrees reached at 2000 R.P.M. Combined manual and automatic advance is 51 degrees.

Mounting:—Distributor is mounted on the engine block. To remove distributor, disconnect primary lead and manual advance rod. Remove distributor head with high tension cables intact. Remove manual advance stop screw and lift unit from position.

Oiling:—Put 8 or 10 drops of light engine oil in each of the distributor oilers every two weeks. If the track of the rotor in the distributor head is not well polished, apply a small amount of vaseline with a soft cloth. Place a bit of medium heavy cup grease on the face of the breaker cam. These attentions should be given every 500 miles or each two weeks.

Timing:—Breaker contacts begin to separate when the piston entering power stroke is 1 inch past top dead center (measured on the flywheel), spark control lever and breaker assembly in the fully retarded position. To check timing, crank engine over until piston No. 1 is coming up on the compression stroke. This is the up stroke with both valves closed. Fully retard the spark and continue to crank engine until piston reaches a position 1 inch past top dead center. Breaker contacts should separate at this point. If they do not, loosen the advance lever clamp screw and turn the distributor in a counter-clockwise direction until the contacts open. Tighten the screw and make certain that the rotor is opposite the segment connected to the spark plug in cylinder No. 1 and connect the remaining plugs in order 5-3-6-2-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plug Gaps:—Spark plug gaps are .030 inch.

VALVE TIMING:—INLET VALVES:—Head diameter is 1⅝ inches; stem diameter is .371 inch; stem length is 5¼ inches. Tappet clearance is .004 inch (cold). Spring pressure is 50 pounds. Inlet valves open at 10 degrees after top dead center and close at 35 degrees after lower dead center.

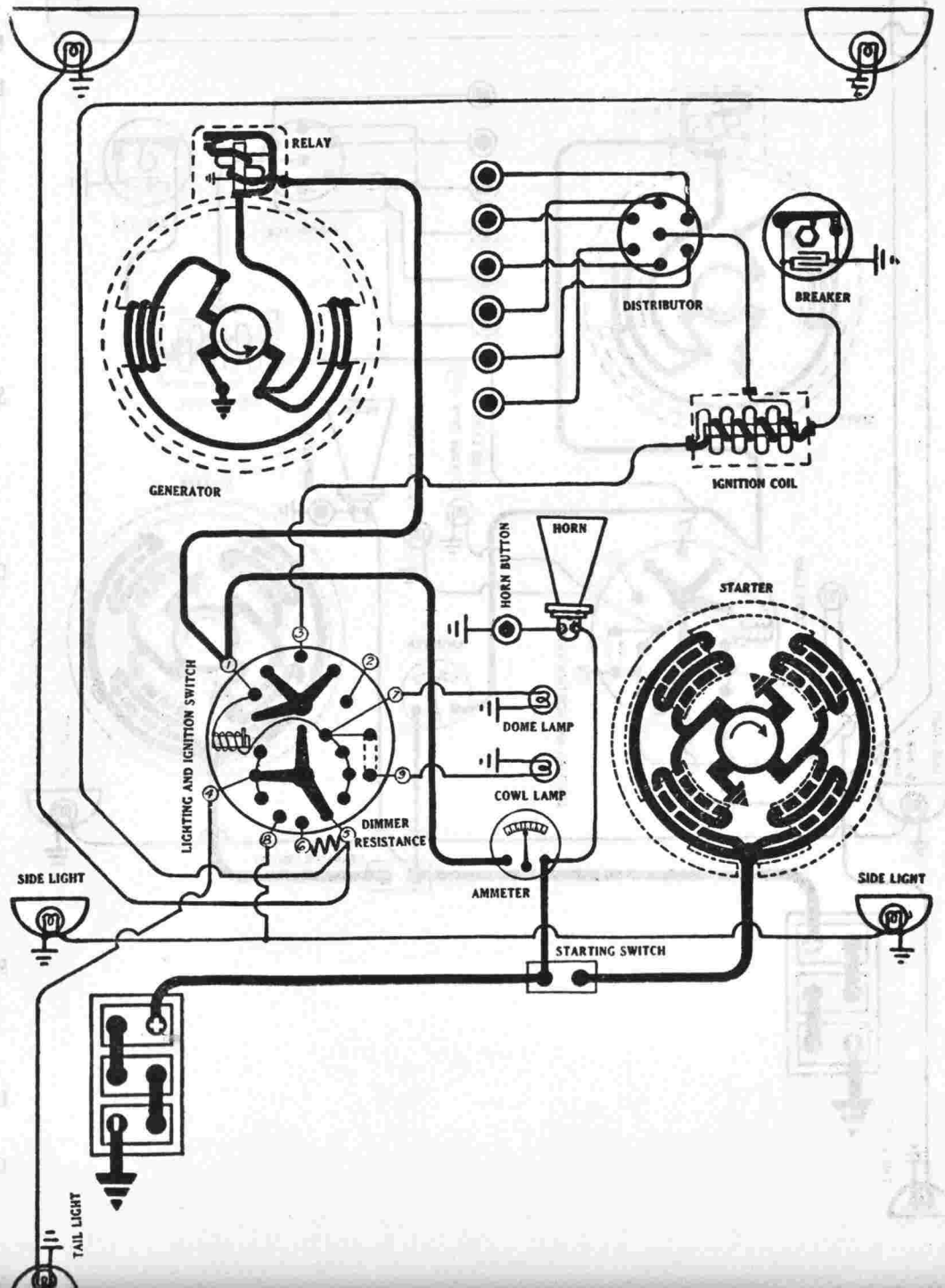
EXHAUST VALVES:—Head diameter is 1⅝ inches; stem diameter is .371 inch; stem length is 5¼ inches. Tappet clearance is .006 inch (cold). Spring pressure is 50 pounds. Exhaust valves open at 35 degrees before lower dead center and close at 11 degrees after top dead center.

STARTER:—Model No. 181. The starter is connected to the engine by a Bendix drive. The direction of rotation is clockwise, looking at the commutator end. Starter brush spring tension should be 2¼-2¾ pounds. Starter switch is Model 1955.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	36
28 "	Lock	4	525

Mounting:—Starter is sleeve mounted. To remove starter, disconnect lead from starter terminal and remove tapered pilot screw. Pull the starter forward and out from engine.



WESTCOTT

MODEL H-60 (1925)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

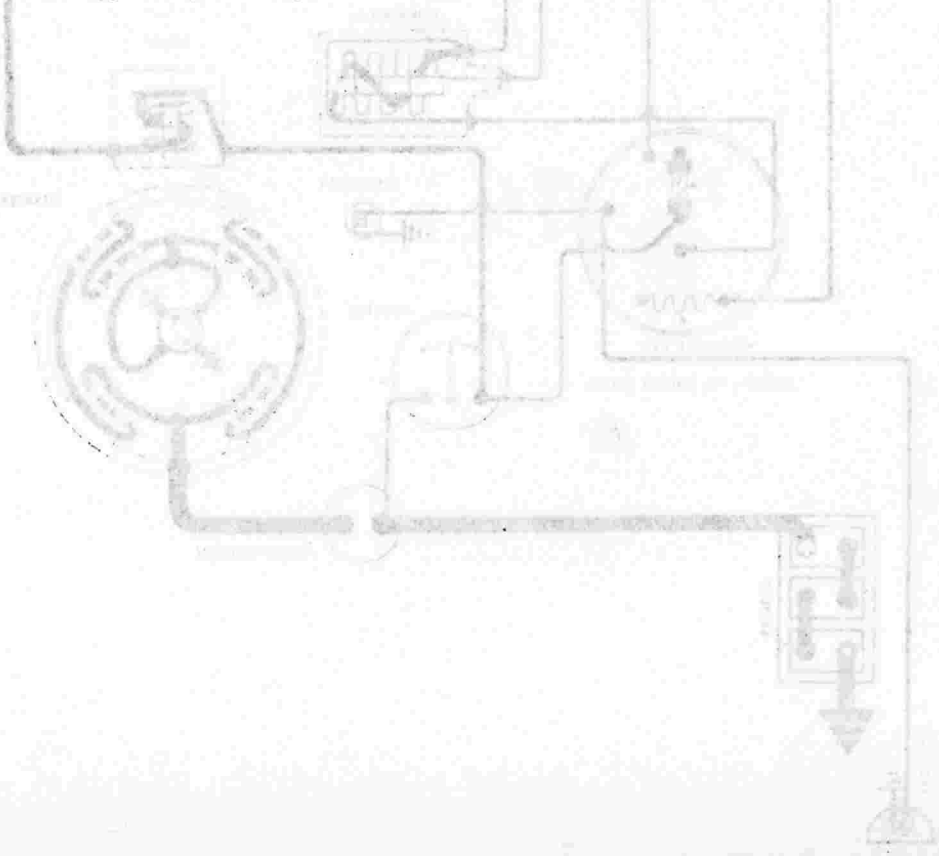
Oiling:—Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every 1000 miles or each month. Remove the grease plug and repack the reduction gear housing with medium heavy cup grease every six months. Saturate the wick oiler in the end of the Bendix gear case with light engine oil once each year.

GENERATOR:—Model No. 258. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. The maximum charging rate is 17 amperes, reached at 1600 R.P.M. of the armature.

Generator Data

Amperes	R.P.M.
4	800
8	1000
17	1600
15	2000

To adjust the charging rate, loosen the generator cover band and shift the third brush mounting plate by means of the handle. Moving the third brush in the direction of armature rotation (counter-clockwise) increases the charging rate and in the opposite (clockwise) direction decreases the charging rate. The brush tension of the generator brushes should be from 1¼ to 1¾ pounds each.



Mounting:—Generator is base mounted. To remove generator, disconnect the generator lead and coupling. Remove hold-down screws and lift generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, this oiling must be done every 500 miles.

RELAY:—The relay is mounted on the generator frame. The relay contacts close at 6.75 to 7.5 volts and open with a discharge current of 0 to 3 amperes. The gap between the relay armature and the coil core is .015 to .020 inch. To raise the cut-in voltage, increase the spring tension by bending the long brass stop or increase the gap by bending the short brass stop. To lower the cut-in voltage, decrease the gap or the spring tension.

LAMPS:—Combination Switch No. 1244. Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

CIRCUIT BREAKER:—A vibrating circuit breaker mounted on the back of the switch takes the place of fuses. It requires a current of 25 to 30 amperes to start it vibrating. While vibrating the current is 10-15 amperes.

WHIPPET

MODEL 96 (1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

BATTERY:—U.S.L. Type 3-CVX-5X-6, 6 volt. Starting capacity is 96 amperes for 20 minutes. Lighting capacity is 5 amperes for 17 hours. The negative (—) terminal is grounded. The battery is mounted on the chassis under the front floor board.

IGNITION:—Coil Model IG-4065. Distributor Model IG-4135-A. Breaker contacts separate .020-.024 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine, flat contact file. Ignition current is 1-3 amperes with engine running and 3.4-5 amperes with engine stopped. Distributor is of the manual type.

Mounting:—Ignition coil is mounted on right side of engine. Distributor is mounted at rear of generator on right side of engine. To remove distributor, disconnect breaker lead and high tension cables or remove distributor head. Then loosen two clamp screws in mounting bracket on generator end plate. Then lift distributor from place.

Oiling:—Put 5 to 8 drops of light engine oil in the oiler on the side of the distributor housing every two weeks or each 500 miles. Put one drop of oil on the breaker arm pivot pin and put a small bit of vaseline on the face of the breaker cam under the fiber bumper of the breaker arm every 5000 miles.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 28° before top dead center (measured on the flywheel) with the manual spark control lever in the fully advanced position. Intake opens at top dead center and closes at 40° past lower dead center. Exhaust opens at 46° before lower dead center and closes at top dead center.

Firing Order:—The firing order is 1-3-4-2.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

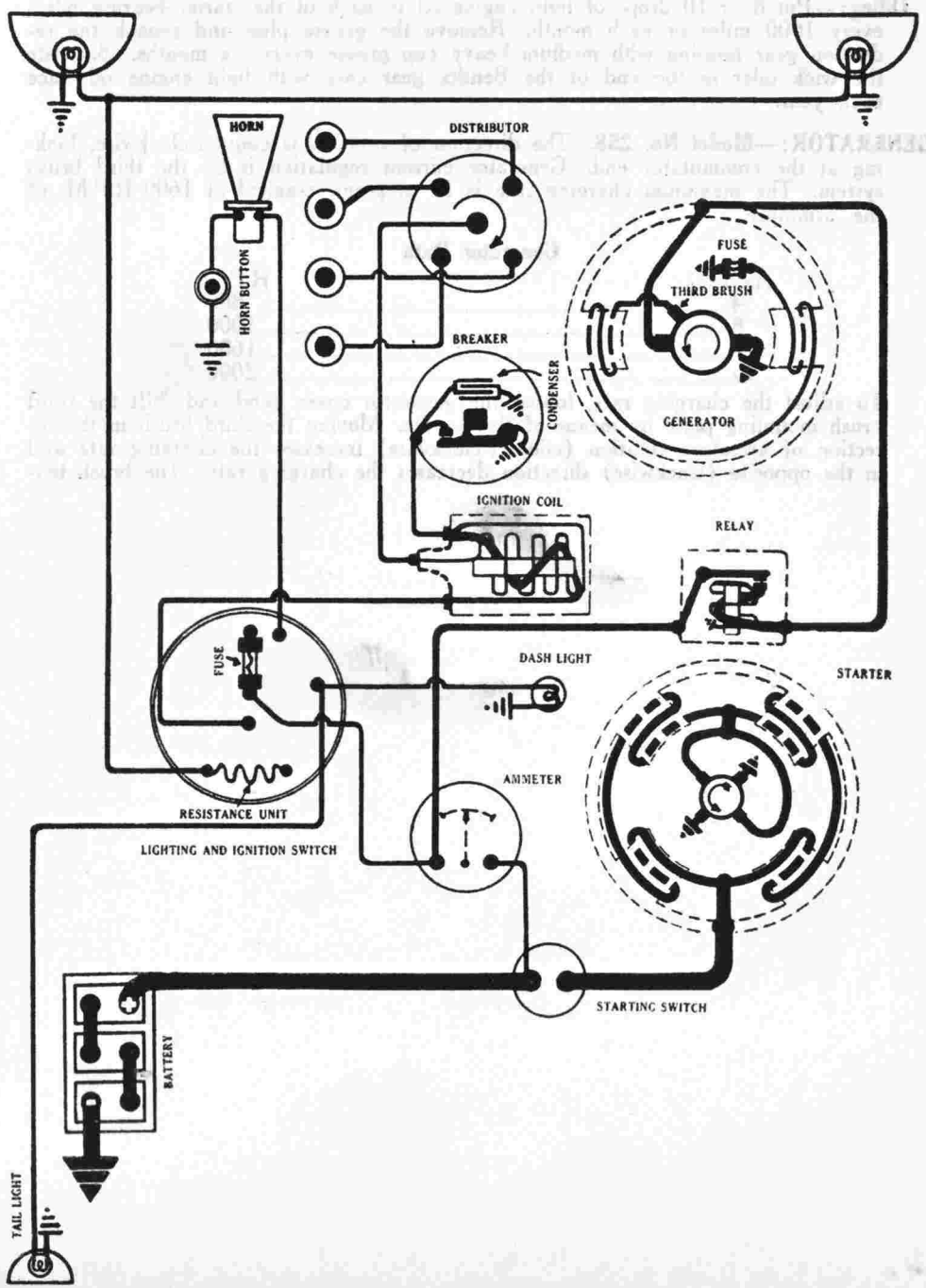
STARTER:—Model MO-4105. Starter is connected to the engine through an inboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 140 R.P.M. taking 150 amperes at 5 volts. Starter brush tension should be 1¼-1½ pounds each. Starter switch is Model SW-4001.

Starter Data

Torque	R.P.M.	Volts	Amperes
1.5 lb. ft.	2080	5.25	150
2.5 "	1480	5.0	200
3.5 "	1090	4.7	250
4.7 "	790	4.5	300
5.9 "	500	4.3	350
7.0 "	220	4.0	400
11.6 "	Lock	4.0	550

Mounting:—Starter is flange mounted on right side of engine at forward side of flywheel housing. To remove starter, disconnect starter cable and remove three flange mounting screws. Then slide starter forward and lift from place.

Oiling:—Starter bearings are graphite-bronze self oiling type. They require no attention.



WHIPPET

MODEL 96 (1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

GENERATOR:—Model GTB-4101. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, remove commutator cover band and shift third brush mounting bracket by prying on third brush mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any desired position by friction between the third brush mounting stud and the generator end plate. The maximum charging rate is 16 amperes reached at 1800 R.P.M. of the armature or approximately 25 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
2	6.6	720	2	7.2	800
5	7.0	850	5	7.4	950
10	7.3	1075	10	7.7	1300
14	7.7	1340	14	7.9	1800
16	7.9	1800			

Running as a motor, generator draws 5 amperes at 6 volts. Shuntfield current is 3.6 amperes at 6.2 volts. Generator brush tension should be 1¼-1½ pounds each.

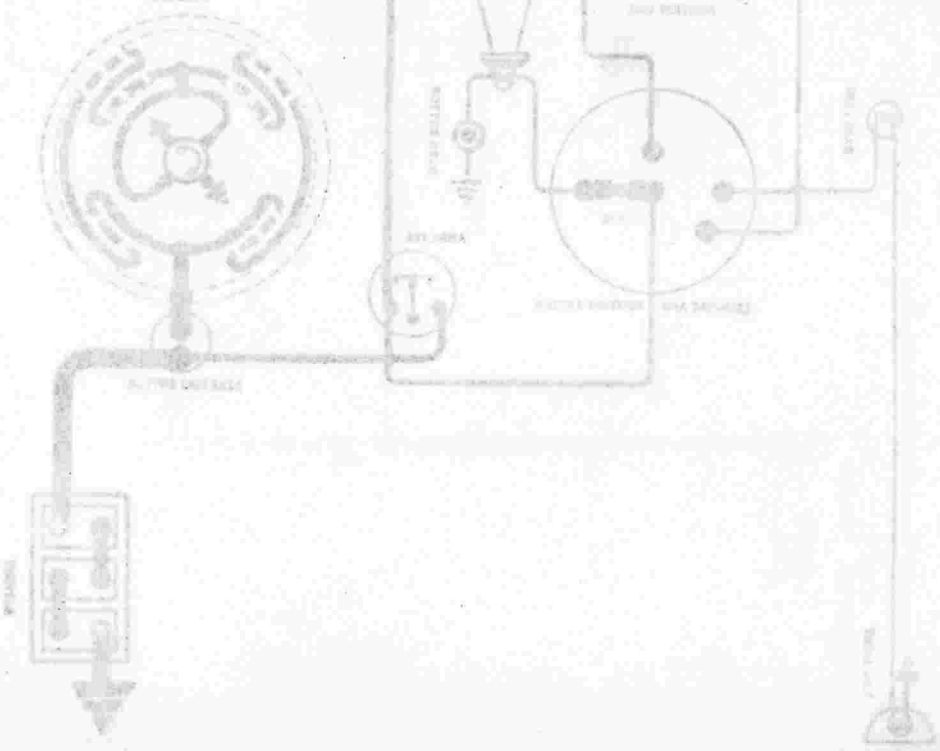
Mounting:—Generator is mounted on right side of engine at rear of timing chain case by an eccentric mounting which permits adjustment of the chain. To remove generator, disconnect generator lead and all ignition leads or remove distributor from mounting bracket. Then remove chain case cover on forward side and remove nut on generator drive sprocket. Remove generator mounting strap and slide generator to rear allowing sprocket to remain meshed in chain. Remove generator from place.

Oiling:—Put 8 to 10 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles. The drive end bearing is oiled by splash from the timing chain.

RELAY:—Model CB-4007. Relay is mounted on the generator. Relay closes at approximately 11 M.P.H. when the generator voltage reaches 7-7.5 volts and opens at approximately 9 M.P.H. with a discharge current of .5-2.5 amperes. Charging current must not exceed 5 amperes when contacts close. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.020 inch, contacts closed.

LIGHTING:—Briggs & Stratton Switch Model 38200. Head lamps are 6-8 volt, 21 cp. S.C. Dimming is by .5 ohm resistance on switch. Dash, dome and tail lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuse on switch is 20 amperes.



WHIPPET SIX

(1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L. Type 3-CVX-6x, 6 volt. Starting capacity is 115 amperes for 20 minutes. Lighting capacity is 5 amperes for 21 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model IG-4065. Distributor Model IG-4116-B. Breaker contacts separate .020-.024 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine, flat contact file. Ignition current is 1-3 amperes with engine running and 3.4-5 amperes with engine stopped. Distributor is semi-automatic. Manual advance is 30° (on flywheel). Automatic advance begins at 400 R.P.M. and reaches a maximum of 20° (on flywheel) at 2800 R.P.M. of the engine.

Oiling:—Put 5 drops of light engine oil in the oiler on commutator every 1000 miles. Drive end is oiled by splash from gears.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

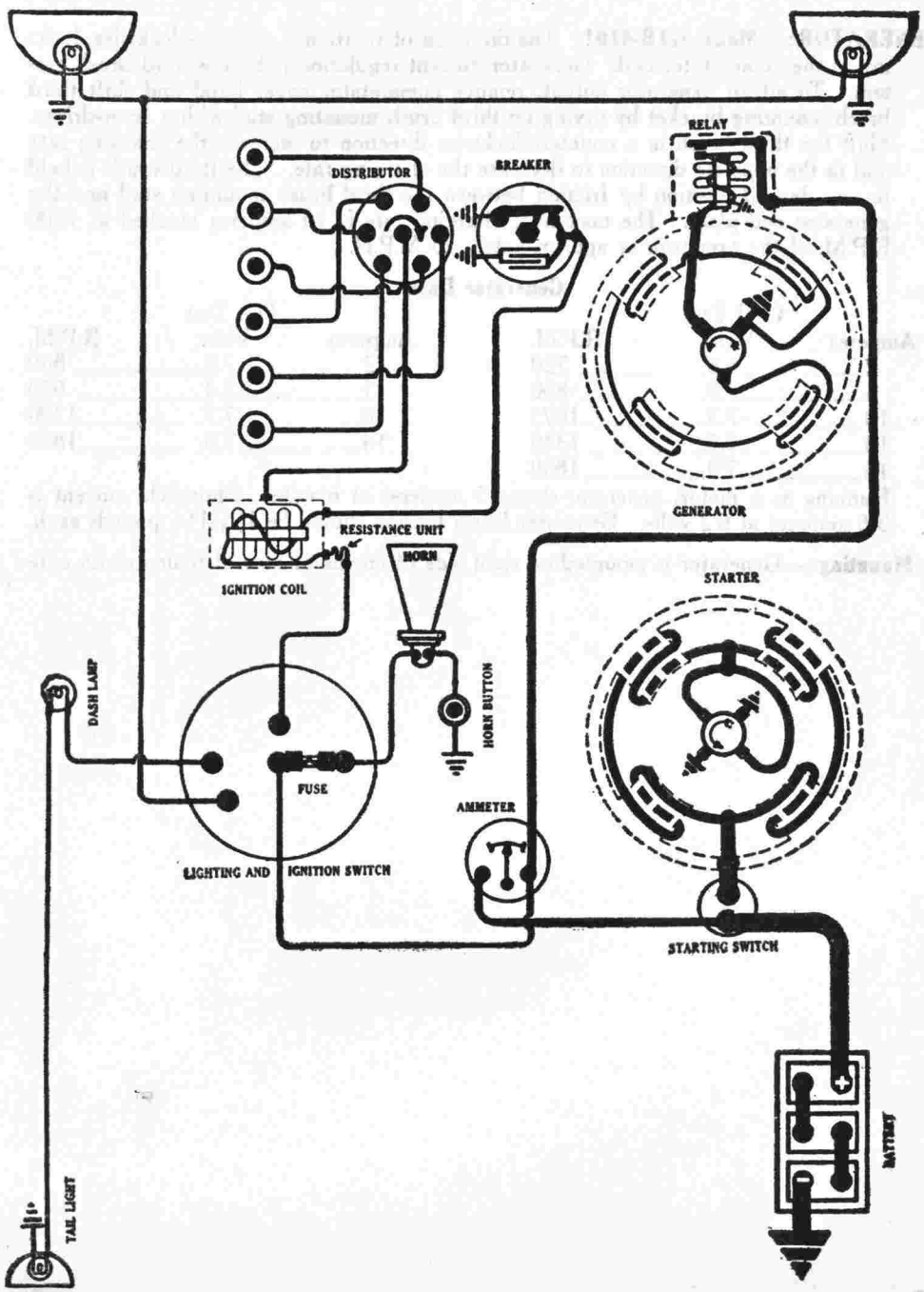
STARTER:—Model MN-4104. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 228 R.P.M. taking 160 amperes at 5.25 volts. Starter brush tension is 1¼-1½ pounds each.

Starter Data.

Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	Free	5.5	45	(Without Bendix)
0 "	Free	5.5	50	(With Bendix)
.5 "	2800	5.5	100	
2.4 "	1450	5.0	200	
4.8 "	950	4.5	300	
7.2 "	650	4.0	400	
13.6 "	Lock	3.0	540	

Oiling:—Put 5 to 10 drops of light engine oil in the oiler on the drive end of the starter every month or each 1000 miles. The commutator end bearing is oilless.

GENERATOR:—Model GP-4105. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, loosen the commutator cover band and shift the third brush mounting plate by tapping on the third brush mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any desired position by friction between the third brush mounting stud and the generator end plate. The maximum charging rate is 17 amperes at 8 volts.



WHIPPET SIX

(1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

Generator Data

	Cold Test			Hot Test	
Amperes	R.P.M.	M.P.H.	Amperes	R.P.M.	M.P.H.
2	440	8	2	660	11.5
5	540	9.5	5	700	12
10	760	13	10	1200	21
14	1050	18.4			

Motoring freely, generator draws 5 amperes at 6 volts. Shuntfield current is 3 amperes at 6.2 volts. Generator brush spring tension should be 1¼-1½ pounds each.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every two weeks or each 500 miles. The drive end bearing is oiled by splash from the gear case.

RELAY:—Model CB-4007. Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of ½-2½ amperes. Contacts separate .025-.035 inch; air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING.—Briggs and Stratton Switch Model 39320. Head lamps are 6-8 volt, 21 cp. S. C. Dash and tail lamps are connected in series. They are each 3-4 volt, 2 cp. S. C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuse is 20 amperes.

WHIPPET

MODEL 96 FOUR (1928)

AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L., Type 3-CVX-5X6, 6 volt, 11 plates. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 96 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted on left frame member.

IGNITION:—Coil Model IG-4065. Coil is mounted on engine block on right side. Ignition current is 1-3 amperes with engine running and 3.4-5 amperes with engine stopped.

Distributor Model IGB-4001-A. Breaker contacts separate .020-.025 inch. Set contact opening by loosening lock nut on stationary contact stud and turning up stud until proper gap is secured with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is full automatic. Automatic advance begins at 800 R.P.M. of engine. Maximum automatic advance is 24 degrees (engine) reached at 3400 R.P.M.

Mounting:—Distributor is mounted at rear of generator on right of engine. To remove distributor, disconnect primary lead and remove head with cables intact. Then loosen clamp on shaft housing and lift distributor from place.

Oiling:—Put 5 to 8 drops of light engine oil in the spring oiler on the side of the distributor every 500 miles. Every 5000 miles put one drop of oil on the breaker arm pivot pin and put a small amount of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 6 degrees before top dead center with the breaker assembly fully retarded. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Then continue to crank engine until the ignition mark on the flywheel (which is 6 degrees before top dead center) is opposite the indicator mark on the flywheel case. Loosen clamp screw on timing arm and rotate distributor until contacts begin to separate. Tighten the clamp screw and make certain that the segment opposite the rotor is connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-3-4-2.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Champion No. 2. Gaps are .025 inch.

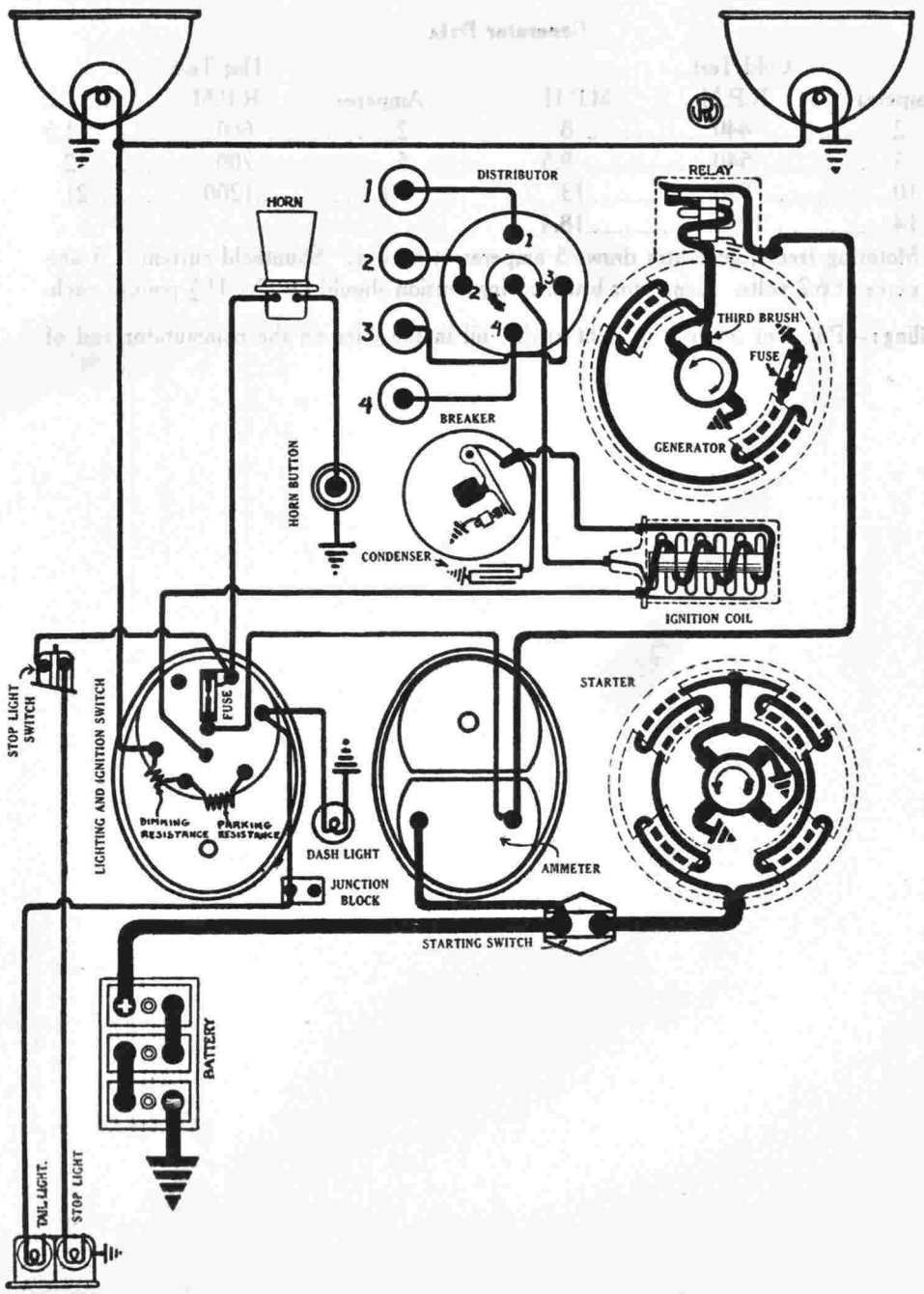
VALVE TIMING:—INLET VALVES:—Head diameter, 1 15/32 inches; stem diameter, 11/32 inch; stem length, 5½ inches; valve lift, 5/16 inch. Spring pressure, 48 pounds. Tappet clearance, .004 inch. Inlet valves open at top dead center and close 40 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 1/16 inches; stem diameter, 11/32 inch; stem length, 5½ inches; valve lift, 5/16 inch. Spring pressure, 48 pounds. Tappet clearance, .006 inch. Exhaust valves open 46 degrees before lower dead center and close at top dead center. Oversize valves are made.

STARTER:—Model MZ-4001. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 2½-3 pounds. Starter cranks the engine at 130 R.P.M.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	....
1.5 "	1800	5.2	150
2.5 "	1325	5.0	200
5.0 "	740	4.5	300
7.6 "	220	4.0	400
12.2 "	Lock	4.0	550



WHIPPET

MODEL 96 FOUR (1928)
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

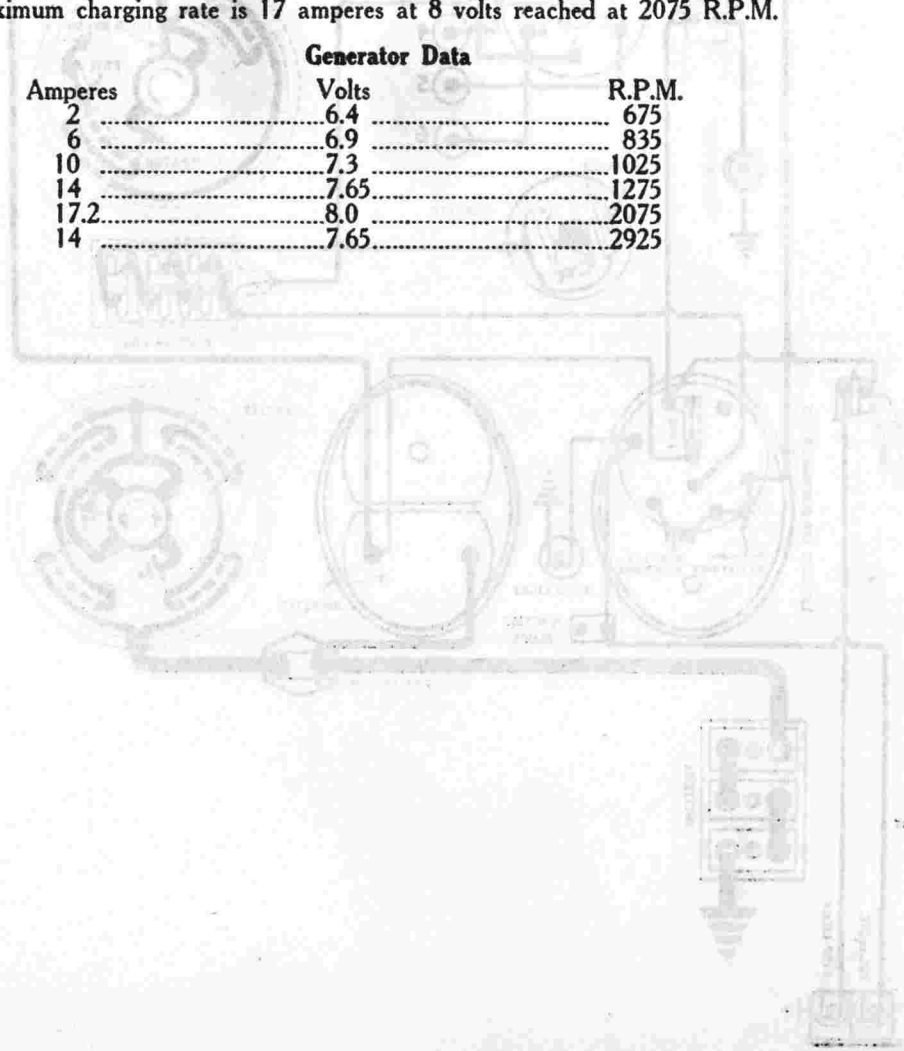
Mounting:—Starter is flange mounted on right of engine on forward side of rear motor support. To remove starter, disconnect cable and remove 3 flange mounting cap screws. Then pull starter forward and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GAL-4102. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush system. To adjust generator output, remove the commutator cover band and shift the third brush mounting bracket by tapping on the mounting stud. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush and mounting bracket are held in position by friction between the stud and the end plate. The maximum charging rate is 17 amperes at 8 volts reached at 2075 R.P.M.

Generator Data

Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	835
10	7.3	1025
14	7.65	1275
17.2	8.0	2075
14	7.65	2925



Generator brush spring tension is 24-32 ounces. Generator motoring draws 4.7-5.7 amperes at 6 volts. Shunt field current is 4.2 amperes at 6 volts. A five ampere field fuse is mounted on top of the generator.

Mounting:—Generator is mounted at right of engine. To remove generator, disconnect all ignition connections or remove distributor. Then remove generator drive gear with puller and remove clamp band. Lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at each end of the generator every 500 miles.

RELAY:—Model CB-4104. Relay is mounted on the generator. Relay contacts close at 675 R.P.M. when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Briggs and Stratton Switch. Lighting switch is mounted on the instrument board. Head lights are each 6-8 volt, 21 cp. S.C. Mazda No. 1129. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dash, tail and dome lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63. Dimming is by resistance on switch. An additional resistance is used with head lights for parking.

FUSES:—Generator field fuse is 5 amperes. Lighting fuse on switch is 20 amperes capacity.

WHIPPET

MODEL 98 SIX (1928)
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L., Type 3-CVX-6X6, 6 volt, 13 plates. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 115 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 21 hours. Battery is mounted on left frame member.

IGNITION:—Coil Model IG-4065. Coil is mounted on right side of engine block. Ignition current is 1-3 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped.

Distributor Model IGB-4009. Breaker contacts separate .020-.025 inch. Set contact opening by loosening lock nut on stationary contact stud and turning up stud until proper gap is secured with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 800 R.P.M. of engine. Maximum automatic advance is 24 degrees reached at 3200 R.P.M.

Mounting:—Distributor is mounted on rear of generator at right of engine. To remove distributor, disconnect primary lead and manual advance rod and remove head with cables intact. Then loosen clamp screw on side of shaft and lift distributor from place.

Oiling:—Put 5 to 8 drops of light engine oil in the spring oiler on the side of the distributor every 500 miles. Every 5000 miles put one drop of oil on the breaker arm pivot pin and put a small amount of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 10 degrees before top dead center with the manual spark lever fully advanced. To set timing, crank engine until piston No. 1 enters compression stroke (the upstroke with both valves closed). Fully advance spark lever and continue to crank engine until the piston reaches a position 10 degrees before top dead center when the flywheel mark will be opposite indicator or retard spark lever half way and continue to crank engine until the piston reaches top dead center. Then loosen clamp screw on advance arm and rotate distributor until the contacts begin to separate. Tighten the clamp screw. Make certain that the segment opposite the rotor is connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Champion No. 2. Gaps are .025 inch.

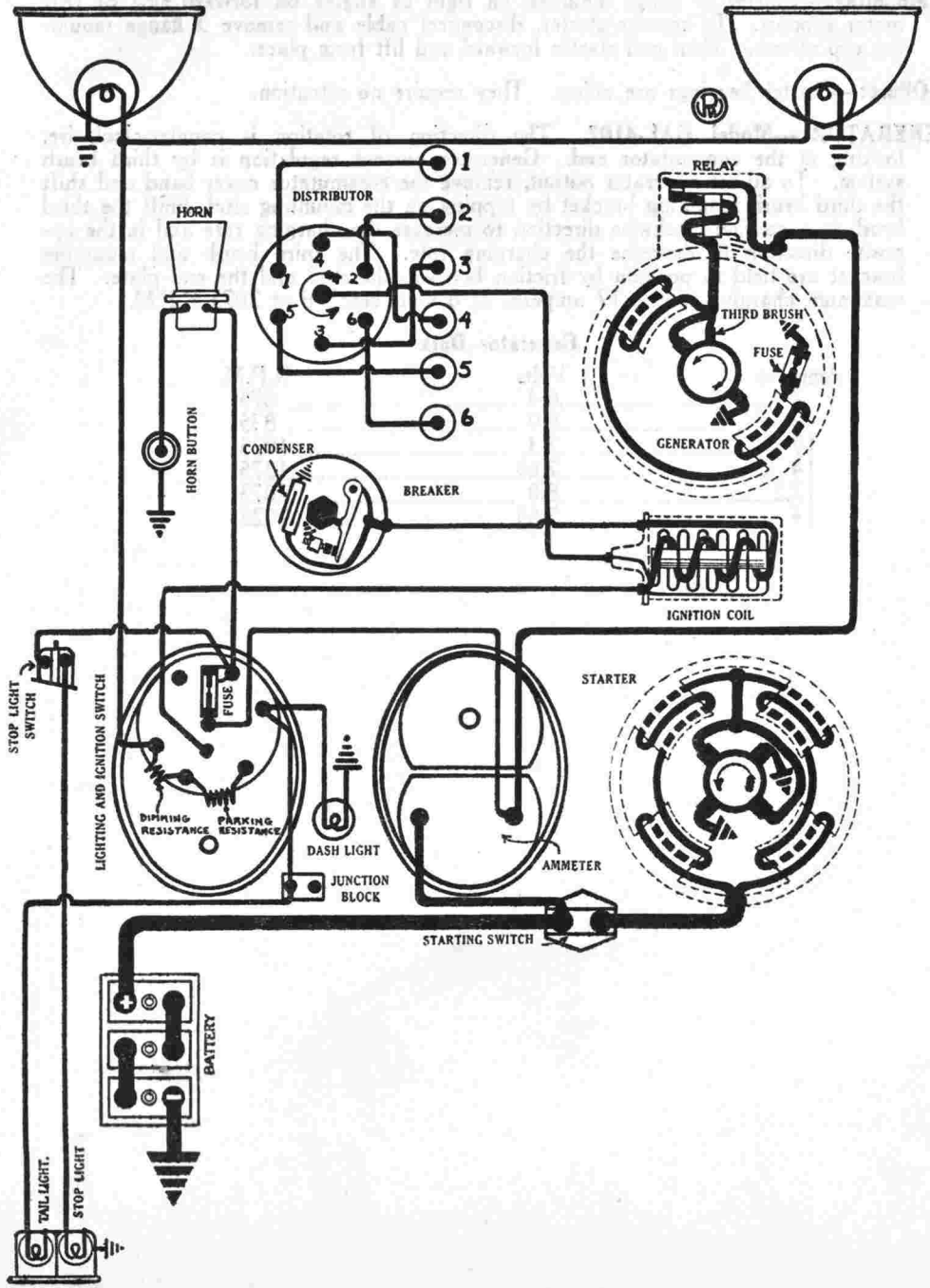
VALVE TIMING:—INLET VALVES:—Inlet valves open 7 degrees after top dead center and close 39 degrees after lower dead center. Tappet clearance is .004 inch.

EXHAUST VALVES:—Exhaust valves open 38 degrees before lower dead center and close 2 degrees after top dead center. Tappet clearance is .006 inch.

STARTER:—Model MZ-4011. Starter is connected to the engine through an inboard Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 2½-3 pounds. Starter cranks the engine at 140 R.P.M.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	....
1.5 "	1800	5.2	150
2.5 "	1325	5.0	200
5.0 "	740	4.5	300
7.6 "	220	4.0	400
12.2 "	Lock	4.0	550



WHIPPET

MODEL 98 SIX (1928)
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

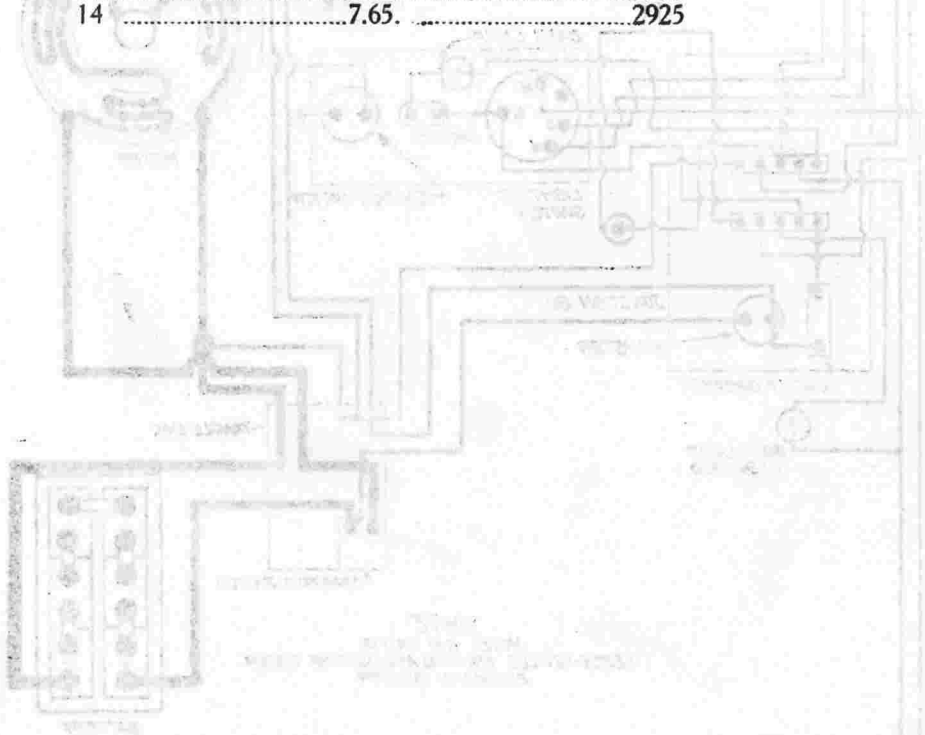
Mounting:—Starter is flange mounted on rear engine support at right of engine. To remove starter, disconnect cable and remove 3 flange mounting cap screws. Then pull starter forward and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GAL-4106. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove commutator cover band and shift third brush by tapping on third brush mounting bracket. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any position by friction between the mounting bracket and the end plate. The maximum charging rate is 17 amperes at 8 volts reached at 2025 R.P.M.

Generator Data

Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	835
10	7.3	1025
14	7.65	1275
17.2	8.0	2025
14	7.65.	2925



Generator brush spring tension is 24-32 ounces. Generator motoring draws 4.7-5.7 amperes at 6 volts. Shunt field current is 4.2 amperes at 6 volts. A five ampere field fuse is mounted on top of the generator.

Mounting:—Generator is mounted at right of engine. To remove generator, disconnect all ignition wiring or remove distributor. Then pull generator drive gear and remove clamp band. Lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at each end of the generator every 500 miles.

RELAY:—Model CB-4104. Relay is mounted on the generator. Relay closes at 675 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Briggs and Stratton Switch. Switch is mounted on the instrument board. Head lights are 6-8 volt, 21 cp. S.C. Mazda No. 1129. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dash, tail and dome lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63. Dimming is by resistance on the switch.

FUSES:—Generator field fuse is 5 amperes. Lighting fuse on switch is 20 amperes capacity.

White

MODEL GM (1917-18)

LEECE-NEVILLE GENERATING, STARTING AND LIGHTING SYSTEM
EISEMANN MAGNETO IGNITION

BATTERY.—Battery is 12 volt, 75 ampere-hour. The two wire system is used.

IGNITION.—Magneto Model E.M. Breaker contacts separate .012 to .014 inch. When condition of points affects the ignition, resurface with a fine flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 2 or 3 drops of light machine oil in each of magneto oilers every month. If car is driven more than 1000 miles in a month, oiling must be done every 1000 miles.

TIMING.—Breaker contacts begin to separate when piston entering stroke is on top dead center, spark control and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Starter is connected to engine through a Bendix drive.

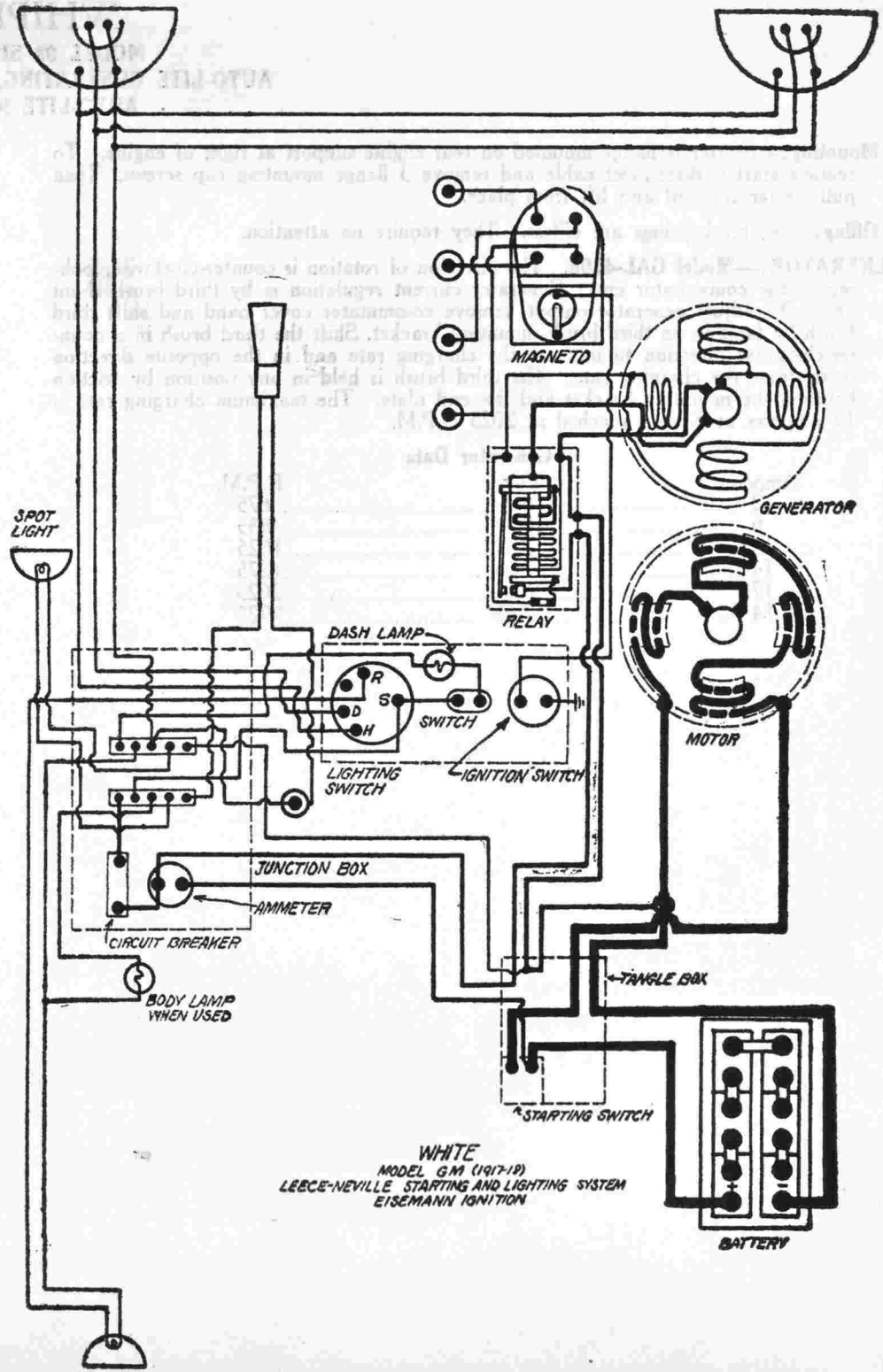
OILING.—Put 3 or 4 drops of light engine oil in each of starter oilers every month.

GENERATOR.—Generator current regulation is by third brush system. Maximum charging rate of 10 amperes is reached at 18 miles per hour. Maximum generator current output must never be made to exceed 12 amperes. Charging rate is varied by moving third brush. Moving third brush in direction of armature rotation increases charging rate. Moving it in opposite direction decreases charging rate. Brush is moved by turning nut on front end of generator.

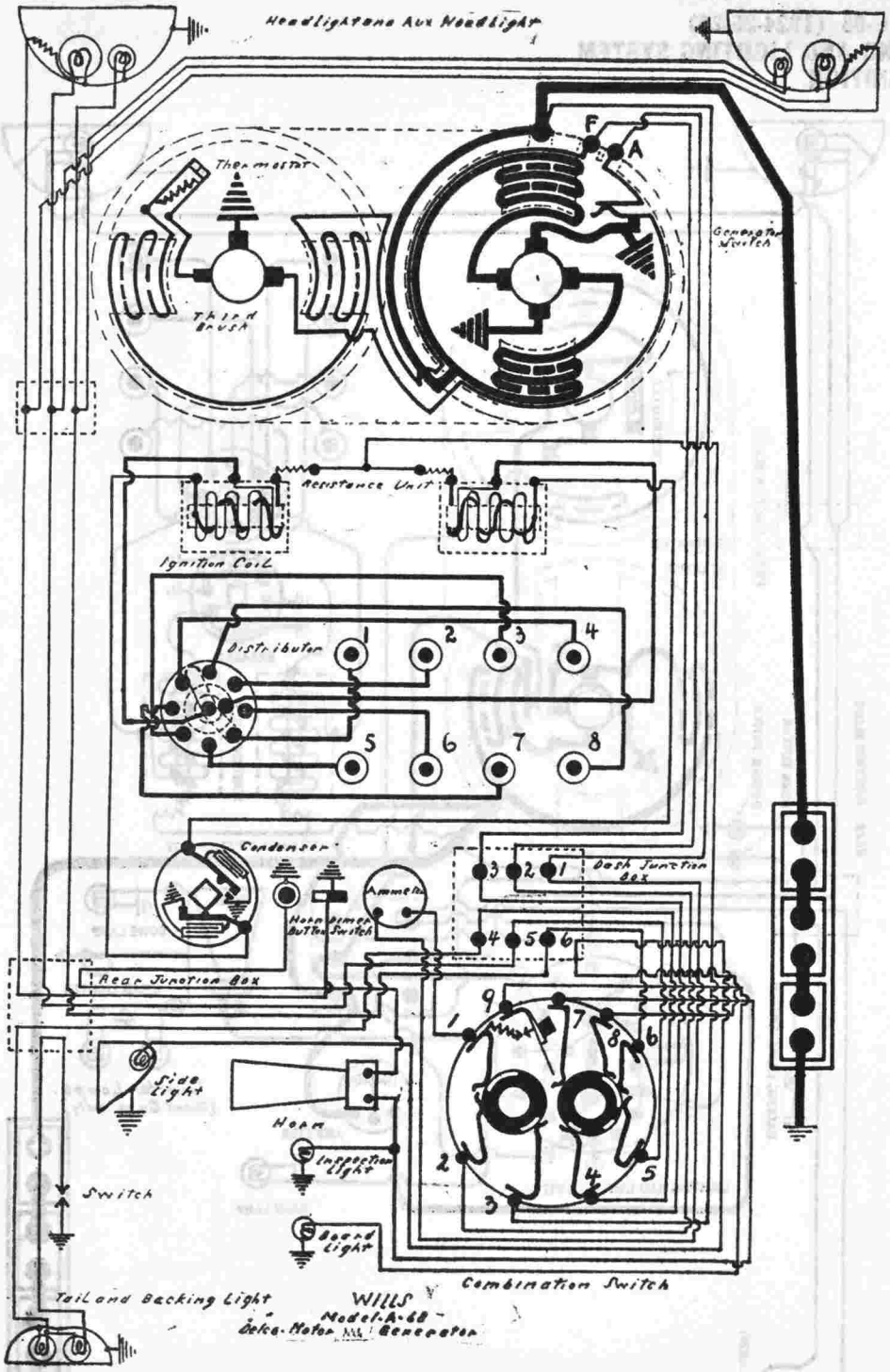
OILING.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

RELAY.—Relay closes at 7 and opens at 5 miles per hour. Charging current is 1 to 1.5 amperes at closing and the discharge current 0 to 1 ampere at opening of relay. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 12-16 volt, 21 cp. Dimmer lamps are 12-16 volt, 4 cp. Spot light is 12-16 volt, 7 cp. Dash lamp is 12-16 volt, 2 cp. Dome lamp is 12-16 volt, 2-4 cp. Tonneau lamp is 12-16 volt, 2 cp. Tail lamp is 12-16 volt, 2 cp.



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WILLS SAINT CLAIRE

MODEL A-68 (1922-23)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY.—Willard, Type SJR-5, 6 volts, 140 ampere-hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model 2178. Distributor Model 5235. Breaker contacts separate .020-.025 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone. Two sets of contacts are provided. They operate with a four sided cam and open separately. Each breaker cam controls one coil and fires one bank of cylinders. The distributor is provided with manual and automatic advance. Manual advance is 45-50°. Automatic advance begins at 500 R.P.M. and reaches a maximum of 19-22° at 2000 R.P.M. The breaker arm spring tension is 16-20 ounces.

Oiling.—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every 500 miles or each two weeks. Put a small bit of medium heavy grease on the breaker cam and on the track in the distributor head every 1000 miles. After polishing the rotor track with a clean cloth, remove all excess grease.

Timing.—Breaker contacts firing right bank of cylinders begin to separate when piston No. 1 entering power stroke reaches a position 7° past top dead center (measured on flywheel) with the spark control lever and breaker assembly in the fully retarded position. This position is reached when the flywheel marking EC-1 is slightly past the indicator. Breaker contacts firing the left bank open when piston No. 8 reaches a similar position. The engine fires at intervals of 60 and 120° corresponding to 30 and 60° of distributor travel. These intervals must be accurately set. This may be done by connecting a test lamp in each circuit and noting the exact moment the contacts separate. If small scratches are made on the distributor housing opposite the rotor when the contacts separate the firing intervals can be measured. The straight line distances between the marks should be 1 1/16" for the 30° and 2 1/32" for the 60° intervals.

Firing Order.—The firing order is 1, 8, 3, 6, 4, 5, 2, 7.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER GENERATOR.—Model 207. Starter cranks the engine at 100 R.P.M. Current required to break away is 265 amperes. While cranking starter draws 50-75 amperes. Rotation is clockwise, looking at the commutator end.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	60
10 lb. ft.	Lock	3	—

GENERATOR.—Generator current regulation is by the third brush system. **Thermostat** opens 190-200° F., cuts in Res., reducing charging rate 50 per cent.

Generator Data—No. 207

Amperes	Cold	R.P.M.	Amperes	Hot	R.P.M.
0		575-600	0		750-800
8-10		1000	1-2		1000
16-18		1500	6-8		1500
18-20		2400	11-13		2400

To adjust the charging rate, loosen cover band and locknut on the generator commutator end and shift the third brush mounting plate by means of the handle . To increase the charging rate shift the third brush in the direction of armature rotation and in the opposite direction to decrease the charging rate. Tighten the locknut after making the adjustment.

Oiling.—Put 8 or 10 drops of light engine oil in each of the starter-generator oilers every 500 miles. Every 1000 miles apply heavy grease to starting gear shaft through fitting in rear end of shaft and apply heavy oil to the generator clutch through oiler in top of housing. Once each year remove, disassemble and clean generator and motor clutches. Repack with vaseline.

RELAY.—There is no relay. The circuit between the battery and generator is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volts, 21 cp. Dash and tail lamps are 6-8 volts, 2 cp. Dimmer lamps are 6-8 volt, 2 cp. All are single contact.

FUSES.—A vibrating circuit breaker takes the place of fuses. It requires a current of 25-30 amperes to start this device. While vibrating the current is 10-15 amperes.

WILLS SAINTE CLAIRE

MODELS B-68 AND C-68 (1924-25-26)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

BATTERY.—Willard, Type SJR-5, 6 volt, 139 ampere-hour. **The positive (+) terminal is** grounded.

IGNITION.—Coil Model 2178. Distributor Model 5235. Breaker contacts separate .020-.025 inch. They are made of tungsten. Resurface contacts on a medium hard oil-stone. Two sets of contacts are provided. They operate with a four sided cam and open separately. Each breaker cam controls one coil and fires one bank of cylinders. The distributor is provided with manual and automatic advance. Manual advance is 45-50°. Automatic advance begins at 500 R.P.M. and reaches a maximum of 19-22° at 2000 R.P.M. The breaker arm spring tension is 16-20 ounces.

Mounting.—Distributor is mounted at forward end of engine between the cylinder banks. To remove, disconnect manual advance rod and remove lock nut on clamp holding distributor housing. Then lift unit from place.

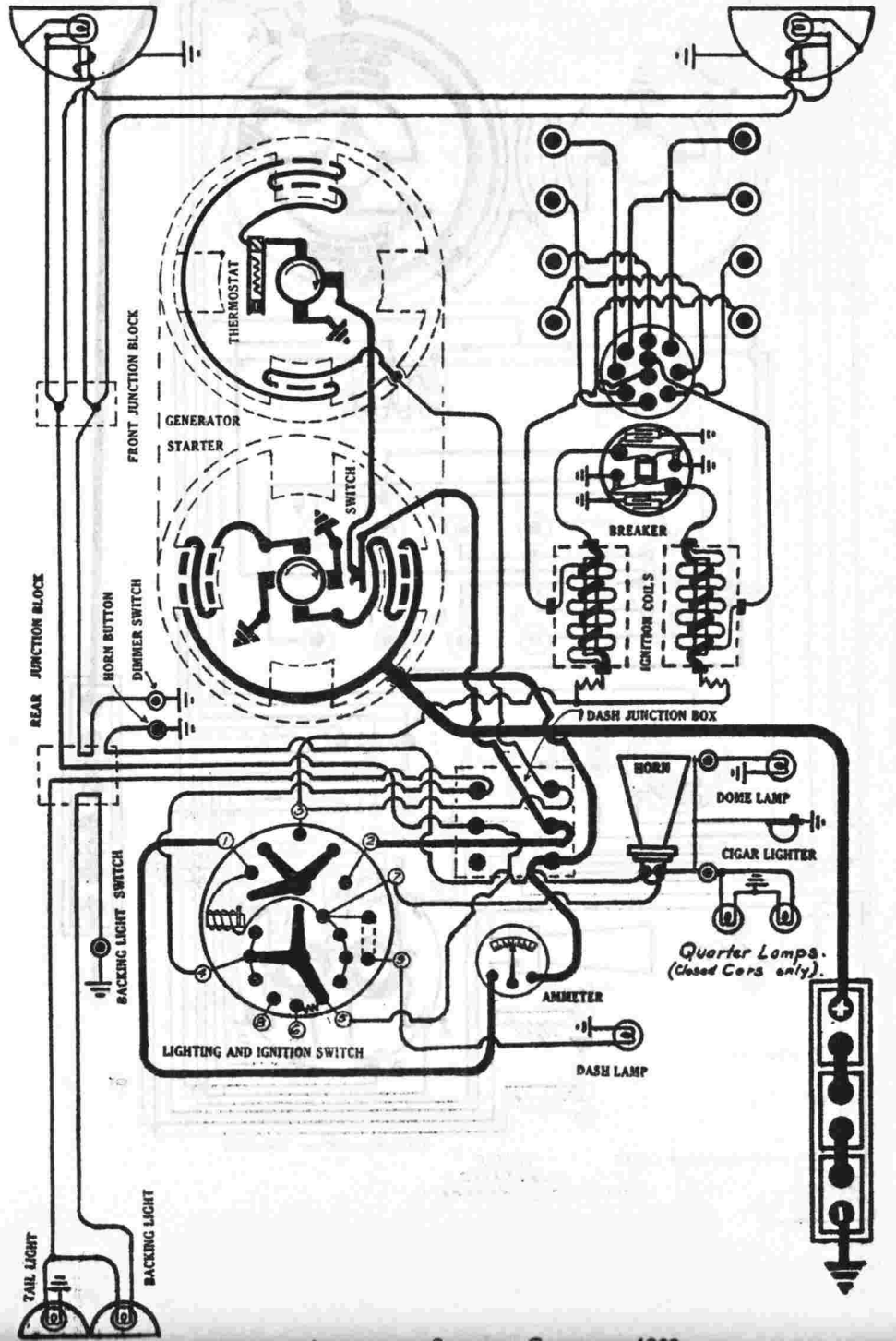
Oiling.—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every 500 miles or each two weeks. Put a small bit of medium heavy grease on the breaker cam and on the track in the distributor head every 1000 miles. After polishing the rotor track with a clean cloth, remove all excess grease.

Timing.—Breaker contacts firing right bank of cylinders begin to separate when piston No. 1 entering power stroke reaches a position 7° past top dead center (measured on flywheel) with the spark control lever and breaker assembly in the fully retarded position. This position is reached when the flywheel marking EC-1 is slightly past the indicator. Breaker contacts firing the left bank open when piston No. 8 reaches a similar position. The engine fires at intervals of 60 and 120° corresponding to 30 and 60° of distributor travel. These intervals must be accurately set. This may be done by connecting a test lamp in each circuit and noting the exact moment the contacts separate. If small scratches are made on the distributor housing opposite the rotor when the contacts separate the firing intervals can be measured. The straight line distances between the marks should be 1 1/16" for the 30° and 2 1/32" for the 60° intervals.

Firing Order.—Right hand bank of cylinders are numbered 1-2-3-4 from the radiator. Left hand bank are 5-6-7-8. Firing order is 1-8-2-7-4-5-3-6.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER-GENERATOR.—Model No. 207. Starter and generator are combined into one unit. Starter is connected to the engine through a set of reduction gears meshed by the operator. Two overrunning clutches are provided. In connection with the ignition switch a current in closed, allowing current to flow through the generator windings, causing armature to revolve slowly, aiding in the meshing of the reduction gears. One clutch permits this rotation, and also permits a relatively high speed of the armature, necessary when operating as a starter. The second overrunning clutch prevents the engine from driving the armature through the reduction gears. Depressing the starter pedal meshes the reduction gears, opens the generator circuit and allows the motor brushes to come in contact with the commutator, closing the starter circuit and cranking the engine. When pedal is released a spring reverses these operations. Starter cranks the engine at 100 R.P.M. requiring 265 amperes to breakaway the engine and drawing 50-75 amperes while cranking. Rotation is clockwise, looking at the commutator end.



WILLS SAINTE CLAIRE

MODELS B-68 AND C-68 (1924-25-26)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM
DELCO IGNITION

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	60
10 lb. ft.	Lock	3	—

GENERATOR.—Generator current regulation is by the third brush system. Thermostat opens 190-200° F., cuts in Res., reducing charging rate 50 per cent.

Generator Data—No. 207

Amperes	Cold	R.P.M.	Amperes	Hot	R.P.M.
0		575-600	0		750-800
8-10		1000	1-2		1000
16-18		1500	6-8		1500
18-20		2400	11-13		2400

To adjust the charging rate, loosen cover band and locknut on the generator commutator end and shift the third brush mounting plate by means of the handle. To increase the charging rate shift the third brush in the direction of armature rotation and in the opposite direction to decrease the charging rate. Tighten the locknut after making the adjustment.

Mounting.—Starter-generator is mounted between the cylinder banks at the rear of the engine. To remove, drain radiator, remove manifold assembly and spark plugs in rear cylinders. Remove floor board and disconnect and remove drive shaft. Then remove hold down screws and lift unit from position.

Oiling.—Put 8 or 10 drops of light engine oil in each of the starter-generator oilers every 500 miles. Every 1000 miles apply heavy grease to starting gear shaft through fitting in rear end of shaft and apply heavy oil to the generator clutch through oiler in top of housing. Once each year remove, disassemble and clean generator and motor clutches. Repack with vaseline.

RELAY.—There is no relay. The circuit between the battery and generator is controlled by the ignition switch.

LAMPS.—Head lamps are 6-8 volt , 21 cp. Dimmer lamps are 6-8 volt, 2 cp. Dash and tail lamps are 6-8 volt, 2 cp.

Switches.—Combination switch is Model 1259.

CIRCUIT BREAKER.—A vibrating circuit breaker takes the place of fuses. It requires a current of 25-30 amperes to start this device. While vibrating the current is 10-15 amperes.

WILLS SAINTE CLAIRE

MODEL W-6 (1925)
DELCO GENERATING, STARTING AND LIGHTING SYSTEM.
DELCO IGNITION

BATTERY:—Willard, Type SJR-5. 6 volt. The starting capacity is 145 amperes for 20 minutes. The lighting capacity is 5 amperes for 27 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. 2177. ..Distributor Model No. 5280. Breaker contacts separate .020 to .025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone. No manual advance is provided. Automatic advance begins at 250 R.P.M. and reaches a maximum of 53-57° at 900 R.P.M. The tension of the breaker arm spring should be 16-20 ounces.

Mounting:—Distributor is mounted at right of engine. To remove, disconnect manual advance rod and remove manual advance stop screw. Then lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the two oilers on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Place a small bit of medium heavy grease or vaseline on the face of the breaker cam and on the rotor track in the distributor head every 1000 miles. Polish the distributor head and remove all excess grease with a soft clean cloth.

Timing:—Breaker contacts begin to separate when piston No. 1 entering power stroke reaches a position of 7° before top dead center (measured on the flywheel). In this position the mark "T"/SP on the flywheel will be opposite the mark on the flywheel housing. To check timing, crank engine over until piston No. 1 is coming up on the compression stroke. This is the up stroke with both valves closed. Continue to crank engine until the flywheel mark "T/SP" on the flywheel is opposite the indicator on the flywheel housing. Breaker contacts should separate at this point. If they do not, loosen the lockscrew in the center of the breaker cam and rotate the cam until contacts open. Tighten the screw and make certain that the segment opposite the rotor is connected to the spark plug in cylinder No. 1 and connect the remaining plugs in order 5-3-6-2-4 around the distributor head.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are metric standard. Gaps are .025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter is 1½ inches; stem diameter is 5/16 inch; stem length is 5⅛ inches. Tappet clearance is .006 inch. Spring pressure is 45 pounds. Inlet valves open at top dead center and close 40 degrees after lower dead center.
EXHAUST VALVES:—Head diameter is 1 5/16 inches; stem diameter is 5/16 inch; stem length is 5 ⅛ inches. Tappet clearance is .012 inch. Spring pressure is 45 pounds. Exhaust valves open at 45 degrees before lower dead center and close at 50 degrees after top dead center.

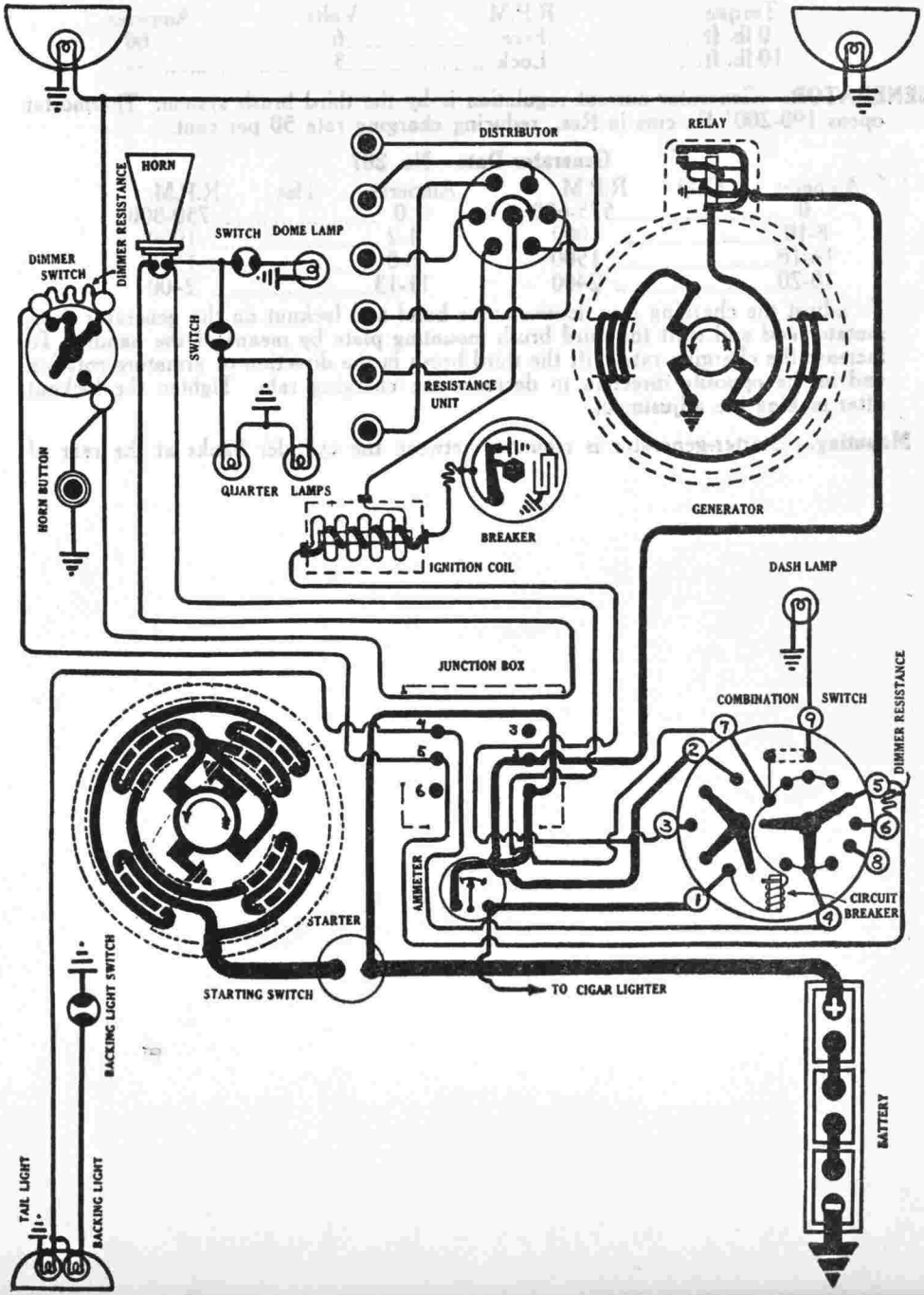
STARTER:—Model No. 310. The starter is connected to the engine through a manual gear shift incorporated with the starting switch. The direction or rotation is counter-clockwise, looking at the commutator end.

Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	50
13 "	Lock	3.2	—

The starter brush tension should be 2¼-2½ pounds each.

Mounting:—Starter is mounted at left of engine by a sleeve mounting. To remove the starter, disconnect pedal return sepring and connecting rod and remove large pilot mounting screw. Then slide starter from place.



WILLS SAINTE CLAIRE

MODEL W-6 (1925)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

Oiling:—Oilless bearings are used. They require no attention.

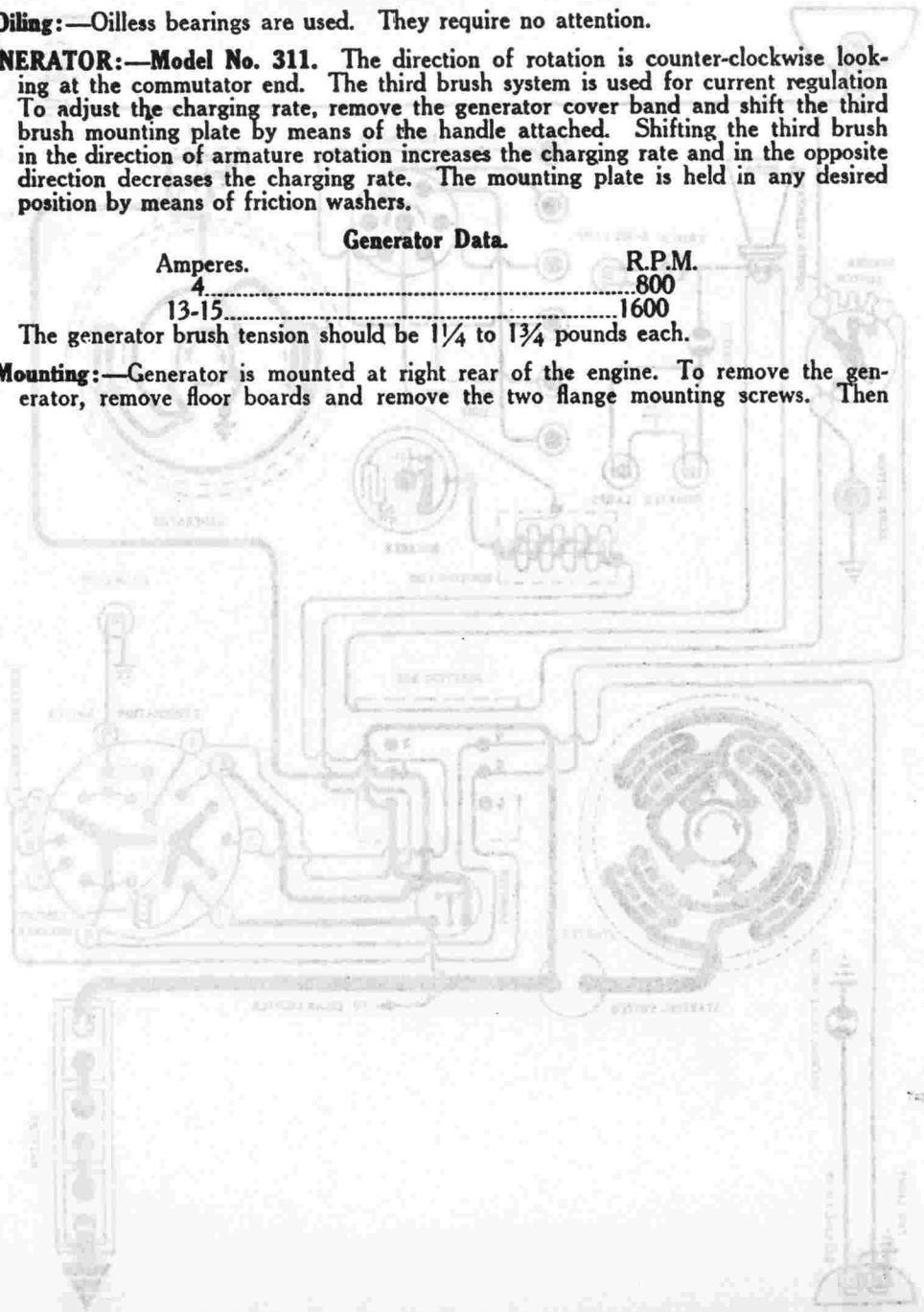
GENERATOR:—Model No. 311. The direction of rotation is counter-clockwise looking at the commutator end. The third brush system is used for current regulation To adjust the charging rate, remove the generator cover band and shift the third brush mounting plate by means of the handle attached. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. The mounting plate is held in any desired position by means of friction washers.

Generator Data.

Amperes.	R.P.M.
4	800
13-15	1600

The generator brush tension should be 1¼ to 1¾ pounds each.

Mounting:—Generator is mounted at right rear of the engine. To remove the generator, remove floor boards and remove the two flange mounting screws. Then lift generator from place.



Oiling:—Put 8 or 10 drops of light engine oil in the oiler at the commutator end of the generator every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. The bearing at the drive end of the generator is oiled by splash from the gear case.

RELAY:—Relay contacts close when the voltage of the generator reaches 6.75 to 7.5 volts and open with a discharge current of 0-3 amperes. Contacts separate .030 inch. Air gap between relay armature and coil core is .015 to .020 inch, contacts closed.

LIGHTING:—Combination Switch No. 1264. Head lamps are each 6-8 volts, 21 cp. Dash and tail lamps are each 6-8 volt, 2 cp. A dimmer switch is mounted on the steering column. It is Model No. 1286.

CIRCUIT-BREAKER:—A vibrating circuit-breaker mounted on the back of the switch protects the horn and lighting circuits. A current of 25-30 amperes will cause this device to operate. While vibrating the current is 10-15 amperes.

WILLS SAINTE CLAIRE

MODEL W-6 (1926)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

DELCO IGNITION

BATTERY:—Willard, Type SJR-5. 6 volt. The starting capacity is 145 amperes for 20 minutes. The lighting capacity is 5 amperes for 27 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. 2177. Distributor Model No. 5280. Breaker contacts separate .020 to .025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone. No manual advance is provided. Automatic advance begins at 250 R.P.M. and reaches a maximum of 53-57° at 900 R.P.M. The tension of the breaker arm spring should be 16-20 ounces.

Mounting.—Distributor is mounted at right of engine. To remove, disconnect manual advance rod and remove manual advance stop screw. Then lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the two oilers on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Place a small bit of medium heavy grease or vaseline on the face of the breaker cam and on the rotor track in the distributor head every 1000 miles. Polish the distributor head and remove all excess grease with a soft clean cloth.

Timing:—Breaker contacts begin to separate when piston No. 1 entering power stroke reaches a position of 7° before top dead center (measured on the flywheel). In this position the mark "T"/SP on the flywheel will be opposite the mark on the flywheel housing. To set timing, loosen screw in center of breaker cam and rotate cam until the contacts begin to separate. Then tighten the screw.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are metric standard. Gaps are .025 inch.

STARTER:—Model No. 310. The starter is connected to the engine through a manual gear shift incorporated with the starting switch. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	50
13 "	Lock	3.2	—

The starter brush tension should be 2¼-2½ pounds each.

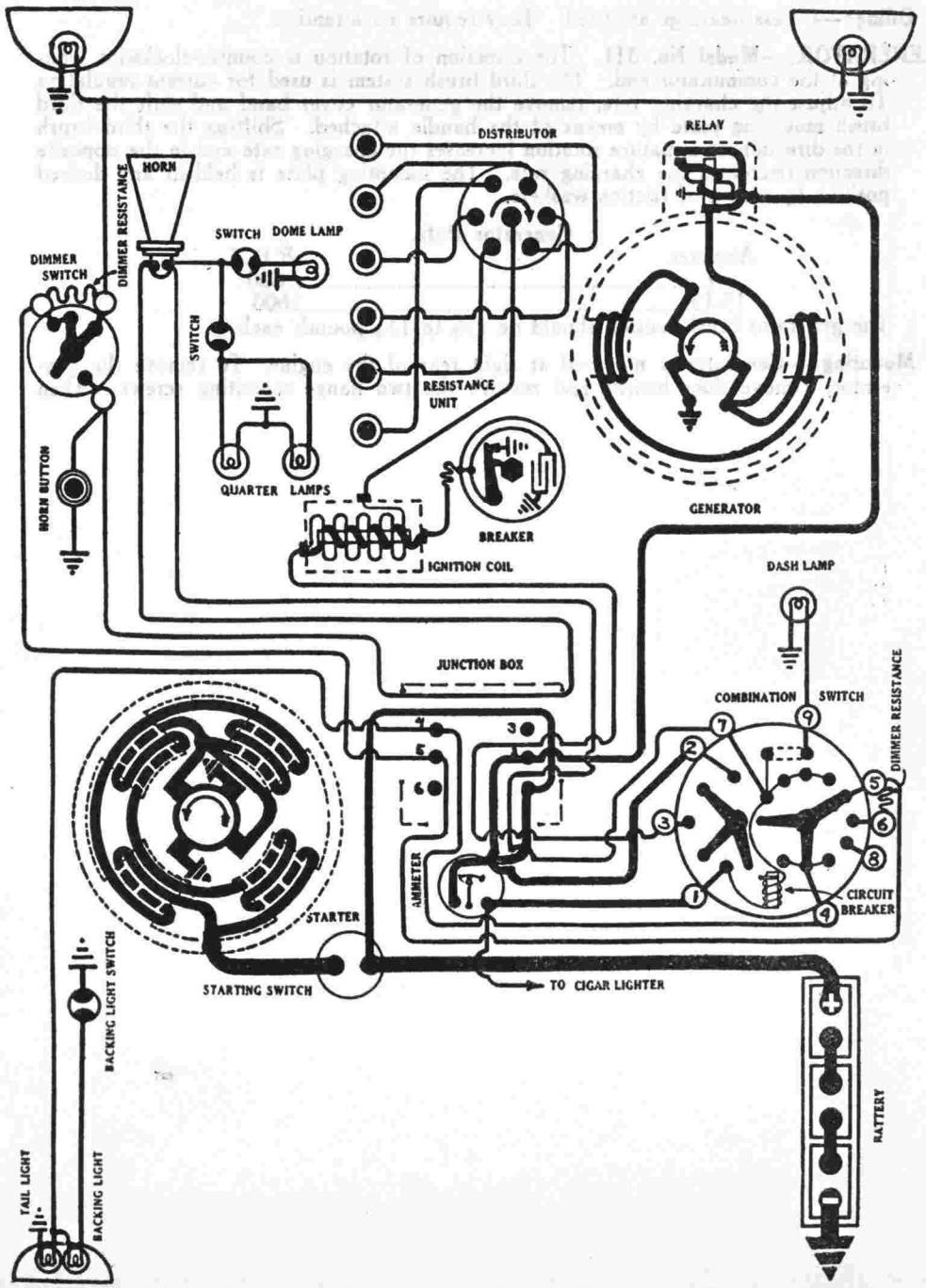
Mounting.—Starter is mounted at left of engine by a sleeve mounting. To remove, disconnect pedal return spring and connecting rod and remove large pilot mounting screw. Then slide starter from place.

Oiling:—Oilless bearings are used. They require no attention.

GENERATOR:—Model No. 311. The direction of rotation is counter-clockwise looking at the commutator end. The third brush system is used for current regulation. To adjust the charging rate, remove the generator cover band and shift the third brush mounting plate by means of the handle attached. Shifting the third brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate. The mounting plate is held in any desired position by means of friction washers.

Generator Data

Amperes	R.P.M.
4	800
13-15	1600



WILLS SAINTE CLAIRE

MODEL W-6 (1926)

DELCO GENERATING, STARTING AND LIGHTING SYSTEM

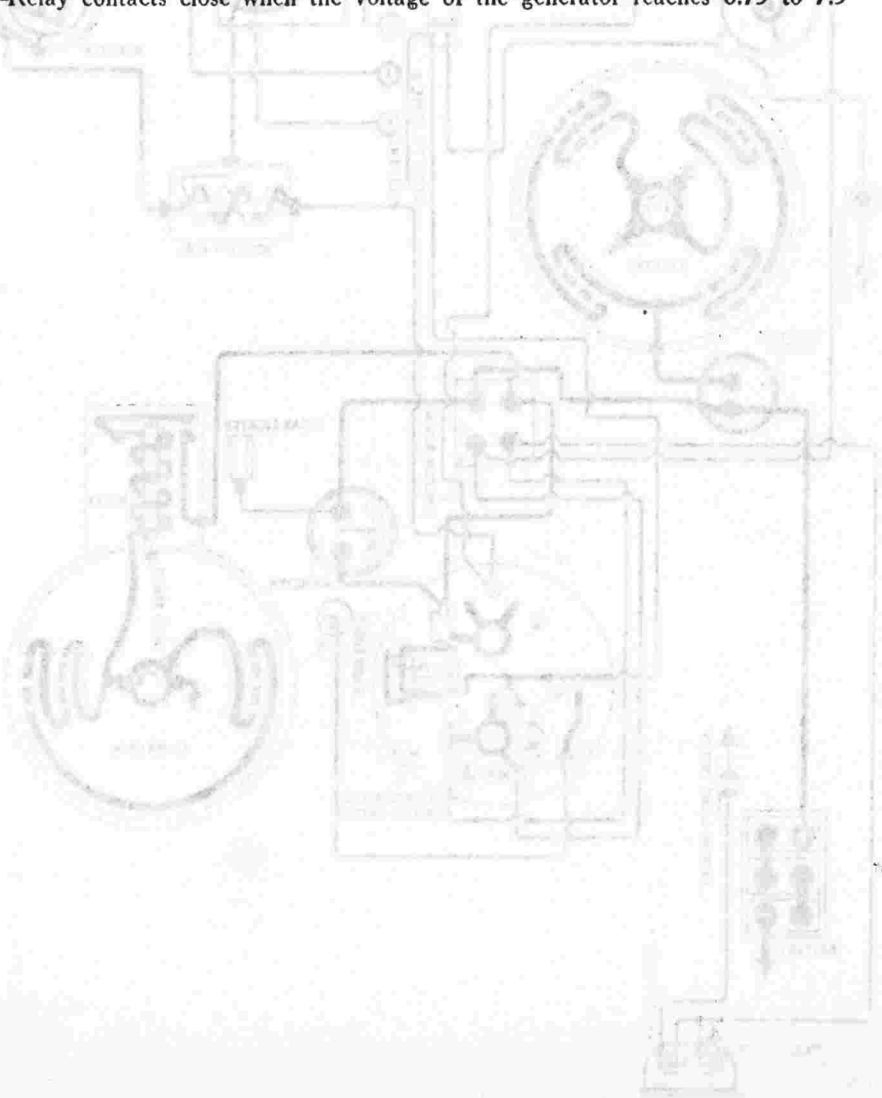
DELCO IGNITION

The generator brush tension should be 1¼ to 1¾ pounds each.

Mounting.—Generator is mounted at right rear of the engine. To remove generator, remove floor boards, remove the two flange mounting screws. Then lift generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at the commutator end of the generator every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. The bearing at the drive end of the generator is oiled by splash from the gear case.

RELAY:—Relay contacts close when the voltage of the generator reaches 6.75 to 7.5 volts and open with a discharge current of 0-3 amperes. Contacts separate .030 inch. Air gap between relay armature and coil core is .015 to .020 inch, contacts closed.



LIGHTING:—Combination Switch No. 1264. Head lamps are each 6-8 volts, 21 cp. Dash and tail lamps are each 6-8 volt, 2 cp. A dimmer switch is mounted on the steering column. It is Model No. 1286.

CIRCUIT BREAKER:—A vibrating circuit-breaker mounted on the back of the switch protects the horn and lighting circuits. A current of 25-30 amperes will cause this device to operate. While vibrating the current is 10-15 amperes.

WILLS SAINTE CLAIRE

MODEL W-6 (1926), T-6 (1927)
DELCO-REMY GENERATING AND LIGHTING SYSTEM
AMERICAN BOSCH STARTER
DELCO-REMY IGNITION

BATTERY:—Willard, Type SJR-5, 6 volt. The starting capacity is 145 amperes for 20 minutes. The lighting capacity is 5 amperes for 27 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model No. 2177. Distributor Model No. 5280. Breaker contacts separate .020 to .025 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone. No manual advance is provided. Automatic advance begins at 250 R.P.M. and reaches a maximum of 53°-57° at 900 R.P.M. The tension of the breaker arm spring should be 16-20 ounces.

Mounting:—Distributor is mounted at right of engine. To remove, disconnect manual advance rod and remove manual advance stop screw. Then lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the two oilers on the side of the distributor housing every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. Place a small bit of medium heavy grease or vaseline on the face of the breaker cam and on the rotor track in the distributor head every 1000 miles. Polish the distributor head and remove all excess grease with a soft clean cloth.

Timing:—Breaker contacts begin to separate when piston No. 1 entering power stroke reaches a position of 7° before top dead center (measured on the flywheel). In this position the mark 'T/SP' on the flywheel will be opposite the mark on the the flywheel housing. To set timing, loosen screw in center of breaker cam and rotate cam until the contacts begin to separate. Then tighten the screw.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are metric standard. Gaps are .025 inch.

STARTER:—A.B. Model No. 974. Starter is connected to the engine through a manually operated pinion shift. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 2-2¼ pounds each.

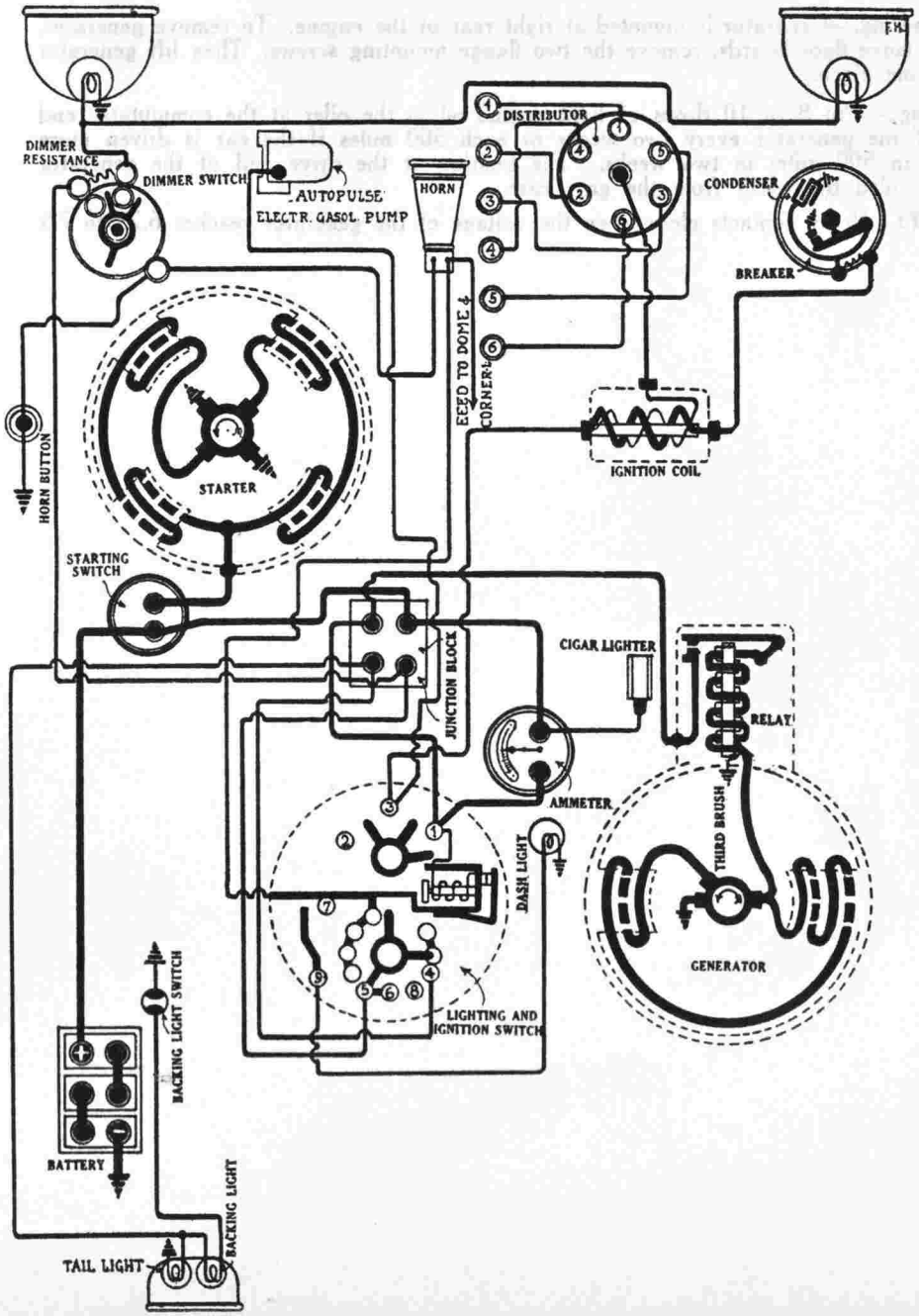
Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2000	6	60
22 "	Lock	3.5	500

Mounting:—Starter is mounted at left of engine by special sleeve mounting. To remove starter, disconnect cable and remove pilot mounting screw from the starter sleeve. Then slide starter from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model 335 (1926) Model 357 (1927). The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. The Model 357 generator is of split field type with third brush shunt field wound on one field pole. A straight shunt field is wound on the other field pole. This has a thermostat in series. Thermostat contacts open at 175°F. opening the field circuit and allowing the generator to operate as a third brush machine with reduced output. To adjust charging rate, remove commutator cover band and shift third brush. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Third brush is held in position by friction clamp washers. On the Model 357 it will be necessary to loosen the clamp bolt nut before the third brush can be shifted.



WILLS SAINTE CLAIRE

MODEL W-6 (1926) T-6 (1927)
DELCO-REMY GENERATING AND LIGHTING SYSTEM
AMERICAN BOSCH STARTER
DELCO-REMY IGNITION

Generator Data (Model 335—Hot)

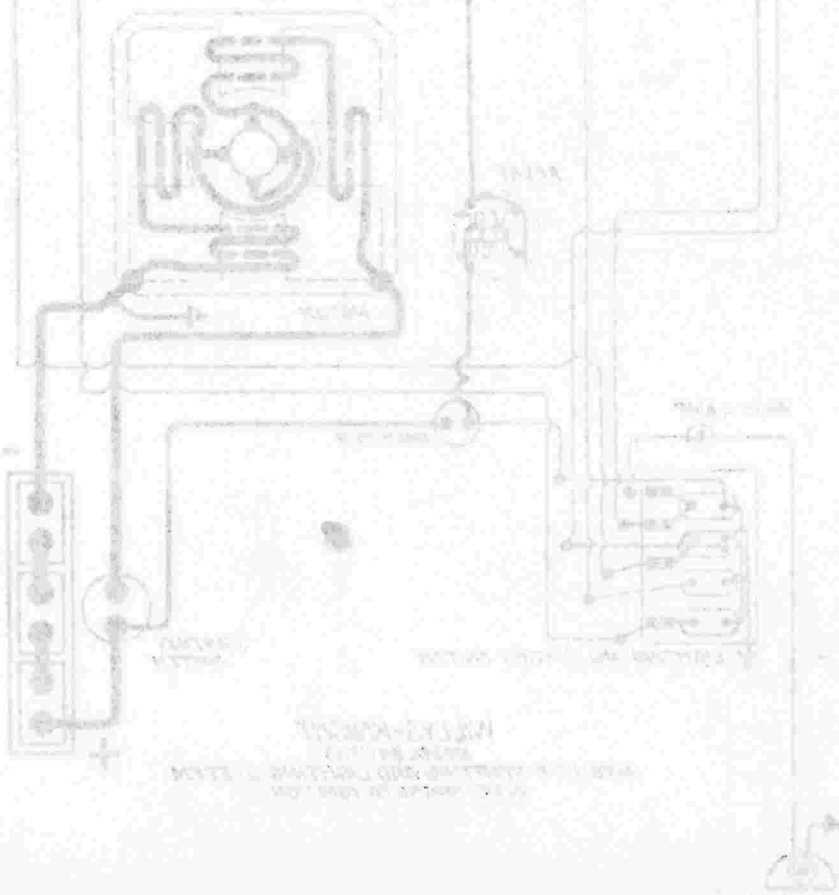
Amperes	Volts	R.P.M.
7	7.5	850
16.5	8.25	1700

Generator Data (Model 357—Cold)

Amperes	Volts	R.P.M.
18	8.0	1050

Straight shunt field current on Model 357 generator is .6 amperes at 6 volts. Third brush shunt field current is 3.25 amperes at 6 volts. Brush spring tension is 1¼-1¾ pounds each.

Mounting:—Generator Model 357 is flange mounted at rear of engine and is driven through transmission gears. To remove generator, first remove floor boards and disconnect generator lead. Then remove two mounting screws and lift generator from place. Generator Model 335 is cradle mounted.



Oiling:—Put 8 or 10 drops of light engine oil in the generator every two weeks or each 500 miles.

RELAY:—Model 5766. Relay is mounted on top of the generator. Relay closes when the voltage of the generator reaches 6.75-7.5 volts and opens with a discharge current of 0-3 ampers. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010 inch with contacts closed.

LIGHTING:—Head lamps are 6-8 volt, 21 cp. S.C. Stop lamp is 6-8 volt, 21 cp. S.C. Dash, tail, dome and quarter lamps are each 6-8 volt, 3 cp. S.C.

Switches:—Lighting switch is Model 1297. Dimmer switch is Model 1286. The dimmer switch is mounted on the steering column.

CIRCUIT BREAKER:—A vibrating circuit breaker is mounted on the back of the lighting switch. This operates when the current reaches 25-30 amperes limiting the current to 10-15 amperes.

Willys-Knight

Model 84 (1916)
Auto-Light Starting and Lighting System.
Dixie Magneto Ignition.

Battery.—Battery is 6 volt, 115 ampere-hour. The positive (+) terminal is grounded at the starting motor.

Ignition.—Instructions for the care of the magneto are given on Page No. 189.

Timing.—Contacts should open .020 inch. Magneto should be timed so that when the mark "1+4" T. C. on the flywheel is 2¼ inches past the indicator, spark control lever and breaker assembly in the fully retarded position, breaker contacts will be just beginning to separate.

Care.—Should they become badly burned or pitted, resurface them with a very fine flat jeweler's file, or a small strip of worn No. 00 sand paper.

Spark Plug Gaps.—Spark plug gap should be .020 inch.

Firing Order.—The firing order is 1, 3, 4, 2.

Oiling.—Put 3 or 4 drops of light machine oil in each of the magneto oilers once every two weeks or 500 miles. Put one or two drops of oil on the contact lever pivot at the same time. Apply this oil with a toothpick so as not to get on too much.

Starter.—The starter is connected to the engine through a Bendix drive. Motor bearings are packed with a soft cup grease. The bearings should be cleaned and repacked with grease once every season. Should the pinion jam and remain meshed with the flywheel gear, close starting switch for an instant and then turn engine quickly by hand crank. This method will nearly always loosen pinion after several trials. Use only the special copper-carbon composition brushes furnished by the manufacturers. Odinary carbon brushes will cause trouble.

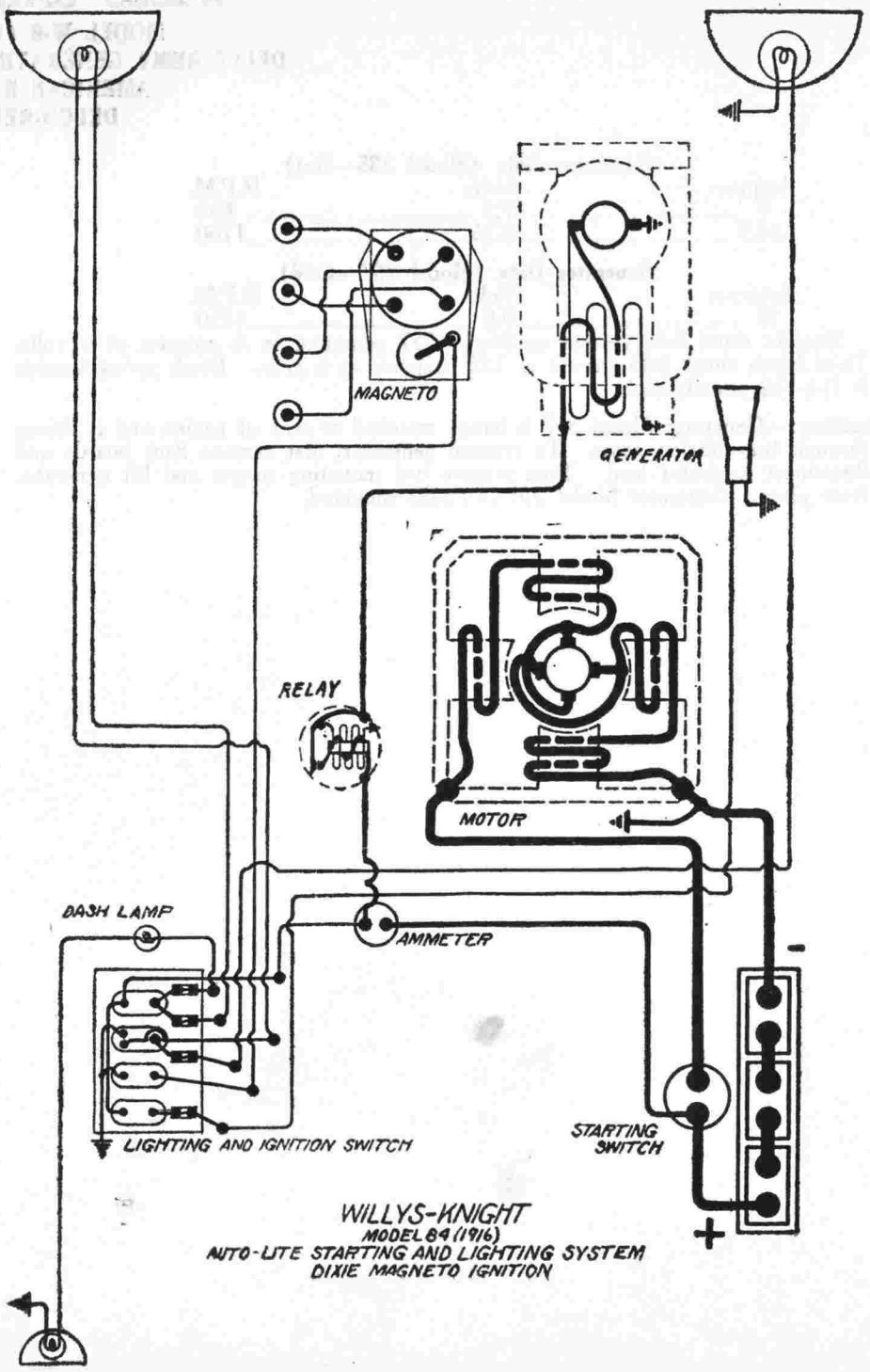
Generator.—Generator voltage regulation is by reverse series winding. Relay should close at 7½ miles per hour.

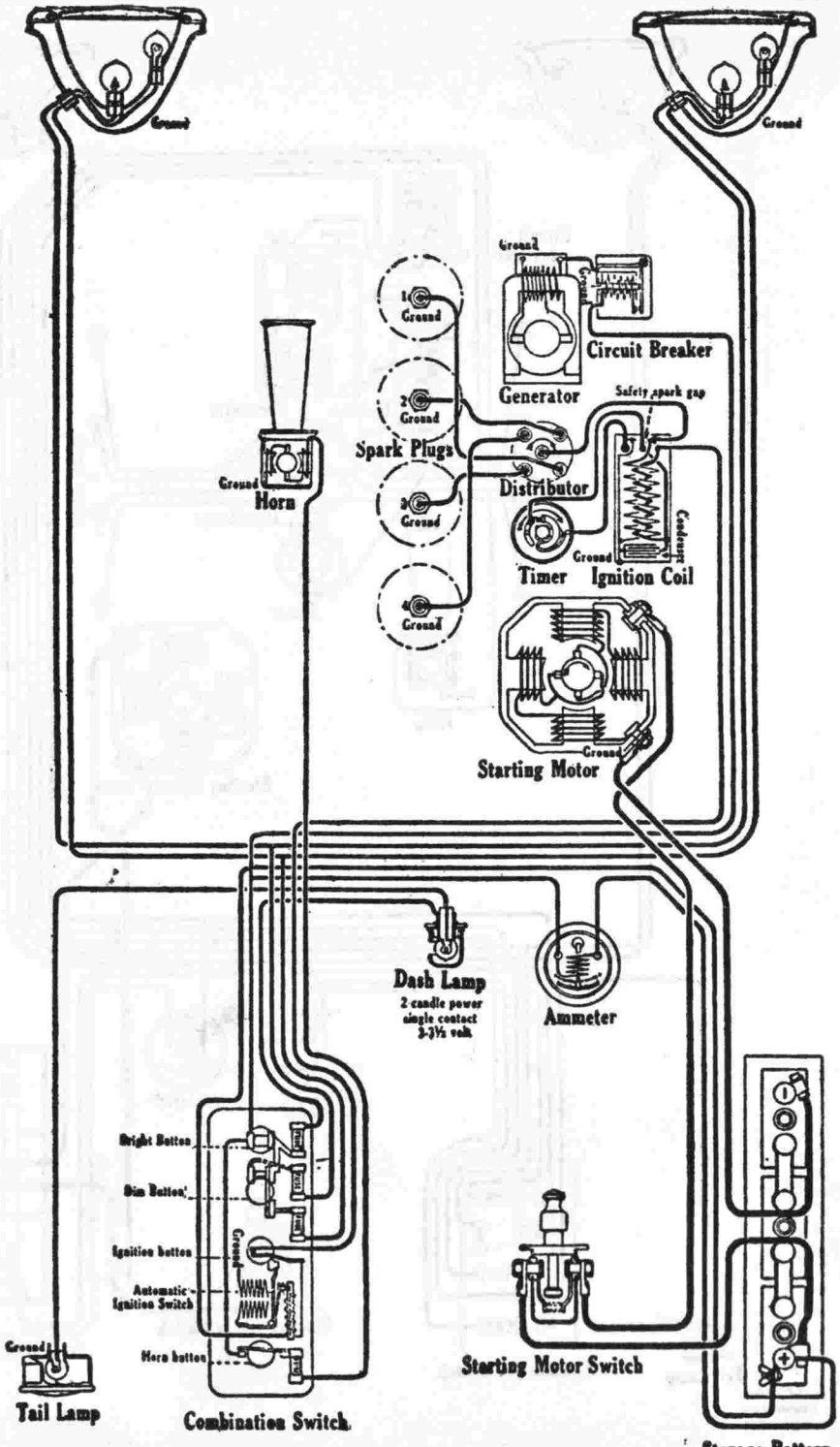
Output.—The maximum generator output should be about 14 amperes reached at 20 miles per hour. The output should be about 10 amperes at 15 miles per hour.

Oiling.—Generator bearings are packed with soft cup grease. The bearings should be thoroughly cleaned and repacked with grease at least once a season. Every two weeks or 1000 miles put a drop of oil in each of the bearings to keep the grease soft. Use only the special copper-carbon composition brushes furnished by the manufacturer. Ordinary carbon brushes will cause trouble. Spring should have just enough tension on brushes to ensure a good contact with the commutator. Generator terminals must be connected if generator is to be operated with battery disconnected.

Lamps.—Head lamps are 6-8 volts, 15 cp. Side lamps are 6-8 volts, 4 cp. Dash and tail lamps are in series. They are each 3-4 volts, 2 cp. All other lamps are 6-8 volts, 4 cp.

Fuses.—Fuses are of 20 amperes capacity.





WILLYS-KNIGHT

MODEL 88-4 (1916-17-18-19)

Auto-Lite Starting and Lighting System
Connecticut Ignition

Battery.—Battery is 6 volt, 120 ampere-hour. The negative (—) terminal is grounded at the starting motor.

Ignition.—Breaker contacts should separate .016 inch to .018 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism must be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should begin to separate when the mark "1-4 U-P" on the flywheel is 2½ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps should be about .023 inch.

Ignition Thermostat.—There is a thermostat in the switch case to open the ignition, preventing battery discharging through the ignition apparatus should ignition switch be left "On" with engine idle, contacts closed. This device is fully described on Page 41.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Starter.—Starter is connected to the engine through a Bendix drive. Cold engine, tight bearings, heavy oil or other obstructions will cause a high current flow and low speed during cranking operation. When running free, armature should revolve at about 4200 R. P. M., taking 50-55 amperes. Greater speed indicates grounded, short circuited or damp field windings. Greater current or vibrating of the ammeter needle indicates grounded or short circuited armature coils or commutator. Damp armature windings will cause high current or slow speed.

Oiling.—Clean and repack starter bearings with soft cup grease every six months. Put in one or two drops of oil every month to keep grease soft. Do not oil the Bendix drive. Should pinion stick, clean shaft with gasoline.

Generator.—Generator current regulation is by reverse series field. Relay should close at 7-10 M. P. H., or 230-265 R. P. M., of generator armature. Charging current should be .5 to 1.5 amperes at closing and discharge current 0 to 1 at opening.

Amperes	GENERATOR DATA, MODEL GF	R. P. M.
5		430- 490
10		730- 870
12.5		945-1180
15		1225-1660
16-19		2200-2800

A variation of 1.5 amperes from these amounts is allowable. Output may be varied slightly by adjusting brush pressure on commutator. The pressure should be 1 to 1¼ pounds. If operated freely as a motor, armature should revolve at 200 R. P. M., taking 1.8 amperes. Much higher speed indicates damp, grounded or short circuited field coils. Greater current or lower speed indicates tight bearings or damp, grounded or short circuited armature windings or commutator. Periodic swinging of ammeter needle indicates grounded or short circuited armature coils or commutator bars. Shunt field should take about 1 ampere.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps—Head lamps are 6-7 volts, 16 cp. Dimmer lamps are 6-7 volts, 4 cp. Dash and tail lamps are in series. They are each 3-4 volts, 2 cp.

Fuses.—Fuses are 20 ampere.

Model Numbers.—Generator is Model GF 1176. Starter is Model MC 1019 on the first 2400 cars and MC 1126 on later cars. On early cars a Willard OLBA battery was used. On later cars a USL CD 315 D battery is used.

MODEL 88-8 (1916-17-18-19)

Auto-Lite Starting and Lighting System. Remy Ignition

Battery.—Battery is 6 volt, 120 ampere-hour. The negative (—) terminal is grounded at the starting motor.

Ignition.—Breaker contacts should separate .020 inch to .025 inch. Should they become badly burned or pitted, resurface with a fine, flat jeweler's file or a piece of worn No. 00 sand paper.

Timing.—Contacts should begin to separate when the mark "1-4 T-C R" on the flywheel is 1½ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1R, 1L, 3R, 3L, 4R, 4L, 2R, 2L.

Spark Plug Gaps.—Spark plug gaps should be .027 inch to .030 inch.

Oiling.—Refill the cup under the distributor head with soft cup grease and turn down two turns every two weeks. At the same time put a small amount of vaseline on the fiber bumper of the contact arm, using a toothpick. If the car is driven more than 500 miles in two weeks, these attentions should be given every 500 miles.

Starter.—Starter is connected to the engine through a Bendix drive. When running free, armature should revolve at about 4200 R. P. M., taking 50-55 amperes. Greater speed indicates grounded, short circuited or damp field windings. Greater current or vibrating of the ammeter needle indicates grounded or short circuited armature coils or cummutator, Damp armature windings will cause high current or slow speed.

STARTER DATA, MODEL MC

Torque	R. P. M.	Amperes
1 lb. ft.	2650	100
2 lb. ft.	1900	145-150
3 lb. ft.	1600	185-190
4 lb. ft.	1400	225-230
5 lb. ft.	1250	250-255
6 lb. ft.	1000	290-300

Starter should develop 16 pound-feet lock torque, taking 450-460 amperes at 3.8-4.2 volts.

Oiling.—Clean and repack starter bearings with soft cup grease every six months. Put in one or two drops of oil every month to keep grease soft.

Generator.—Generator current regulation is by reverse series field (GG) on early cars and by third brush system on later models (GH). Relay should close at 8-10 miles per hour or 500-575 R. P. M., of armature on Model GG generator and at 550-600 R. P. M., on Model GH. Charging current should be .6 to 1.5 amperes at closing and discharge current 0 to 1 at opening.

GENERATOR DATA

Model GG		Model GH (Three Brush Type).	
Amperes	R. P. M.	Amperes	R. P. M.
5.0	750- 860	5.0	760- 820
10	1225-1400	10	1020-1100
12.5	1600-1825	12.5	1200-1300
15	2175-2450	15	1460-1675
17 -19	3200-3700	15 -17	1950-2250

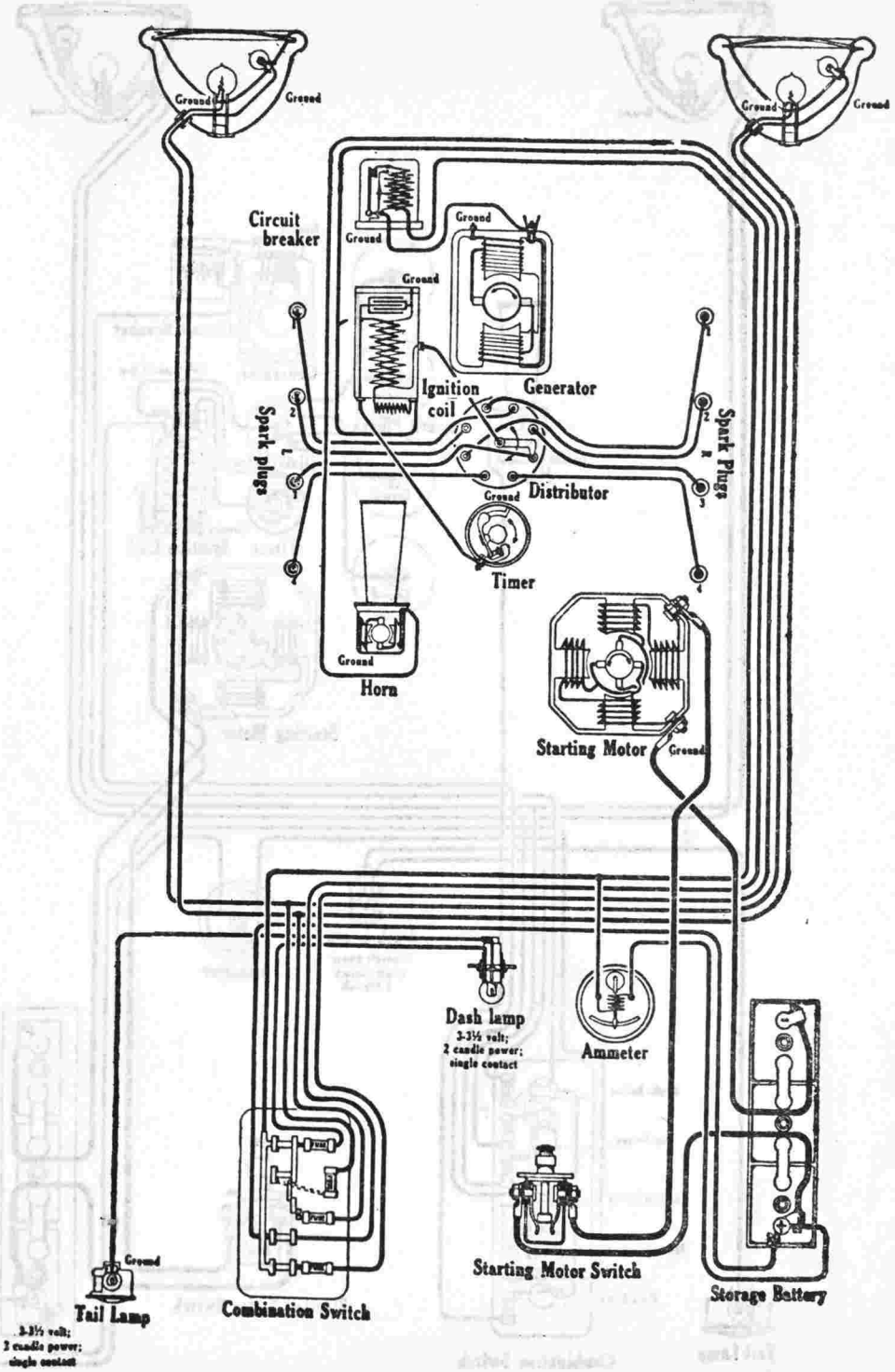
A variation of 1.5 amperes from these amounts is allowable. Generator output may be varied slightly by adjusting third brush on Model GH or brush pressure on Model GG The pressure should be 1 to 1¼ pounds. When operating freely as a motor, GG generator should take 2.8 amperes, armature turning at 350 R. P. M. Model GH should take 2.7 amperes, armature turning at 450 R.P.M. Much higher speed indicates damp, grounded or short circuited field coils. Greater current or lower speed indicates tight bearings or damp, grounded or short circuited armature windings or commutator. Periodic swinging of ammeter needle indicates grounded or short circuited armature coils or commutator bars. Shunt field should take 1.1 amperes on Model GG and 1.7 amperes on Model GH.

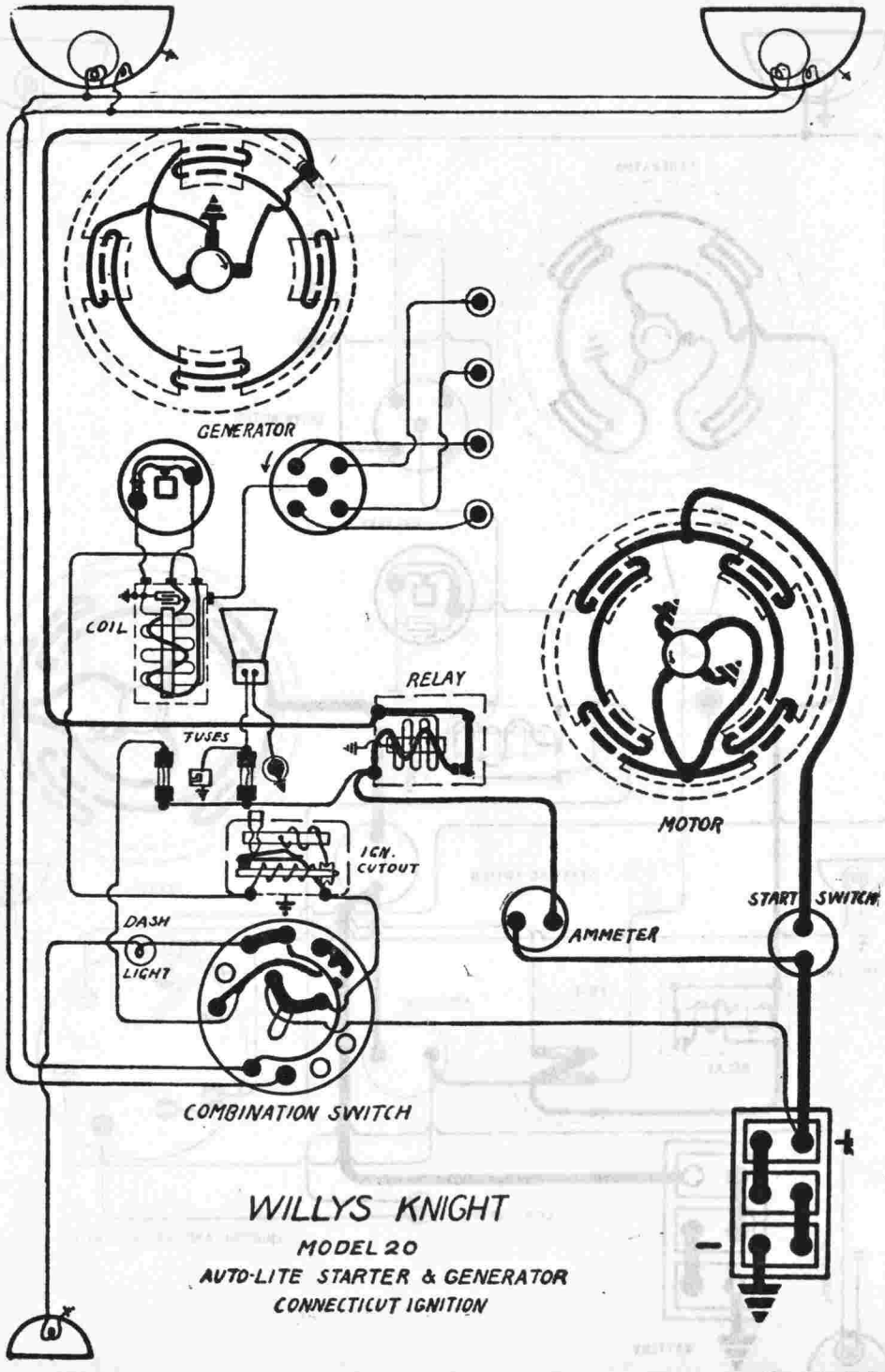
Oiling.—Put 5 or 6 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, oiling must be done every 500 miles.

Lamps.—Head lamps are 6-7 volts, 16 cp. Dimmer lamps are 6-7 volts, 4 cp. Dash and tail lamps are in series. They are each 3-3½ volts, 2 cp.

Fuses.—Fuses are 20 ampere.

Model Numbers.—Starter is Model MC 1126. Generator is Model GG 1046 on cars





WILLYS-KNIGHT

MODEL 20 (1920-21)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
CONNECTICUT IGNITION

BATTERY:—U. S. L. (1920) 6 volt, 120 ampere hour. **(1921) Type 317** 6 volt, 170 ampere hour. The negative (—) terminal is grounded.

IGNITION.—Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, renew the inner breaker mechanism. For temporary service, resurface contacts with fine emery cloth.

OILING.—Refill the cup under the breaker head with pure vaseline and turn down every month. If the car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 3, 4, 2.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER.—Model MH-1014. Starter is connected to the engine through a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes
2 lb. ft	1160	110
6 lb. ft	700	225
8 lb. ft	580	275
10 lb. ft	460	325
12 lb. ft	375	365
17.5 lb. ft	Lock	600

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every two weeks.

GENERATOR.—Model GJ. Generator current regulation is by third brush system. Maximum current output is 12-16 amperes, reached at 1700 R.P.M. of the armature or 25 miles per hour.

Generator Data

Amperes	Cold Test R.P.M.	Amperes	Hot Test R.P.M.
0	500	0	580
4	600	3	700
12	960	9	1050
16	1400	12	1360
16.5	1700	12.7	1700
12	3400	10	3400

Move the third brush in a clockwise direction (looking at the commutator end) to increase the charging rate, and in the opposite direction to decrease the charging rate. Reseat the brush after adjusting position.

OILING.—Put 5 or 6 drops of light engine oil in the generator bearing oilers every week. If the car is driven more than 250 miles in a week, the oiling must be done every 250 miles.

RELAY.—Relay closes at 8-10 miles per hour or 580 R.P.M. of the armature, and opens at 6-8 miles per hour or 360 R.P.M. of the armature. Relay contacts separate .030 to .045 inch. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 30 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are in series and are each 3-4 volt, 2 cp.

WILLYS-KNIGHT

MODEL 20-A (1922)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

BATTERY.—U. S. L., Type HDN-317-X, 6 volts, 166 ampere hours. Starting capacity—170 amperes for 20 minutes. Lighting capacity—5 amperes for 33 hours. The negative (—) terminal is grounded.

IGNITION.—Auto-Lite Battery Ignition. Breaker contacts separate .018 inch. If condition of contact points affects the ignition, remove and resurface on a hard oilstone.

Timing.—Breaker contacts begin to open when piston No. 1 is at top dead center, on compression stroke, spark control lever and breaker fully retarded.

Oiling.—Put 4 or 5 drops of light engine oil into timer distributor each week. If the car is driven over 250 miles in a week, this care must be given every 250miles.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—The spark plug gaps are .020 to .025 inch.

STARTER.—Model MH. The direction of rotation looking at commutator end is counter-clockwise. The starter is connected to engine by a Bendix drive.

Starter Data

Torque	R.P.M.	Amperes
2.0 lb. ft.	1160	110
6 lb. ft.	700	225
10 lb. ft.	460	325
12 lb. ft.	375	365
17.5 lb. ft.	Lock	600

Oiling.—Pour 7 or 8 drops of light engine oil into starter oiler every two weeks. If car is driven over 500 miles in two weeks, this attention must be given every 500 miles. Keep drive end bearing well lubricated.

GENERATOR.—Model GJ. The direction of rotation, looking at commutator end, is counter-clockwise. The third brush system is used for voltage regulation. Motoring freely, takes 4 to 5 amperes, 6 volts. Field test current is 2.2 amperes at 6volts. Each coil separately, current is 8.8 amperes at 6 volts.

Generator Test Data

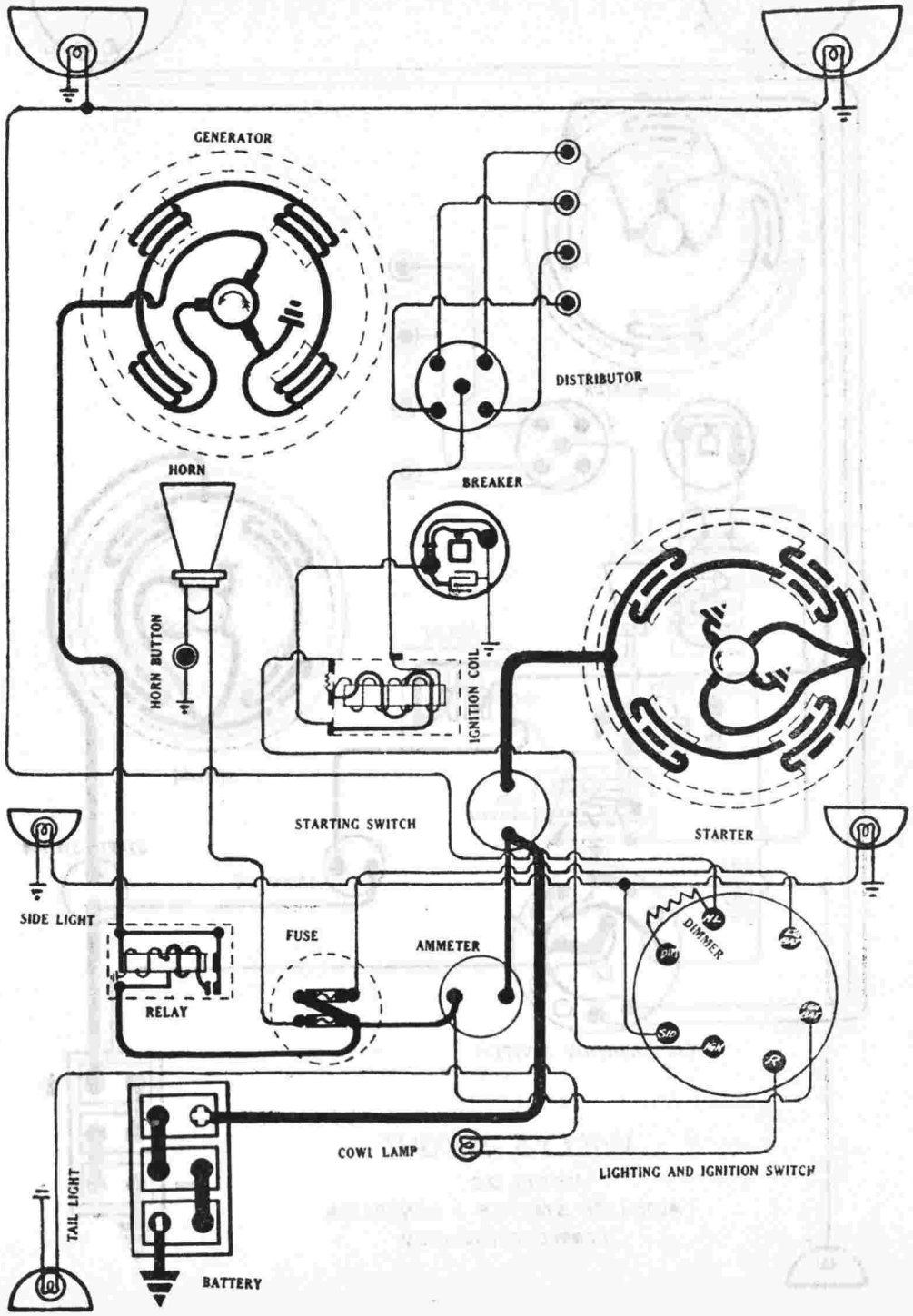
Amperes	Cold Test R.P.M.	Amperes	Hot Test R.P.M.
0.0	500	0.0	580
8	750	6	840
12	960	9	1050
16	1400	12	1360
16.5	1700	12.7	1700
12	3400	10	3400

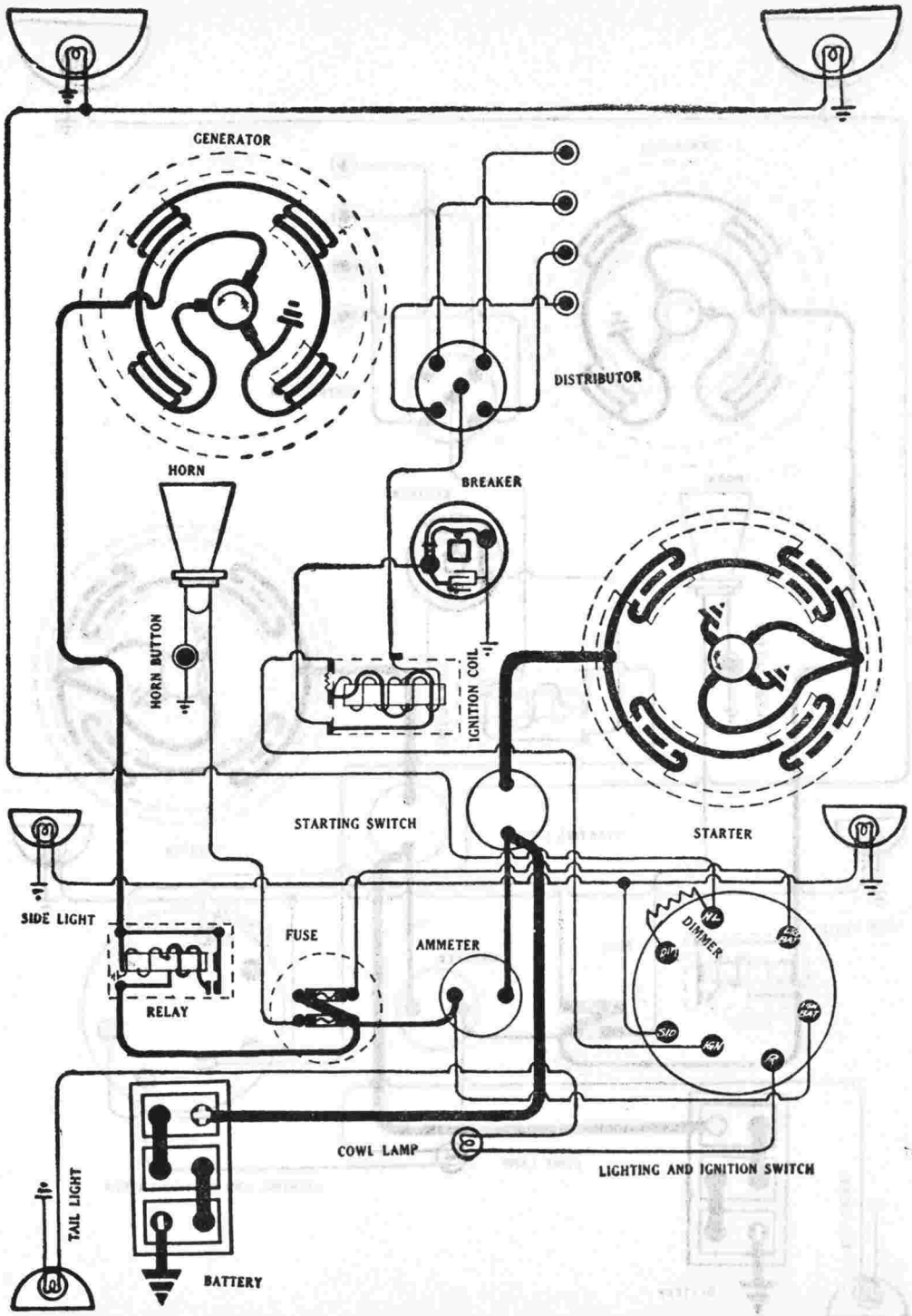
Oiling.—Pour 7 or 8 drops of light engine oil each week. If car is driven over 250 miles a week this attention must be given every 250 miles.

RELAY.—Relay closes at 7-9 M.P.H., 500-550 R.P.M., 7-8 volts, and opens at 5-7 M.P.H. 450-500 R.P.M., 1-2 ampere discharge. Contacts separate .025-.035 inch; and air gap between relay armature and coil core is .010-.015 inch, contacts closed.

LIGHTING.—Head lamps are 6-8 volts, 21 cp., S.C. Dash and tail lamps, 3-4 volts, 2 cp., S.C.

FUSES.—Two 15 ampere fuse used.





WILLYS-KNIGHT

MODEL 64-67 (1923-24-25)

AUTO LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

BATTERY.—U. S. L., Type 3HVX-8X, 6 volt. The starting capacity is 170 amperes for 20 minutes. The lighting capacity is 5 amperes for 33 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model 4035. Distributor Model IG-4036B. Breaker contacts separate .018 inch contacts fully separated. If condition affects ignition, remove and resurface on a hard oilstone.

Oiling.—Put 4 or 5 drops of light engine oil into timer distributor each week. If the car is driven over 250 miles in a week, this care must be given every 250 miles.

Timing.—Breaker contacts just open when flywheel is 12° late on compression stroke, spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plugs.—Spark plugs, diameter 7/8 inch. Gap, .025 inch.

STARTER:-Model MH-4002. Direction of rotation looking at commutator end is counter-clockwise. The starter is connected to engine by a Bendix drive. Motor running free at 4000 R.P.M., takes 40-60 amperes, at 6 volts, cranking engine at 100 to 200 R.P.M., takes 250-300 amperes at 5 volts. Lock torque is 17.5 pound feet, current being 600 amperes at 3-4 volts.

Oiling.—Pour 7 or 8 drops of light engine oil into starter oiler every two weeks. If car is driven over 500 miles in two weeks, this attention must be given every 500 miles. Keep drive end bearing well lubricated

GENERATOR:-Model GJ-4010A. The direction of rotation looking at commutator end is counter-clockwise. The third brush system is used for voltage regulation. Move third brush in counter-clockwise direction to increase the output, and to decrease, in the opposite direction. The maximum charging rate is 12-13 amperes (generator hot) reached at 1700 R.P.M. of the generator armature or approximately 20-25 M. P. H.

Generator Test Data

Cold Test. (77°F.)			Hot Test. (167°F.)		
Amperes	Volts.	R.P.M.	Amperes.	Volts.	R.P.M.
0	6.8	500	0	6.8	600
4	7.	580	4	7.3	740
8	7.6	650	8	7.8	950
12	8.	950	11	8.	1200
16.5	8.4	1700	12.7	8.2	1700
15	8.3	2400	11.6	8.1	2400
12.6	8.2	3200			

Motoring freely the generator takes 4-5 amperes at 6 volts. The shunt field current is 2.2 amperes at 6 volts. Each coil tested separately draws 8.8 amperes at 6 volts.

Oiling.—Pour 7 or 8 drops of light engine oil into generator oiler once a week. If car is driven more than 250 miles in a week, this care must be given each 250 miles.

RELAY.—Relay closes at 7-9 M.P.H., 500-550 R.P.M., 7-8 volts, and opens at 5-7 M.P.H. 450-500 R.P.M., 1-2 ampere discharge. Contacts separate .025-.035 inch; and air gap between relay armature and coil core is .010-.015 inch, contacts closed.

LIGHTING.—Clum Combination Ignition and Lighting Switch is used. Head lamps are 6-8 volts, 21 cp., S.C. Dimmer resistance employed. Tail and dash lamps are 3-4 volts, 2 cp., S.C.

FUSES.—Fuses are 20 amperes.

WILLYS-KNIGHT

MODEL GHF TAXICAB (1925-26)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L., Type 3HVX-8X. 6 volt. The starting capacity is 170 amperes for 20 minutes. The lighting capacity is 5 amperes for 33 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model 4035. Distributor Model IG-4036B. Breaker contacts separate .018 inch contacts fully separated. If condition affects ignition, remove and resurface on a hard oilstone.

Oiling:—Put 4 or 5 drops of light engine oil into timer distributor each week. If the car is driven over 250 miles in a week, this care must be given every 250 miles.

Timing:—Breaker contacts just open when flywheel is 12° late on compression stroke, spark control lever and breaker assembly fully retarded.

Firing Order:—The firing order is 1-3-4-2.

Spark Plugs:—Spark plug diameter is 7/8 inch. Gaps are .025 inch.

STARTER.—Model MH-4101. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 100-200 R.P.M., taking 250-300 amperes at 5 volts.

Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	6.	40-60
1.3 lb. ft.	1500	5.5	100
5. lb. ft.	800	5.	200
9. lb. ft.	400	4.5	300
17.5 lb. ft.	Lock	4.	600

Oiling:—Pour 7 or 8 drops of light engine oil into starter oiler every two weeks. If car is driven over 500 miles in two weeks, this attention must be given every 500 miles. Keep drive end bearing well lubricated.

GENERATOR:—Model GJ-4105. The direction of rotation, looking at the commutator end, is counter-clockwise. The third brush system is used for voltage regulation. Move third brush in counter-clockwise direction to increase the output, and to decrease, in the opposite direction. The maximum charging rate is 12-13 amperes (generator hot) reached at 1700 R.P.M. of the generator armature or approximately 20-25 M.P.H.

Generator Data

Cold Test (77°F.)			Hot Test (167°F.)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.8	500	0	6.8	600
4	7	580	4	7.3	740
8	7.6	650	8	7.8	950
12	8	950	11	8	1200
16.5	8.4	1700	12.7	8.2	1700
15	8.3	2400	11.6	8.1	2400
12.6	8.2	3200			

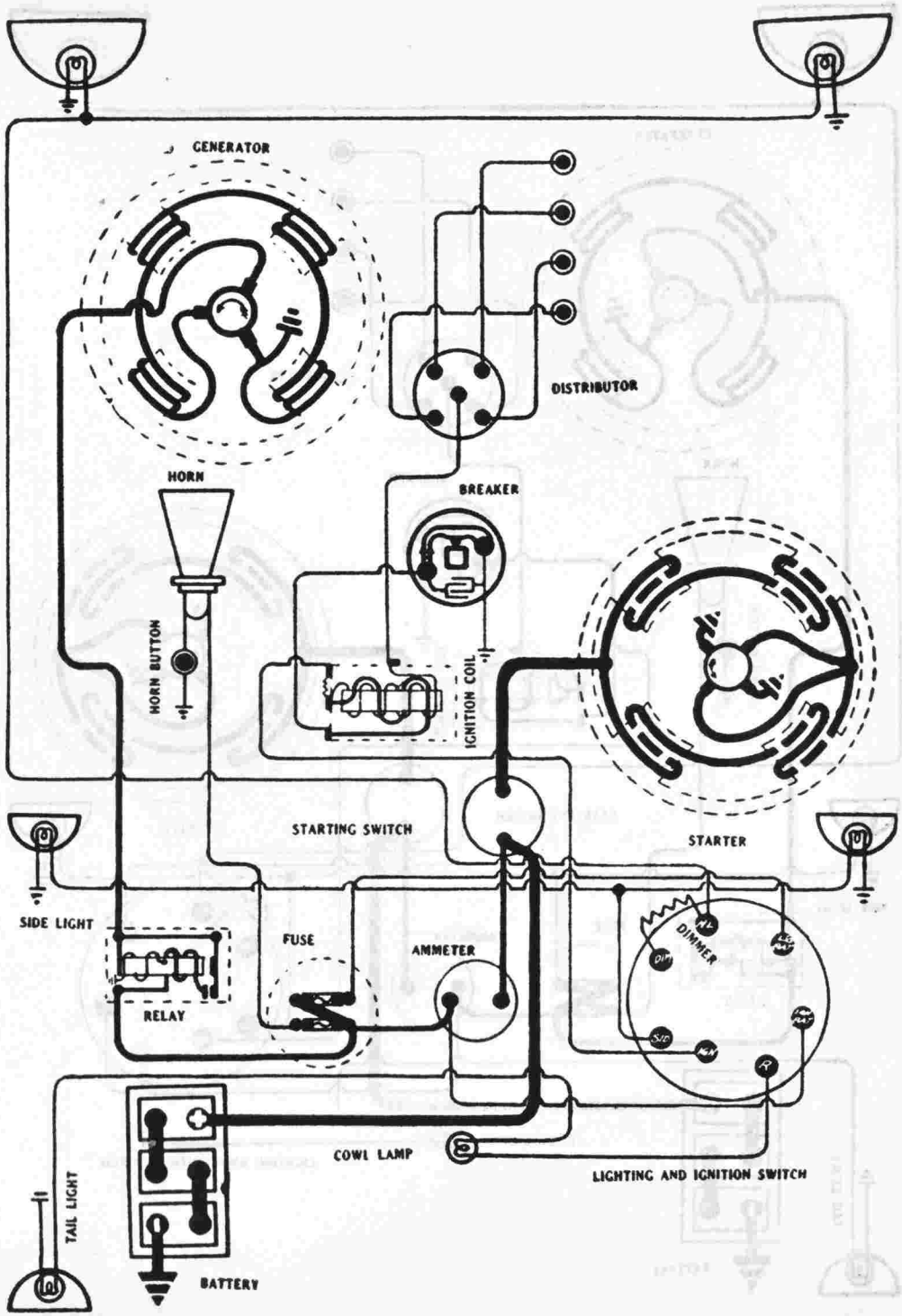
Motoring freely the generator takes 4-5 amperes at 6 volts. The shunt field current is 2.2 amperes at 6 volts. Each coil tested separately draws 8.8 amperes at 6 volts.

Oiling:—Pour 7 or 8 drops of light engine oil into generator oiler once a week. If car is driven more than 250 miles in a week, this care must be given each 250 miles.

RELAY:—Relay closes at 7-9 M.P.H., 500-550 R.P.M., 7-8 volts, and opens at 5-7 M.P.H., 450-500 R.P.M., 1-2 ampere discharge. Contacts separate, .025-.035 inch; and air gap between relay armature and coil core is .010-.015 inch, contacts closed.

LIGHTING.—Briggs and Stratton Switch Model 40072. Head lamps are 6-8 volt, 21 cp. S. C. A dimmer resistance is used. Side lamps are 6-8 volt, 4 cp. S. C. Dash and tail lamps are connected in series. They are each 6-8 volt, 2 cp. S. C.

FUSES:—Fuses are 20 amperes.

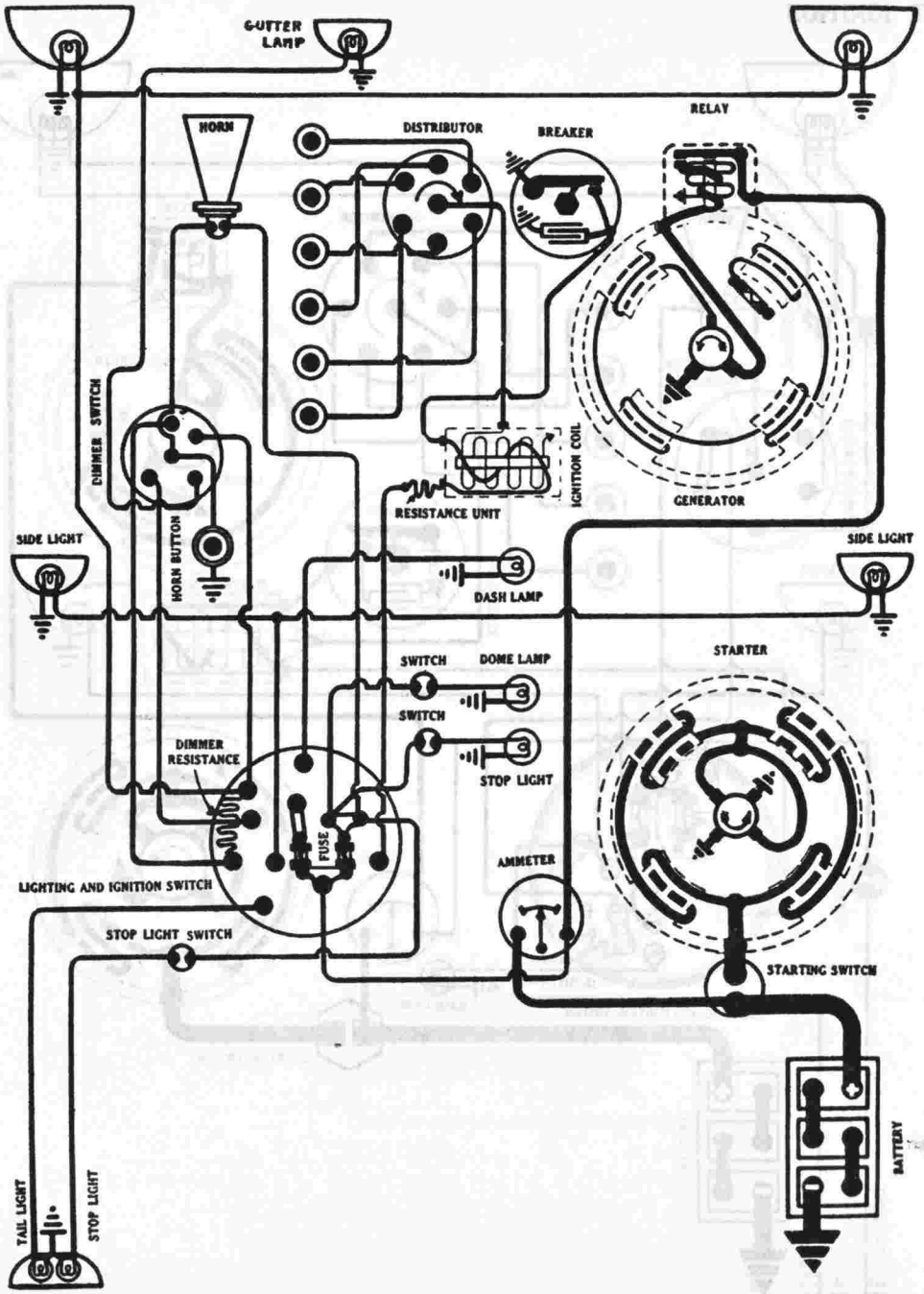


WILLYS KNIGHT

MODEL 66 (1925-26)

DEJON GENERATING, STARTING AND LIGHTING SYSTEM

DEJON IGNITION



BATTERY:—U.S.L. Type 3-HVX-8X. 6 volt. The starting capacity is 170 amperes for 20 minutes. The lighting capacity is 5 amperes for 33.2 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model CA-4010. ..Distributor Model IA-4010. Breaker contacts separate .018-.020 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone or with a fine, flat jeweler's file. Automatic advance begins at 150 R.P.M. of the distributor and reaches a maximum of 15° at 1500 R.P.M. Ignition current is 5 amperes with the resistance unit cold which decreases to 4-4.25 amperes within 30 seconds.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor housing every week or each 250 miles if the car is driven more than 250 miles in a week. Keep the grease cup on the distributor shaft filled with pure vaseline and turn down one turn every week.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 8° before top dead center (measured on the flywheel) with the manual spark control lever in the fully advanced position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Model SB-4008. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	5.	40
1.2 "	2200	5.5	100
4.1 "	1150	5.	200
7.3 "	760	4.5	300
10.5 "	500	4.	400
28.4 "	Lock	4.	930

Oiling:—Put 4 or 5 drops of light engine oil in each of the starter bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

GENERATOR:—Model DB-4003. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the generator output, insert a screwdriver in the slotted end of the third brush shifting shaft which is located on the generator end plate above the bearing retainer and turn the shaft in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The maximum charging rate is 16 amperes at 8 volts reached at 1600 R.P.M. of the generator armature or 20 M.P.H. Shunt field current is 2.5 amperes at 6 volts.

Generator Data.

Cold Amperes	R.P.M.	Hot Amperes
0	500	0
2.75	600	1.5
10.5	1000	8.5
15.5	1600	13.0
11.75	2400	11.0
9.5	3600	8.75

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Model RA-4001-A. Relay contacts close at 480-510 R.P.M. with a generator voltage of 7-7.5 volts and open with a discharge current of 0-2 amperes. Contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010 inch, contacts closed.

LIGHTING:—Head and stop lamps are each 6-8 volt, 21 cp.S.C. Side, tail, dash and dome lamps are each 6-8 volt, 3 cp.S.C.

Switch.—Lighting switch is Briggs and Stratton Model No. 38360.

FUSES.—Generator field fuse is 5 amperes. Lighting fuses are 20 amperes.

WILLYS-KNIGHT

MODEL 70 (1926)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

BATTERY.—U. S. L., Type 3-HVX-7X. 6 volt. Starting capacity is 148.5 amperes for 20 minutes. Lighting capacity is 5 amperes for 28.4 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model IG-4065. Distributor Model IG-4107-B. Breaker contacts separate .020-.024 inch. Resurface contacts with a fine, flat tungsten file or on a medium hard oilstone. Ignition current is 1-3 amperes with engine running and 3.4-5 amperes with engine stopped. Distributor is semi-automatic. Manual advance is 20°. Automatic advance begins at 600 R.P.M. and reaches a maximum of 20° at 2400 R.P.M. Total advance s 40° measured on engine flywheel.

Mounting.—Distributor is mounted at right front of engine. To remove, disconnect manual advance rod and remove two mounting screws. Then lift distributor from place.

Oiling.—Fill the grease cup on the side of the distributor shaft with pure vaseline and turn down one turn every week or each 250 miles if the car is driven more than 250 miles in a week.

Timing.—Breaker contacts begin to separate when the piston entering power stroke reaches a position 8° or 51/64 inch before top dead center as measured on the flywheel with the spark control lever in the fully advanced position. An allowable variation of 1° or 1/8 inch is permitted. With timing correctly set, piston will be .026 inch before top dead center.

Firing Order.—The firing order is 1-5-3-6-2-4.

Spark Plugs.—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER.—Model ML-4106. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, looking at the commutator end. Starter cranks the engine at 140 R.P.M., taking 180 amperes at 5.2 volts. Starter brush tension is 1¼-1½ pounds each.

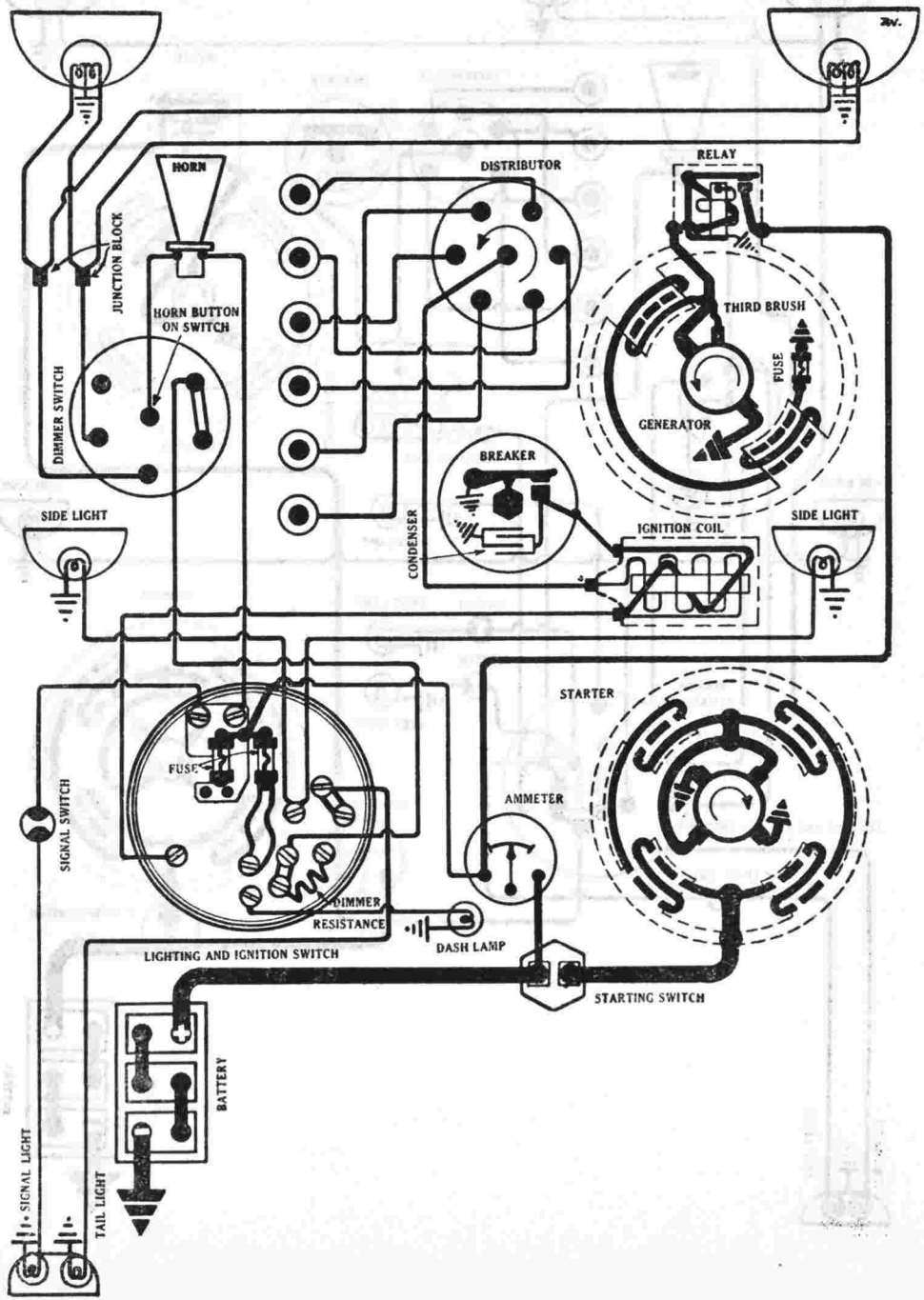
Starter Data

Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	Free	5.5	45	(Without Bendix)
0 "	Free	5.5	50	(With Bendix)
1.1 "	1940	5.5	100	
4.3 "	1050	5	200	
7.8 "	650	4.5	300	
11.4 "	360	4	400	
16 "	Lock	3	560	

Mounting.—Starter is mounted at right of transmission at rear of flywheel housing by a barrel mounting. To remove starter, remove large pilot mounting screw and slide starter from place.

Oiling.—Put 7 or 8 drops of light engine oil in the oiler on the drive end of the starter every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks. The commutator end bearing requires no attention.

GENERATOR.—Model GY-4103. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, remove the commutator cover band and shift third brush mounting bracket by tapping the third brush mounting stud with a screwdriver. Shifting the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. The mounting bracket is held in any desired position by the friction between the mounting stud and the generator end plate. Maximum charging rate is 15.5 amperes at 8 volts.



WILLYS-KNIGHT

MODEL 70 (1926)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

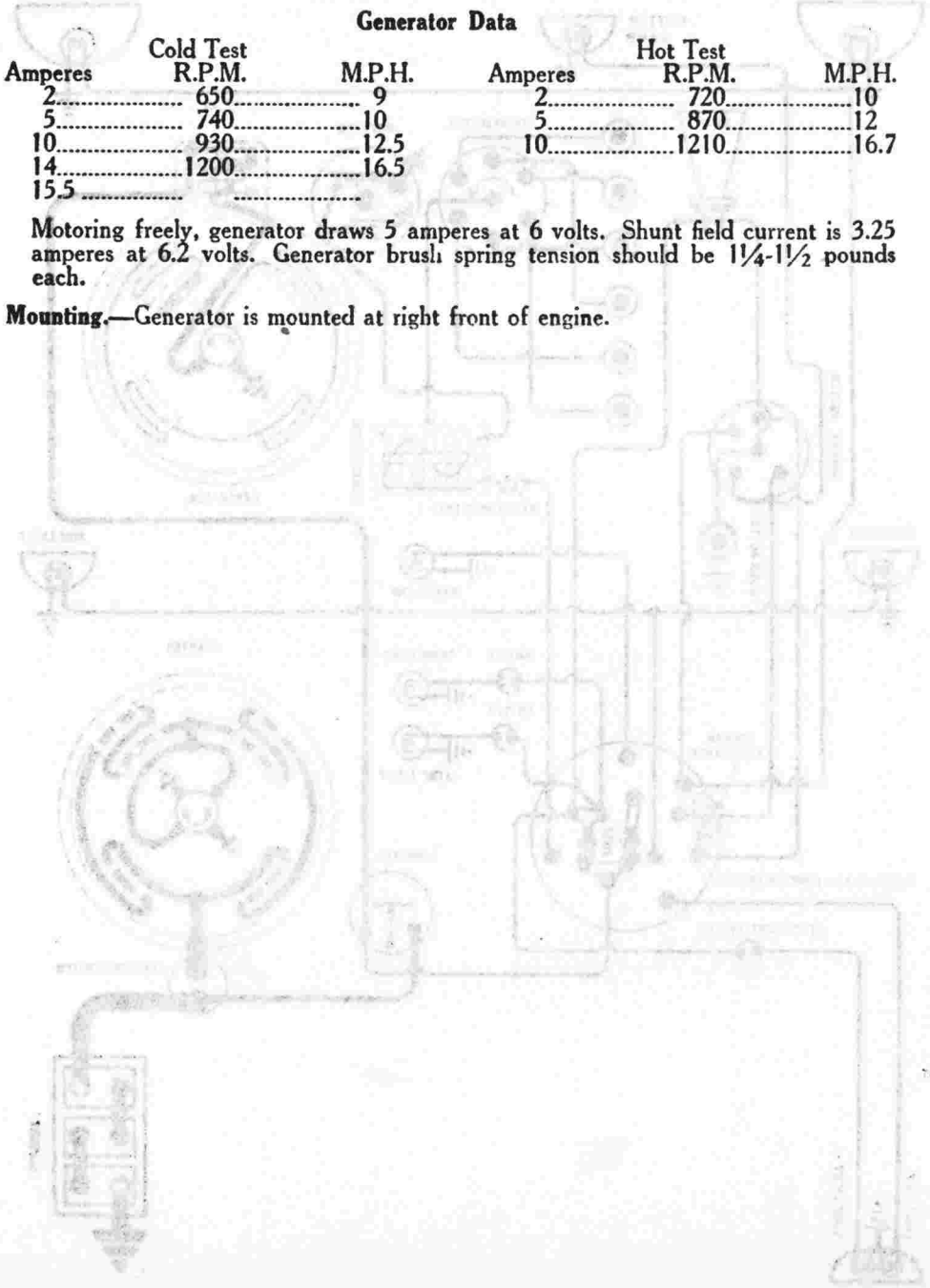
AUTO-LITE IGNITION

Generator Data

Cold Test			Hot Test		
Amperes	R.P.M.	M.P.H.	Amperes	R.P.M.	M.P.H.
2	650	9	2	720	10
5	740	10	5	870	12
10	930	12.5	10	1210	16.7
14	1200	16.5			
15.5					

Motoring freely, generator draws 5 amperes at 6 volts. Shunt field current is 3.25 amperes at 6.2 volts. Generator brush spring tension should be 1¼-1½ pounds each.

Mounting.—Generator is mounted at right front of engine.



Oiling.—Put 7 or 8 drops of light engine oil in each of the generator bearing oilers every week or each 250 miles if the car is driven more than 250 miles in a week.

RELAY.—Model CB-4007. Relay is mounted on top of the generator. Relay closes when the voltage of the generator reaches 7-7.5 volts and opens with a current discharge of .5-2.5 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core .010-.030 inch, contacts closed.

LIGHTING.—Clum Switch. Head lamps are 6-8 volt, double filament, 21 cp. each D. C. Stop lamp is 6-8 volt, 21 cp. S. C. Dash, side and tail lamps are each 6-8 volt, 3 cp. S. C.

FUSES.—Generator field fuse is 5 amperes. Lighting fuse on switch is 20 amperes.

WILLYS-KNIGHT

MODEL 66 (1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

BATTERY:—U.S.L. Type 3-HVX-8X, 6 volt. Starting capacity is 170 amperes for 20 minutes. Lighting capacity is 5 amperes for 33.2 hours. The negative (—) terminal is grounded.

IGNITION.—Coil Model IG-4065. Distributor Model IG-4107 superseded by Model IG-4131. Breaker contacts separate .018-.020 inch. They are made of tungsten. Resurface contacts with a fine, flat contact file or on a medium hard oilstone. Ignition current is 1-3 amperes with engine running and 3.4-5 amperes with engine stopped. Distributor is semi-automatic. Manual advance is 30° (Engine). Automatic advance begins at 200 R.P.M. of the engine and reaches a maximum of 30° (Engine) at 3100 R.P.M. of the engine.

Oiling:—Fill the grease cup on the side of the distributor shaft with pure vaseline and turn down one turn every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 8° before top dead center as measured on the flywheel with the spark control lever in the fully advanced position.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Standard. Gaps are .025 inch.

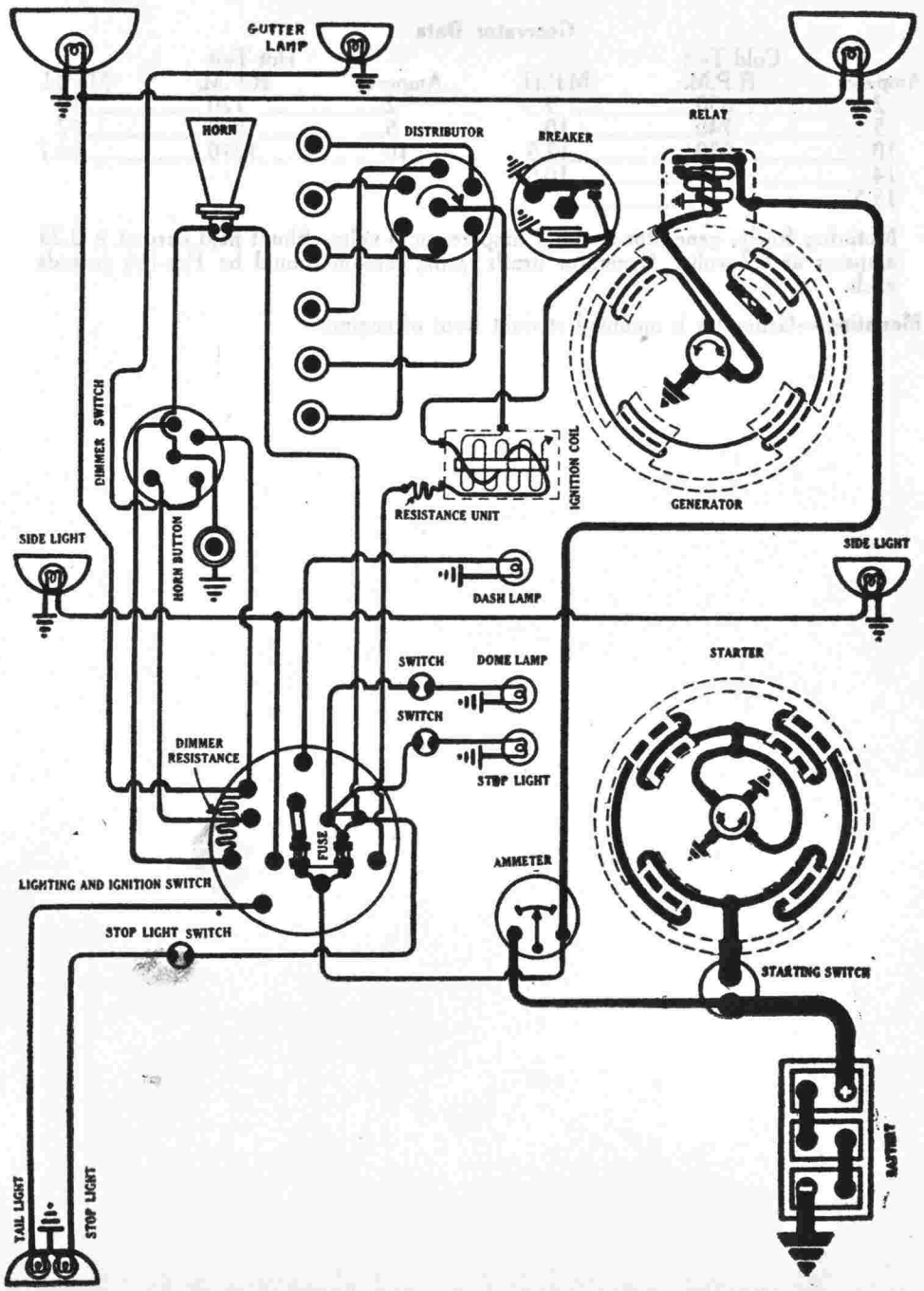
STARTER:—Model ML-4105. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 120 R.P.M. drawing 150 amperes at 5.35 volts. Starter brush tension is 1¼-1½ pounds each. Starter switch is Model SW-4001.

Starter Data

Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	Free	5.5	45	(Without Bendix
0 "	Free	5.5	50	(With Bendix)
1.1 "	1940	5.5	100	
4.2 "	1050	5.0	200	
7.8 "	650	4.5	300	
11.4 "	360	4.0	400	
16.0 "	Lock	3.0	560	

Oiling:—Put 5 to 10 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR:—Model GJA-4109 superseded by Model GRE-4207. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust the generator output remove the commutator cover band and shift the third brush mounting bracket by tapping on the third brush mounting stud with a screwdriver. Shifting the third brush in a counter-clockwise direction increases the charging rate and in the opposite direction decreases the charging rate. The third brush is held in any desired position by friction between the third brush mounting stud and the generator end plate. The charging rate with maximum third brush setting is 17 amperes at 8 volts on the Model GJA-4109 generator and 18.4 amperes at 7.8 volts reached at 1200 R.P.M. on the Model GRE-4207 generator.



WILLYS-KNIGHT

MODEL 66 (1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

Generator Data

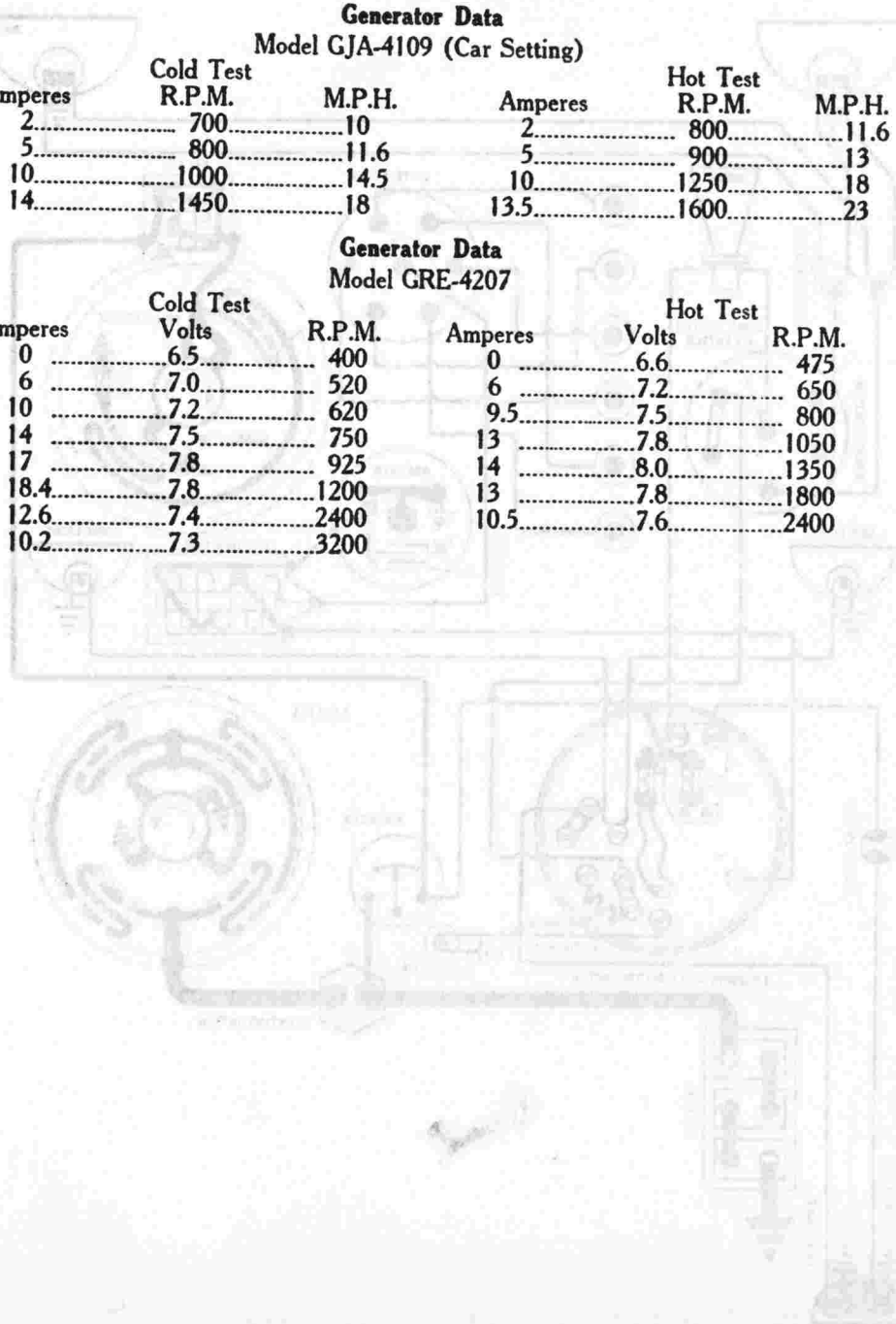
Model GJA-4109 (Car Setting)

Cold Test			Hot Test		
Amperes	R.P.M.	M.P.H.	Amperes	R.P.M.	M.P.H.
2	700	10	2	800	11.6
5	800	11.6	5	900	13
10	1000	14.5	10	1250	18
14	1450	18	13.5	1600	23

Generator Data

Model GRE-4207

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.5	400	0	6.6	475
6	7.0	520	6	7.2	650
10	7.2	620	9.5	7.5	800
14	7.5	750	13	7.8	1050
17	7.8	925	14	8.0	1350
18.4	7.8	1200	13	7.8	1800
12.6	7.4	2400	10.5	7.6	2400
10.2	7.3	3200			



Shuntfield test current is 2.2 amperes at 6.2 volts. Motoring freely, generator draws 5 amperes at 6 volts. Generator brush tension should be 1¼-1½ pounds each.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Model CB-4007. Relay is mounted on top of the generator. Relay closes when the voltage of the generator reaches 7-7.5 volts and opens with a discharge current of .5-2.5 amperes. Contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING:—Briggs & Stratton Switch Model 10482. Head, stop and gutter lamps are each 6-8 volt, 21 cp. S.C. Side, tail and dash lamps are each 6-8 volt, 3 cp. S.C. Dome lamp is 6-8 volt, 3 cp. S.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuses are 20 amperes.

WILLYS-KNIGHT

MODEL 70-A (1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

BATTERY:—U.S.L. Type 3-HVX-7X. 6 volt. Starting capacity is 158.5 amperes for 20 minutes. Lighting capacity is 5 amperes for 28.4 hours. The negative (—) terminal is grounded. Battery is mounted on frame under front floor board on left hand side.

IGNITION:—Coil Model IG-4065. Distributor Model IGA-4021. Breaker contacts separate .020-.024 inch. They are made of tungsten. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Manual advance is 20° (engine). Automatic advance begins at 800 R.P.M. (engine). Maximum automatic advance is 20° (engine) reached at 2400 R.P.M. Breaker arm spring tension is 20 ounces. Ignition current is 1-3 amperes with engine running and 4-5 amperes with engine stopped.

Mounting:—Distributor is mounted on the right of the engine near the forward end. To remove distributor, disconnect primary lead and manual advance rod and remove head with cables attached. Then remove two mounting screws and lift distributor from place.

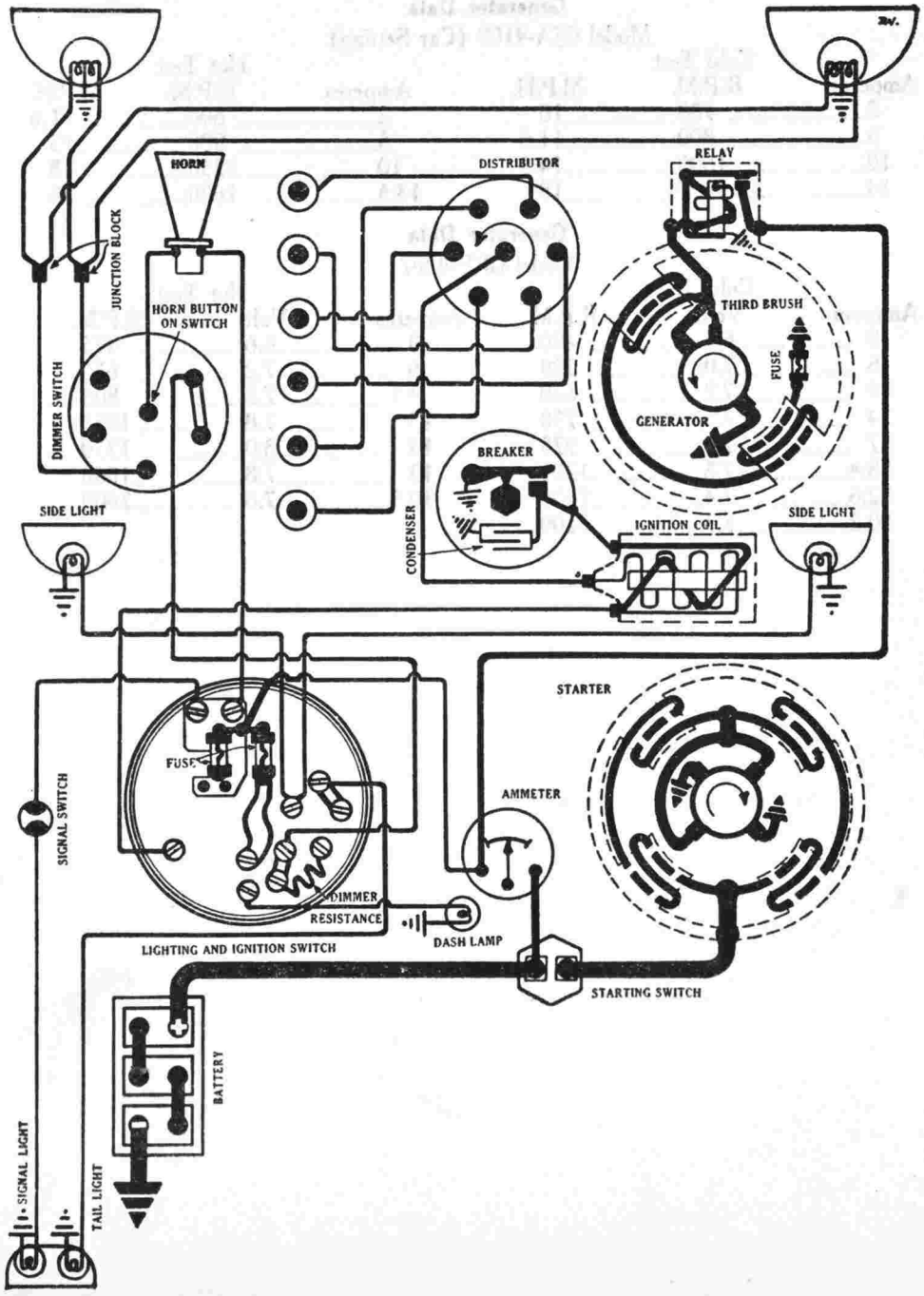
Oiling:—Fill the grease cup on the side of the distributor shaft with pure vaseline and turn down one turn each week or each 250 miles. Every 5000 miles remove the rotor button and saturate the wick oiler in the center of the shaft with light engine oil. Put a small bit of vaseline on the face of the breaker cam under the fiber bumper of the contact arm.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position .026 inch before top dead center with the manual advance lever in the fully advanced position. To check timing, crank engine until piston No. 1 enters compression stroke. This may be checked by removing spark plugs in the other cylinders and cranking engine until compression is felt. Then fully advance manual spark lever and continue to crank engine until ignition mark on the flywheel is opposite the indicator in the clutch inspection hole. This mark is 8° or 51/64 inch before top dead center. At this point the piston will be .026 inch before top dead center and the contacts should separate. To set timing, loosen the clamp screw under the distributor cup and rotate the distributor until contacts begin to separate. Tighten the clamp screw. A variation of 1° or 1/8 inch is allowable in setting the ignition.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

Valve Timing:—The Willys-Knight engine is of the sleeve valve type. To time sleeve valves with eccentric shaft sprocket removed, remove pipe plug in exhaust manifold opposite No. 6 cylinder and scrape carbon from edges of sleeve ports so that closing of ports can be checked. Then remove clutch inspection plate and crank engine until flywheel mark "EC" is opposite the pointer on the flywheel case. Place electric lamp over spark plug port in cylinder No. 6 and rotate eccentric shaft in clockwise direction until the upper edge of the port in the outside port passes the lower edge of the port in the cylinder block on the downward stroke. At this point the ray of light from the lamp will be cut off. Then assemble chain on crankshaft, idler and generator sprockets. Insert the eccentric shaft sprocket in chain and change mesh of sprocket in chain one tooth at a time until the five cap screws can be inserted without changing the position of the eccentric shaft or crankshaft. Then tighten the five cap screws holding the sprocket rigidly on the shaft. To set tension of timing chain, turn idler eccentric bushing spring until all slackness is removed from chain. Then give spring one complete turn and insert end in slot of idler stud.



WILLYS-KNIGHT

MODEL 70-A (1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

STARTER:—Model MAB-4002. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 120 R.P.M. drawing 250 amperes at 5 volts. Starter switch is Model SW-4001. Brush spring tension is 1¾ -2¼ pounds each.

Starter Data

Torque	R.P.M.	Volts	Amperes
.6 lb. ft.	1900	—	100
3.5 "	1100	—	200
6.6 "	700	—	300
10.2 "	410	—	400
24 "	Lock	4	725

Mounting:—Starter is barrel mounted at the right of the transmission case on the rear of the flywheel housing. To remove, disconnect cable and remove pilot mounting screw directly above starter sleeve. Then slide starter to rear and lift from place.

Oiling:—Put 7 or 8 drops of light engine oil in the oiler on the drive end of the starter every two weeks or each 1000 miles.

GENERATOR:—Model GYA-4202A. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove commutator cover band and shift third brush by tapping on the mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush mounting bracket is held in any desired position by friction between the mounting stud and the end plate. Charging rate with maximum setting of third brush is 19 amperes at 8 volts.

Generator Data

Cold Test			Hot Test	
Amperes	Volts	R.P.M.	Amperes	R.P.M.
2	6.6	620	2	700
5	7.	700	5	840
10	7.3	860	10	1100
14	7.7	1050	14	1600
16	7.9	1200		

Motoring generator draws 5 amperes at 6 volts. Shunt field current is 3.8 amperes at 6.2 volts. Brush spring tension is 1¼-2 pounds.

Mounting:—Generator is cradle mounted on the right side of the engine. To remove generator, disconnect lead and loosen two nuts on mounting strap. Then disengage coupling and lift generator from place.

Oiling:—Put 7 or 8 drops of light engine oil in each of the generator oilers every week or each 250 miles.

RELAY:—Model CB-4007. Relay is mounted on the generator. Relay contacts close at approximately 620 R.P.M. when the generator voltage reaches 7-7.5 volts and open with a discharge current of .5-2.5 amperes. Charging current at closing of contacts must not exceed 2 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING:—Briggs & Stratton 70-A. Head lamps are 6-8 volt, 21 cp. double filament using second 21 cp. filament instead of dimming. Stop lamp is 6-8 volt, 21 cp. S.C. Dash, tail and side lamps are each 6-8 volt, 3 cp. S.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuses are 20 amperes.

WILLYS KNIGHT

MODEL 56 (1928)
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L., Type 3-HVX-7X4, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 148.5 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 28.4 hours. Battery is mounted on left frame member.

IGNITION:—Coil Model IG-4065. Coil is mounted on right side of engine block. Ignition current is 1-3 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped.

Distributor Model IGA-4042. Breaker contacts separate .020-.025 inch. Set contact gap by loosening lock nut on stationary contact stud and turning up stud until breaker gap is correct with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 800 R.P.M. of engine. Maximum automatic advance is 20 degrees reached at 2400 R.P.M.

Mounting:—Distributor is mounted at right of engine. To remove distributor, disconnect primary lead and manual advance rod and remove head with cables intact. Then remove two mounting cap screws and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with pure vaseline and turn down one turn every 250 miles. Every 5000 miles remove the rotor and saturate the wick oiler in the center of the shaft with light engine oil and put a small amount of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 8 degrees before top dead center with the manual spark lever fully advanced. To set timing, crank engine until piston No. 1 enters compression stroke. This may be determined by removing all spark plugs except No. 1 and cranking engine until compression is felt. Then advance spark control lever. Continue to crank engine until piston reaches firing position when the ignition mark on the flywheel will be opposite the indicator on the flywheel case. Loosen the clamp screw on the advance arm and rotate the distributor until the contacts begin to open. Tighten the clamp screw and make certain that the segment opposite the rotor is connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Champion No. 1. Gaps are .025 inch.

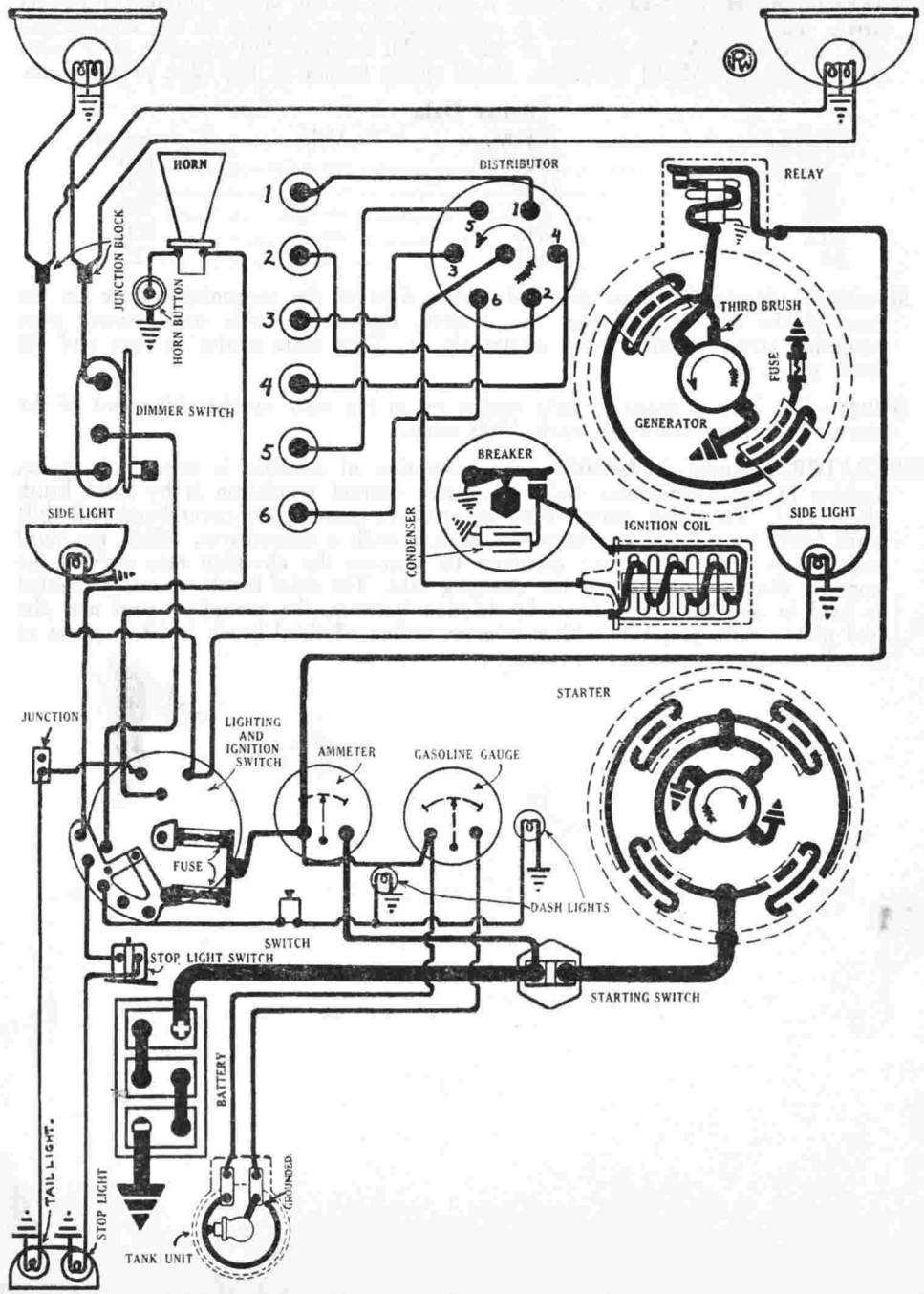
STARTER:—Model MAB-4002. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, looking at the commutator end. Brush spring tension is 1¾-2¼ pounds. Starter switch is Model SW-4001. Starter cranks the engine at 140 R.P.M. drawing 250 amperes at 5 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
.6 lb. ft.	1900		100
3.5 "	1100		200
6.6 "	700		300
10.2 "	410		400
24 "	Lock	4	725

Mounting:—Starter is sleeve mounted at right of transmission case on rear of flywheel housing. To remove starter, take up front floor boards, disconnect cable and take out large pilot mounting screw in housing directly above starter sleeve. Then pull starter to rear and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.



WILLYS-KNIGHT

MODEL 56 (1928)
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

GENERATOR:—Model GAL-4103. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen the commutator cover band and shift the third brush and mounting plate by tapping on the mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in any position by friction between the mounting stud and the end plate. The maximum charging rate is 17 amperes at 8 volts reached at 2075 R.P.M. or 23 miles per hour.

Generator Data

Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	835
10	7.3	1025
14	7.65	1275
17.2	8.0	2075
14	7.65	2925

Brush spring tension is 24-32 ounces. Generator motoring draws 4.7-5.7 amperes at 6 volts. Shunt field current is 4.2 amperes at 6 volts. A five ampere field fuse is mounted on the top of the generator.

Mounting:—Generator is cradle mounted on the right of the engine. To remove generator, disconnect lead and remove clamp band. Then pull generator to rear to disengage coupling and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every 500 miles.

RELAY:—Model CB-4104. Relay is mounted on the generator. Relay closes at 675 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Briggs and Stratton Switch. Switch is mounted on the instrument board. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dash, tail and dome lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Generator field fuse is 5 amperes. Lighting fuses on switch are 20 amperes capacity.

WILLYS KNIGHT

MODEL 66-A (1928)
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L., Type 3-HVX-8X4, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 170 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 33.2 hours. Battery is mounted on right frame member.

IGNITION:—Coil Model IG-4065. Coil is mounted on right of engine block. Ignition current is 1-3 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped.

Distributor Model IGA-4035. Breaker contacts separate .018-.020 inch. Set contact gap by loosening lock nut on stationary contact stud and turning up stud until proper gap is secured with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Manual advance is 10 degrees (engine). Maximum automatic advance is 10 degrees (engine).

Mounting:—Distributor is mounted at right of engine on top of oil pump housing. To remove distributor, disconnect manual advance rod and remove head with cables intact. Remove Electrolock switch on dash. Then take out 2 mounting cap screws and lift distributor from place. Electrolock Type 5-A is used. This must be removed with the distributor when the distributor is taken off the car.

Oiling:—Fill the grease cup on the side of the distributor shaft with pure vaseline and turn down one turn every 500 miles. Every 5000 miles put a small amount of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 12 degrees before top dead center with the manual spark lever fully advanced. To set timing, crank engine until piston No. 1 enters compression stroke. This may be checked by removing all spark plugs except No. 1 and cranking engine until compression is felt. Then fully advance spark lever. Continue to crank engine until ignition mark on flywheel is opposite the indicator when the piston will be 12 degrees before top dead center. Loosen clamp screw and rotate distributor until contacts begin to open. Tighten the clamp screw and make certain that the segment opposite the rotor is connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

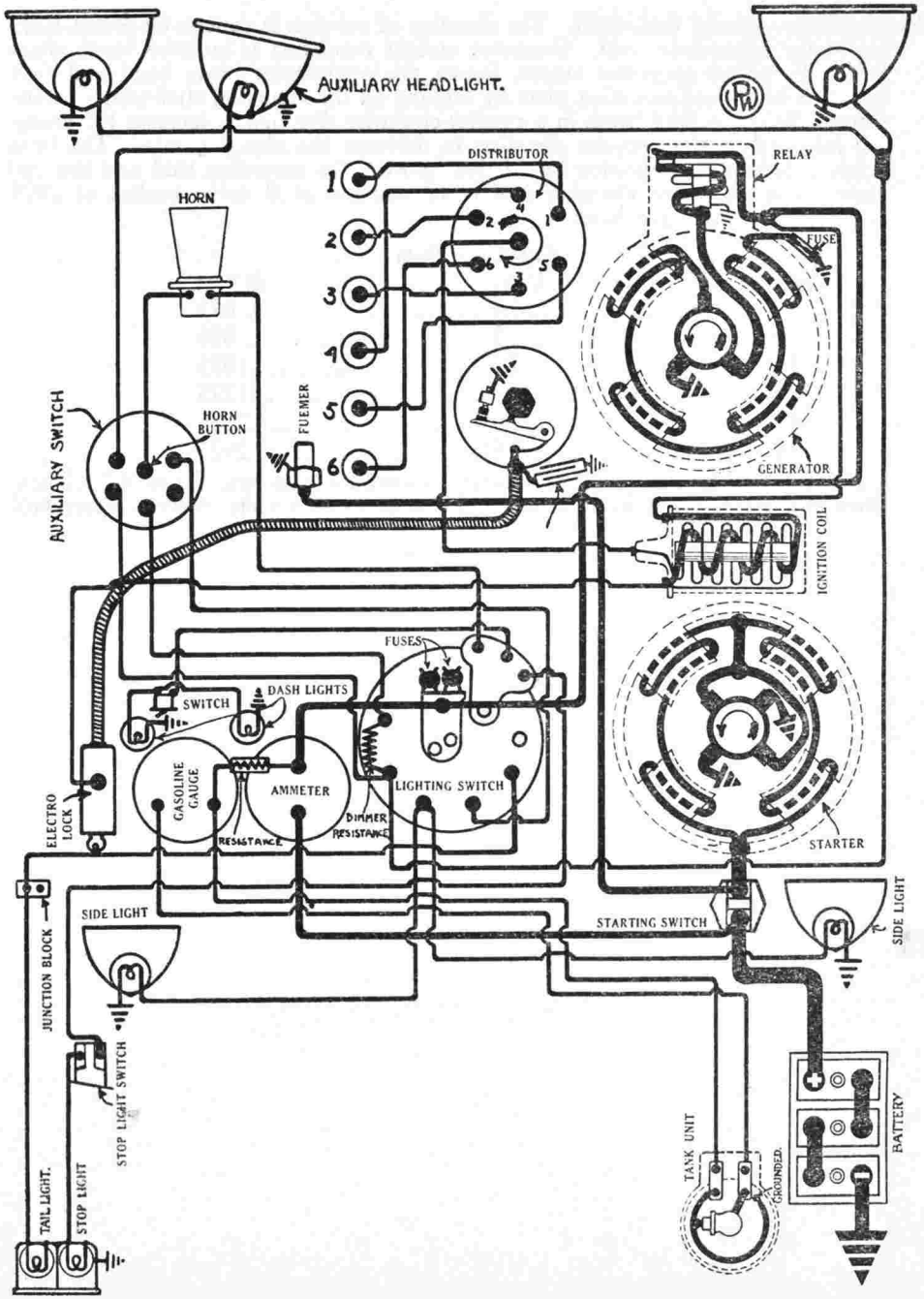
Spark Plugs:—Spark plugs are 7/8-18 S.A.E. Champion No. 2. Gaps are .025 inch.

STARTER:—Model MAB-4001. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Brush spring tension is 1¾-2¼ pounds each. Starter cranks the engine at 1400 R.P.M.

Starter Data

Torque	R.P.M.	Volts	Amperes
.6 lb. ft.	1900		100
3.5 "	1100		200
6.6 "	700		300
10.2 "	410		400
24 "	Lock	4	725

Mounting:—Starter is sleeve mounted at right of engine on forward side of flywheel case. To remove starter, disconnect cable and remove large pilot screw from housing directly above starter sleeve. Then pull starter forward and lift from place.



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WILLYS-KNIGHT

MODEL 66-A (1928)

AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GRE-4207-A. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove commutator cover band and shift third brush and mounting bracket by tapping third brush mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The mounting plate is held in any position by friction between the mounting stud and the end plate. Maximum charging rate is 18.5 amperes at 8 volts reached at 1200 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
2	6.75	440	2	6.9	530
5	7.0	500	5	7.1	620
10	7.2	620	10	7.5	820
13	7.5	710	13	7.8	1045
18	7.85	1240	14	8.0	1360

Brush spring tension is 20-24 ounces. Generator motoring draws 5.5 amperes at 6 volts. Shunt field current is 4-4.5 amperes at 6 volts. A five ampere field fuse is mounted on top of the generator.

Mounting:—Generator is cradle mounted at right of engine. To remove generator disconnect lead and remove clamp band. Then pull generator to rear to disengage coupling and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator oilers every 1000 miles.

RELAY:—Model CB-4007. Relay is mounted on the generator. Relay closes at 450-500 R.P.M. of the generator when the voltage reaches 7-7.5 volts and opens at 400 R.P.M. with a discharge current of .5-2.5 amperes. Charging current at closing of contacts is approximately 3 amperes. Relay contacts separate .025-.035 inch. Air gap is .015 inch with contacts closed.

LIGHTING:—Briggs and Stratton Switch. Switch is mounted on the instrument board. An auxiliary switch on the side of the steering column controls the head light dimming resistance on the lighting switch and the auxiliary head light at the front of the car. Head lights are 6-8 volt, 21 cp. S.C. Mazda No. 1129. Auxiliary head light is 6-8 volt, 32 cp. S.C. Mazda No. 1133. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Side, dash, tail, dome, corner and step lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Generator field fuse is 5 amperes. Lighting fuses on switch are 20 amperes capacity.

WILLYS KNIGHT

MODEL 70-A (1928)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

BATTERY:—U.S.L. Type 3-HVX-7X, 6 volt. Starting capacity is 148.5 amperes for 20 minutes. Lighting capacity is 5 amperes for 28.4 hours. The negative (—) terminal is grounded. Battery is mounted on frame under front floor board on left hand side.

IGNITION:—Coil Model IG-4065. Coil is mounted on right side of engine block. Ignition current is 1-3 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped.

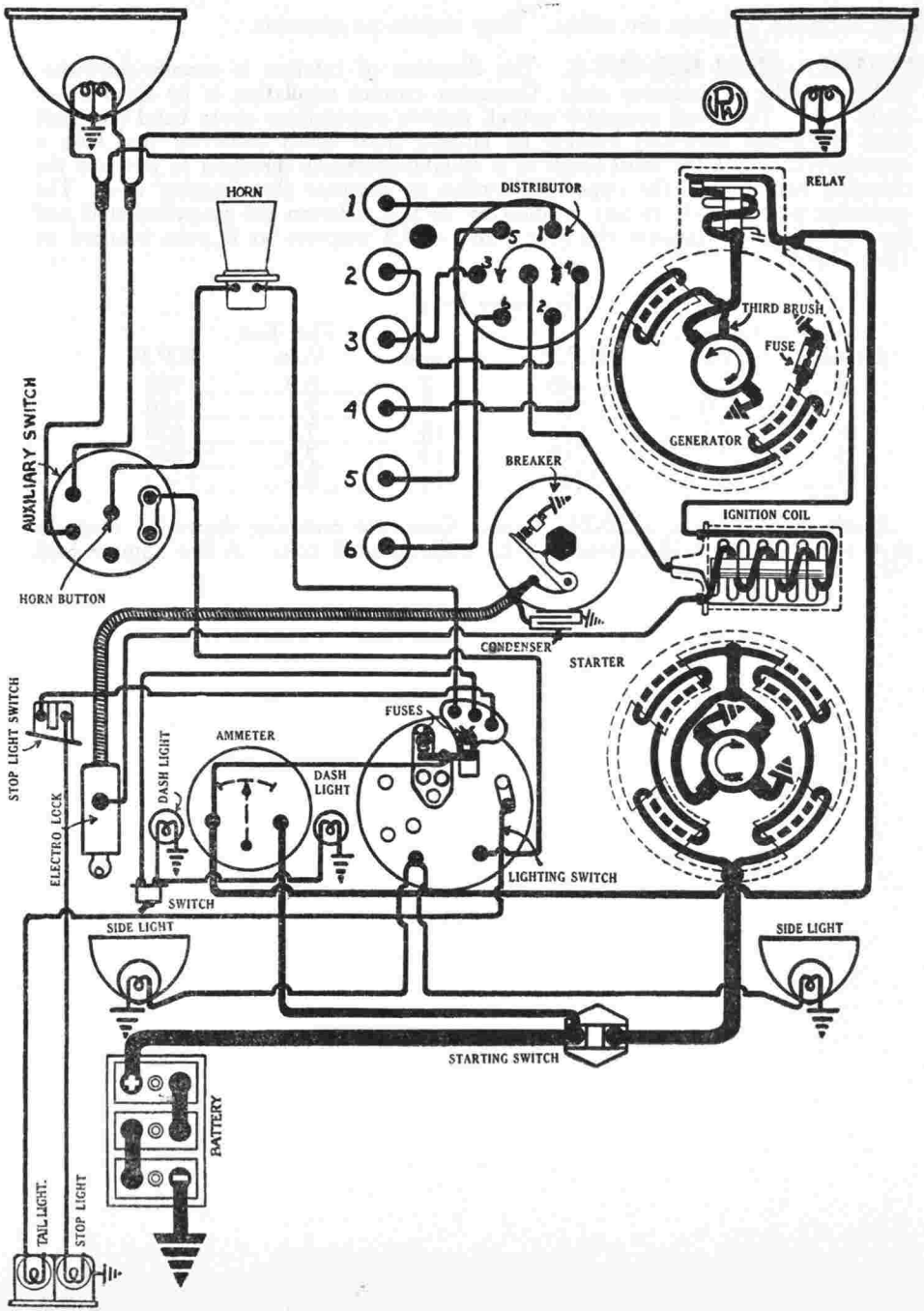
Distributor Model IGA-4042. Breaker contacts separate .020-.025 inch. Set contact gap by loosening lock nut on stationary contact stud and turning up stud until proper gap is secured with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 800 R.P.M. of engine. Maximum automatic advance is 20 degrees reached at 2400 R.P.M.

Mounting:—Distributor is mounted on the right of the engine. To remove distributor, disconnect manual advance rod and remove Electrolock from instrument board. Then remove distributor head with cables intact and remove two mounting cap screws in distributor base. Lift distributor from place and remove Electrolock and distributor as a unit.

Oiling:—Fill the grease cup on the side of the distributor shaft with pure vaseline and turn down one turn each week or each 250 miles. Every 5000 miles remove the rotor button and saturate the wick oiler in the center of the shaft with light engine oil. Put a small bit of vaseline on the face of the breaker cam under the fiber bumper of the contact arm.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position .026 inch before top dead center with the manual advance lever in the fully advanced position. To check timing, crank engine until piston No. 1 enters compression stroke. This may be checked by removing spark plugs in the other cylinders and cranking engine until compression is felt. Then fully advance manual spark lever and continue to crank engine until ignition mark on the flywheel is opposite the indicator in the clutch inspection hole. This mark is 8° or 51/64 inch before top dead center. At this point the piston will be .026 inch before top dead center and the contacts should separate. To set timing, loosen the clamp screw under the distributor cup and rotate the distributor until contacts begin to separate. Tighten the clamp screw. A variation of 1° or 1/8 inch is allowable in setting the ignition.

Valve Timing:—The Willys Knight engine is of the sleeve valve type. To time sleeve valves with eccentric shaft sprocket removed, remove pipe plug in exhaust manifold opposite No. 6 cylinder and scrape carbon from edges of sleeve ports so that closing of ports can be checked. Then remove clutch inspection plate and crank engine until flywheel mark 'EC' is opposite the pointer on the flywheel case. Place electric lamp over spark plug port in cylinder No. 6 and rotate eccentric shaft in a clockwise direction until the upper edge of the port in the outside port passes the lower edge of the port in the cylinder block on the downward stroke. At this point the ray of lamp from the lamp will be cut off. Then assemble chain on crankshaft, idler and generator sprockets. Insert the eccentric shaft sprocket in chain and change mesh of sprocket in chain one tooth at a time until the five cap screws can be inserted without changing the position of the eccentric shaft or crankshaft. Then tighten the five cap screws holding the sprocket rigidly on the shaft. To set tension of timing chain, turn idler eccentric bushing spring until all slackness is removed from chain. Then give spring one complete turn and insert end in slot of idler stud.



WILLYS-KNIGHT

MODEL 70-A (1928)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM

AUTO-LITE IGNITION

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Model MAB-4002. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, looking at the commutator end. Starter cranks the engine at 140 R.P.M. drawing 250 amperes at 5 volts. Starter switch is Model SW-4001. Brush spring tension is 1¾-2¼ pounds.

Starter Data

Torque	R.P.M.	Volts	Amperes
.6 lb. ft.	1900	....	100
3.5 "	1100	....	200
6.6 "	700	....	300
10.2 "	410	....	400
24 "	Lock	4	725

Mounting:—Starter is barrel mounted at the right of the transmission case on the rear of the flywheel housing. To remove, disconnect cable and remove pilot mounting screw directly above starter sleeve. Then slide starter to rear and lift from place.

Oiling:—Put 7 or 8 drops of light engine oil in the oiler on the drive end of the starter every two weeks or each 500 miles.

GENERATOR:—Model GAL-4103. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush and mounting plate by tapping on the third brush mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The mounting plate is held in any position by friction between the mounting stud and the end plate. The maximum charging rate is 17 amperes at 8 volts reached at 2075 R.P.M. or 23 miles per hour.

Generator Data

Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	835
10	7.3	1025
14	7.65	1275
17.2	8.0	2075
14	7.65	2925

Brush spring tension is 24-32 ounces. Generator motoring draws 4.7-5.7 amperes at 6 volts. Shunt field current is 4.2 amperes at 6 volts. A five ampere field fuse is mounted on the top of the generator.

Mounting:—Generator is cradle mounted on the right side of the engine. To remove generator, disconnect lead and loosen two nuts on mounting strap. Then disengage coupling and lift generator from place.

Oiling:—Put 7 or 8 drops of light engine oil in each of the generator oilers every week or each 250 miles.

RELAY:—Model CB-4104. Relay is mounted on the generator. Relay contacts close at 675 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of .5-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Briggs and Stratton Switch. Lighting switch is mounted on the instrument board. An auxiliary switch to control head lights is mounted on the side of the steering column. Head lights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda No. 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda No. 87. Dash, tail and dome lights are each 6-8 volt, 3 cp. S.C. Mazda No. 63.

FUSES:—Generator field fuse is 5 amperes. Lighting fuses are 20 amperes.

WINTHER

MODEL 61 (1919-20-21-22), SERIAL NOS. 61-1 UP
WESTINGHOUSE GENERATING, STARTING AND LIGHTING SYSTEM
WESTINGHOUSE IGNITION

BATTERY.—Willard, Type SJRN-4, 6 volt, 127 ampere-hour. The positive (+) terminal is grounded.

IGNITION.—Type SC. Breaker contacts separate .012 to .016 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface with fine emery cloth or against the flat side of an emery wheel, finishing on a hard oil stone. The bumper on the contact spring is 1/8 inch off center from the line through the centers of the shaft and terminal screw, this offset being opposite to the direction of rotation of the cam. The above adjustment is made by bending the solid arm at the terminal block. A pull of 20-25 ounces, applied to the movable contact, is required to separate the contacts .020 inch. The spring pressure is adjusted by bending the solid arm at the point of contact with the contact spring. Resistance of the primary winding of the ignition coil is 1 ohm. The resistance of the ballast resistor is .4 ohms. Resistance of the secondary winding is 3700-4700 ohms.

OILING.—Put 4 or 5 drops of light engine oil in the oiler at the side of the breaker box every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 4, 2, 6, 3, 5.

SPARK PLUG GAPS.—Spark plug gaps are .025 inch.

STARTER:—Frame Nos. 100, 700, 711, 751. Starter is connected to the engine through a Bendix drive. Starter cranks engine at 150 R.P.M., taking 200 amperes. Lock torque is 12 pound-feet, current being 475 amperes at 4 volts. Running freely, starter takes 35-45 amperes, armature revolving at 4000 R.P.M. or more.

OILING.—Put 5 or 6 drops of light engine oil in each of the starter oilers every month.

GENERATOR:—Frame Nos. 150, 760, 765. Generator current regulation is by the third brush system. Maximum current output is 15-17 amperes at 7.5 volts, reached at 1100-1500 R.P.M. of the armature or 15-20 miles per hour.

Generator Data

Amperes	R.P.M.	Volts
0	500	6.5
8.0	750	7.0
15-17	1100-1500	7.5

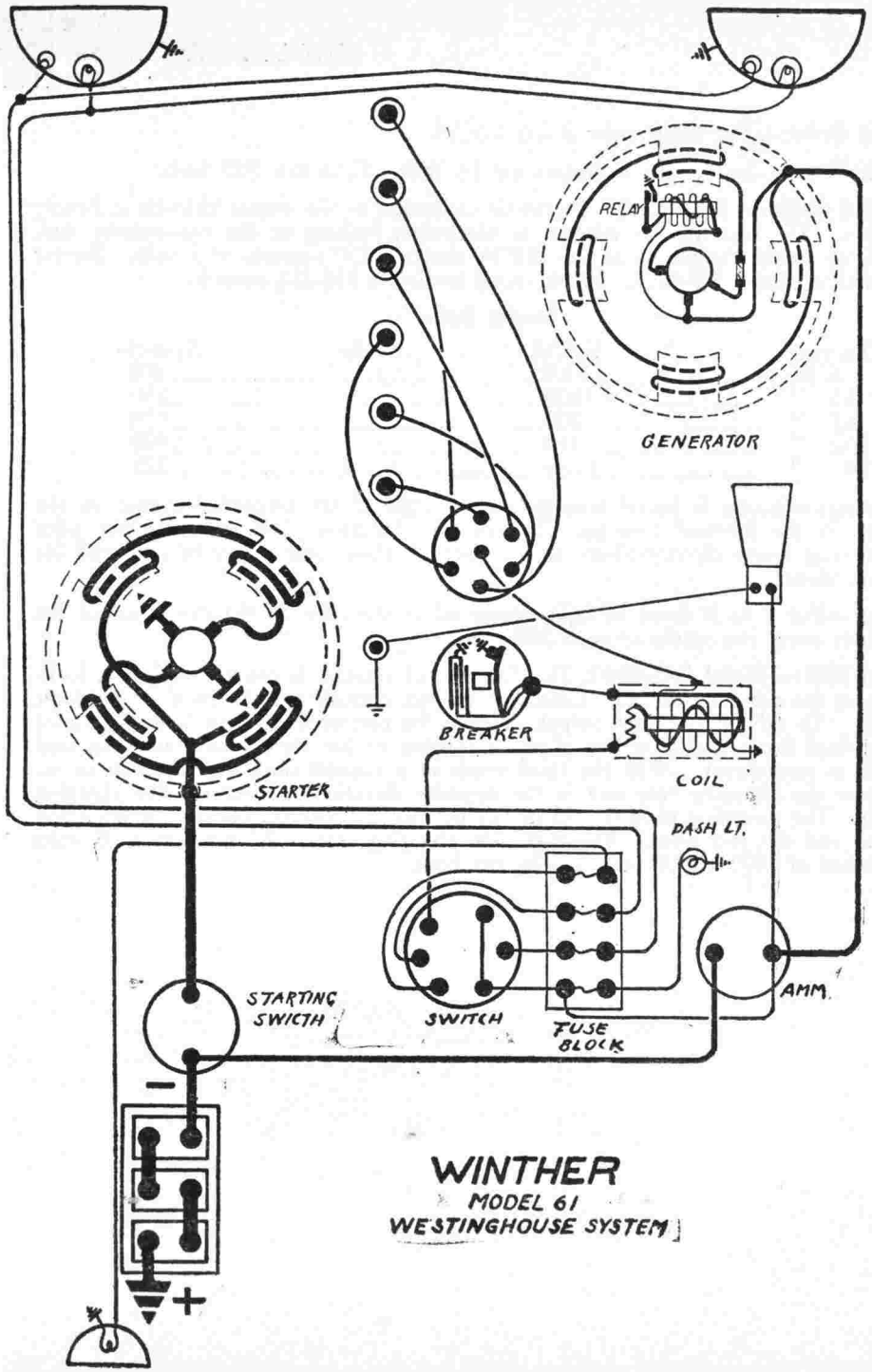
Shunt field winding takes 2.5 amperes at 6 to 6.3 volts. Move the third brush in the direction of armture rotation to increase the charging rate, and in the opposite direction to decrease the charging rate.

OILING.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

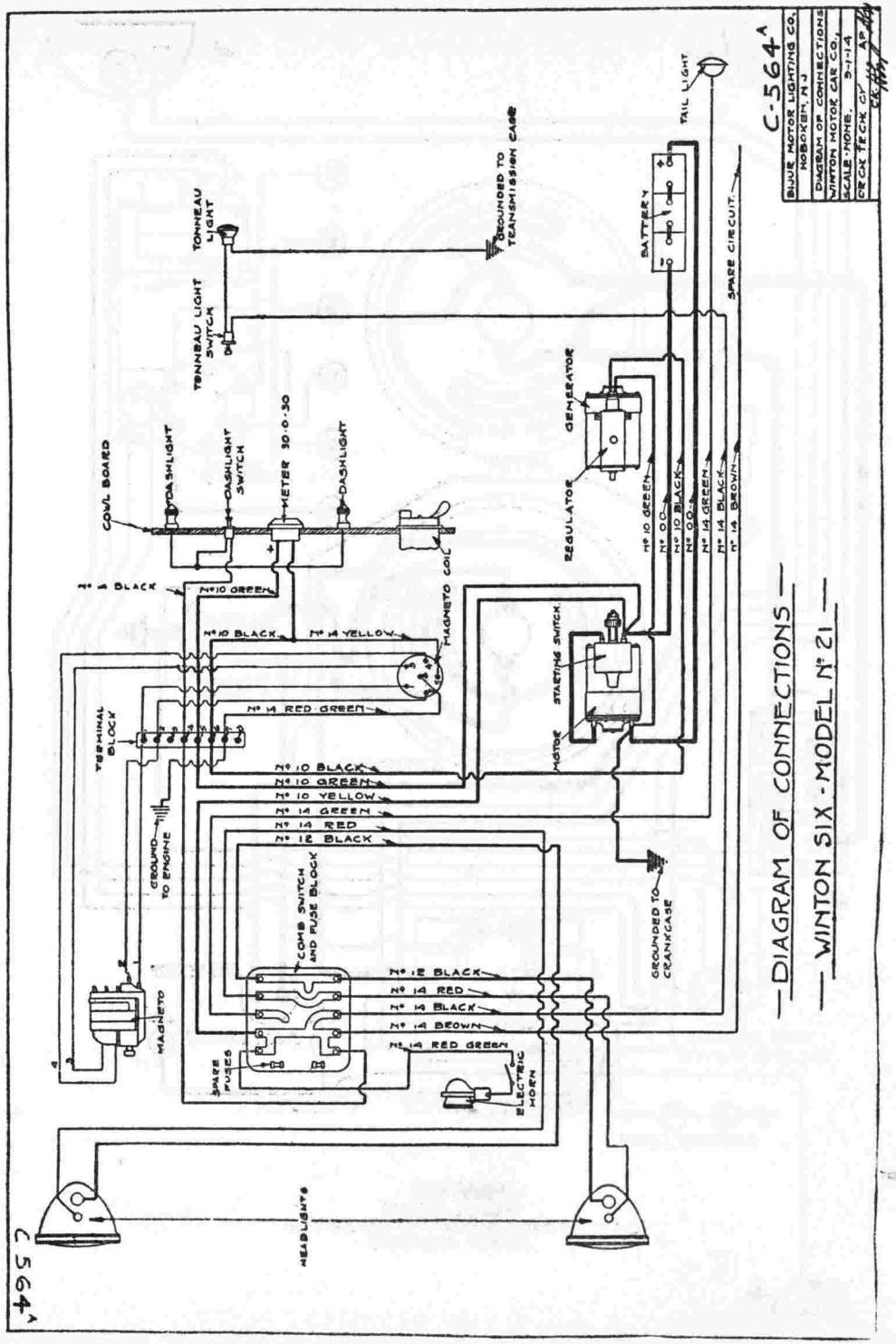
RELAY.—Relay is mounted in the generator frame. Relay closes at 7 miles per hour or 575-600 R.P.M. of the armature, and opens at 5 miles per hour or 525-575 R.P.M. of the armature. Adjust the spring tension on the relay armature so that the contacts open when the discharge current is 0-3 amperes. Adjust the air gap between the relay armature and coil core so that the contacts close when the voltage of the generator reaches 6.2 to 6.5 volts. Air gap between relay armature and coil core is .005 inch, contacts closed. Contacts separate .030 to .035 inch. Resistance of the shunt winding of the relay is 68 ohms. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Fuses are 10 amperes.



WINTHER
MODEL 61
WESTINGHOUSE SYSTEM



Winton

Model 21 (1915)

Bijur Generating, Starting and Lighting System
Bosch Ignition

Battery.—Battery is 6 volt, 120 ampere-hour. The positive (+) terminal is grounded at the starting motor.

Ignition.—Breaker contacts separate .014 to .016 inch. When the condition of the points affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sand paper.

Oiling.—Put several drops of light engine oil in each of magneto oilers every month. If car is driven more than 1000 miles in a month, the oiling must be done every 1000 miles.

Timing.—Breaker contacts begin to separate when piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps are .020 to .025 inch.

Starter.—Type A42-M66. Rotation is anti-clockwise, looking at commutator end. Starter is connected to the engine through a set of reduction gears meshed by the operator.

Oiling.—Put 5 or 6 drops of light engine oil in each of starter bearing oilers every month. At the same time put a small amount of thin grease on the starting switch shaft.

Generator.—Type K638-M62. Generator voltage regulation is by vibrator regulator. Rotation is anti-clockwise, looking at commutator end. Maximum charging rate is 15 to 18 amperes, decreasing to 4 to 6 amperes when battery becomes fully charged. To tighten generator drive belt, loosen the bolts holding generator to frame and adjust tension screws until belt is tight, after which the bolts must again be tightened.

Oiling.—Put 4 or 5 drops of light engine oil in each of generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Relay-Regulator.—Relay closes at 12 miles per hour and opens at 10 miles per hour. Adjust spring tension so that relay closes when voltmeter connected across generator brushes indicates 6.5 volts. To adjust regulator, drive the generator at 1000-1400 R. P. M.. charging a battery of 1250 specific gravity, and adjust the spring tension on regulator armature (moving member) until a voltmeter connected across the brushes of the generator indicates 7.85 volts. This voltage should be maintained at all speeds above the cut-in speed. Clean relay and regulator contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sand paper. Remove all grit. Adjust before again putting into service. Every two weeks or 500 miles of travel reverse the regulator disconnecting plug by pushing it in, turning through 180° until it springs forward and locks on the opposite side of the disconnecting position. Circuits of the relay-regulator are shown on Page 8-A.

Lamps.—Head lamps are 6-8 volt, 17 cp. Dimmer lamps are 6-8 volt, 5 cp. Dash and tail lamps are 6-8 volt, 2 cp.

Fuses.—Fuses are 10 ampere.

WINTON

MODELS 20 AND 21 (1914-15)

GRAY & DAVIS GENERATING, STARTING AND LIGHTING SYSTEM

BOSCH OR MEA IGNITION

BATTERY.—Battery is 6 volt, 80 ampere-hour on the Model 20 cars, and 6 volt, 120 ampere-hour on the Model 21 cars. The positive (+) terminal is grounded at the cutout relay on the Model 20 cars having no electric starter. On Model 21 cars, equipped with electric starter, the positive (+) terminal is grounded at the motor or starting switch.

IGNITION.—Breaker contacts separate .014 to.016 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper. Bosch Dual Ignition system is fully treated on Page 182 and the Mea system on Page 176.

OILING.—Put 2 or 3 drops of light machine oil in each of the magneto oilers every two weeks. Put a small amount of vaseline on the fiber bumper on the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

TIMING.—Contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6,2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .015 to .020 inch.

STARTER.—Model H1. Starter is connected to the engine through a pinion shifted by the operator. There is an overrunning clutch to prevent the engine driving the starter. Starter takes 150 amperes at 6 volts, armature revolving at 1500 R.P.M.

OILING.—Lubricate the sliding parts and bearings with light engine oil every two weeks. Thoroughly clean out and repack the starter bearings with soft cup grease every six months.

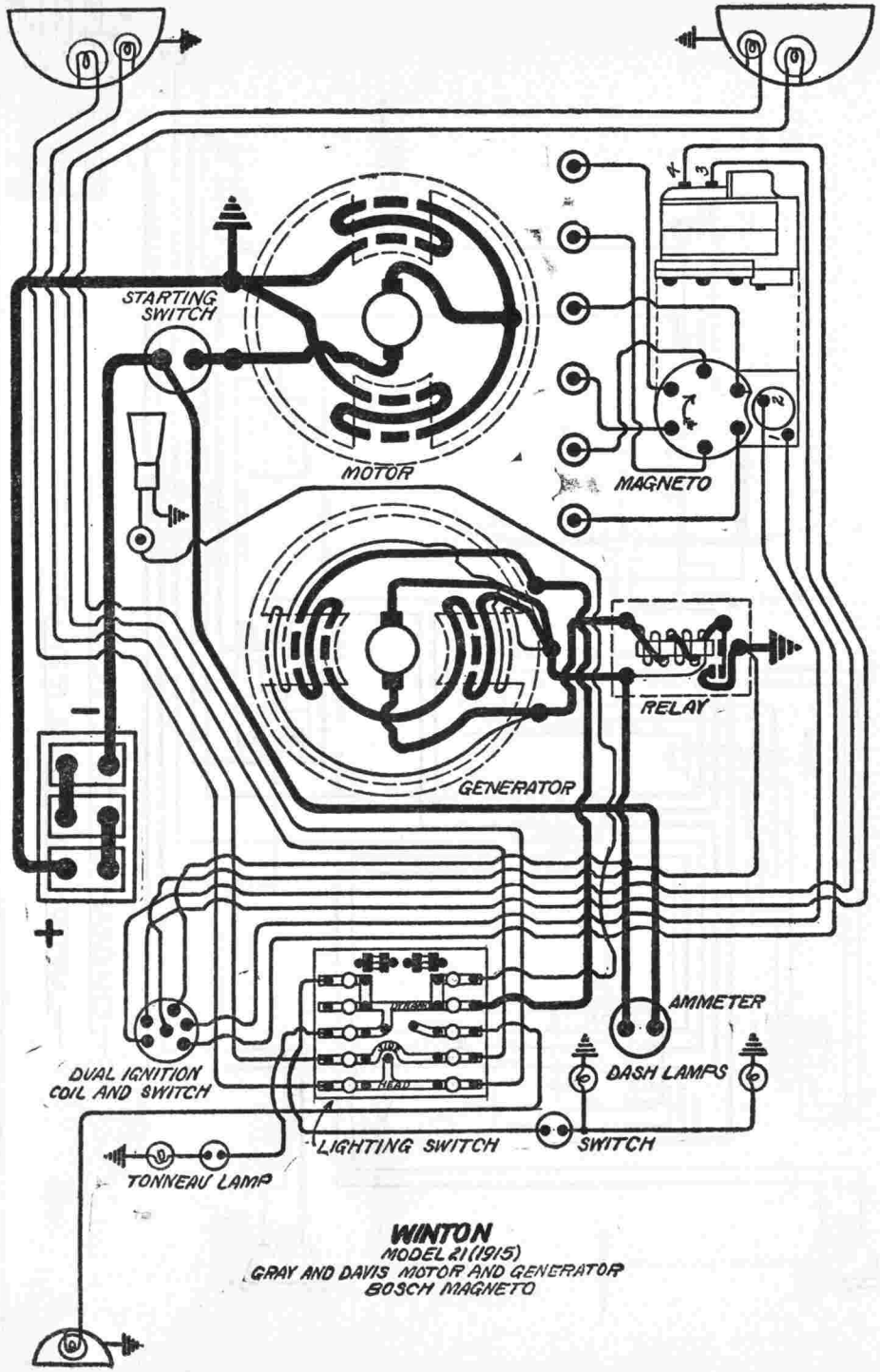
GENERATOR.—Model E. Generator output regulation is by mechanical speed control. The governor is of the shoe-and-shell type, and should be so adjusted that the armature will be driven at 1000 R.P.M. at all speeds above ten miles per hour. Generator output is 9 amperes at 6.5 volts when driven at 1000 R.P.M. At a speed of 12 miles per hour, with all lights on, ammeter indicates .5 to 2 amperes "Charge" and with lights off, from 3 to 8 amperes. The governor is adjustable by means of a screw which is accessible through openings in the shoes and shell. These openings must first be brought into alignment with each other. A narrow screw driver is then inserted. Turn the adjusting screw to the right to increase the output of the generator and to the left to decrease the output. The generator operates as a simple shunt-wound machine except when supplying current to the lights, when it is compounded to increase the output. In case the governor mechanism is worn out, the generator's connections may be altered to give reverse series field regulation. To make this change follow instructions given on Page 188.

OILING.—Put 6 or 8 drops of light engine oil in the three bearing oilers every two weeks. On machines still using the governor clutch, the governor arm bearings must be oiled with light engine oil at the same time. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY.—Relay closes at 10 miles per hour and opens at 8 miles per hour. Clean relay contacts by drawing unglazed paper between them. If badly burned or pitted, resurface with well worn No. 00 sandpaper. Remove all grit. Adjust before again putting into service.

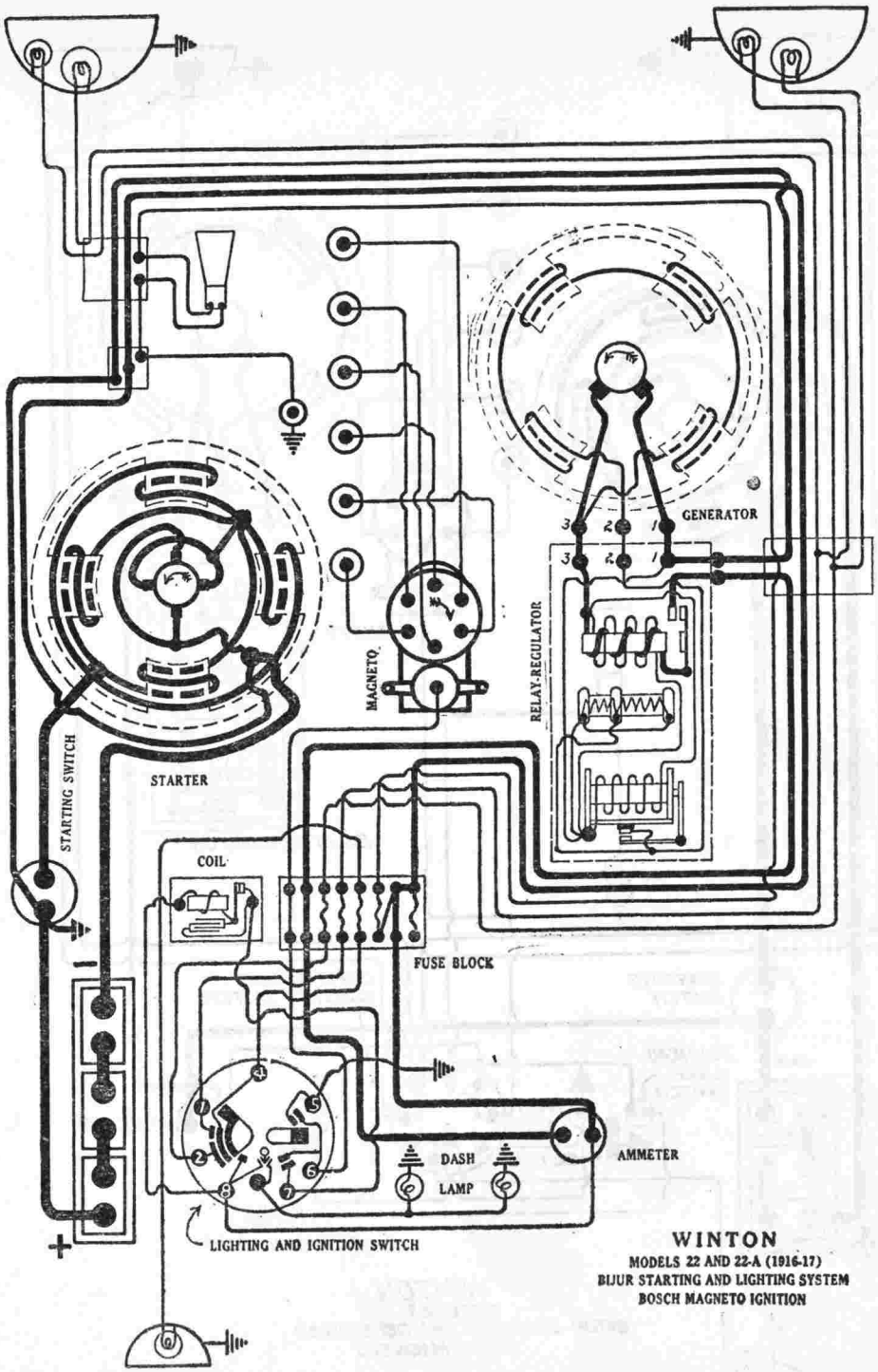
LAMPS.—Head lamps are 6-8 volt, 15 cp. Dimmer lamps are 6-8 volt, 4 cp. Dash and tail lamps are 6-8 volt, 2 cp. All other lamps are 6-8 volt, 4-6 cp.

FUSES.—Fuses are 10 ampere.



WINTON
MODEL 21 (1915)
GRAY AND DAVIS MOTOR AND GENERATOR
BOSCH MAGNETO

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WINTON

MODELS 21-A (1915), 22, 22-A (1916-17-18)
Bijur Starting and Lighting System
Bosch Duplex Ignition

Battery.—Battery is 6 volt, 100 ampere-hour. The positive (+) terminal is grounded at the starting motor.

Ignition.—Magneto breaker contacts should open .014 inch to .016 inch.

Care.—Should they become badly burned or pitted, resurface them with a very fine, flat jeweler's file or a small strip of worn No. 00 sand paper. Duplex ignition is fully described on Page No. 185.

Timing.—Breaker contacts should begin to separate when the piston entering power stroke is on top dead center, spark control lever about ½ inch from the fully retarded position. (See that breaker assembly is nearly fully retarded when lever is in this position.)

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug Gaps.—Spark plug gaps should be about .018 inch to .020 inch.

Oiling.—Every two weeks put 2 or 3 drops of light machine oil in magneto oilers. If the machine is driven more than 500 miles in two weeks, the oiling should be done every 500 miles.

Starter.—On the Model 22 cars, the starter is connected to the engine by a pinion shifted by the operator. This device is described on Page No. 8. On the Model 22-A cars, the power is transmitted through a Bendix drive.

Oiling.—Every two weeks put 2 or 3 drops of light machine oil in each of the motor oilers and also grease the shaft on the Model 22 cars.

Repairs.—If it is desired to remove the motor for repairs and keep the car in service, first disconnect one cable from the battery, to avoid accidental shorts, then remove wires A and B (Plate 271) from the motor, connect them together and tape well, finally remove the wire D from the motor and tape its end. Fasten all wires securely.

Generator.—Generator voltage regulation is by a vibrating regulator mounted on top of the generator. Relay is combined in the same case as the regulator. Relay should close at 10-12 miles per hour and open at 8-10 miles per hour.

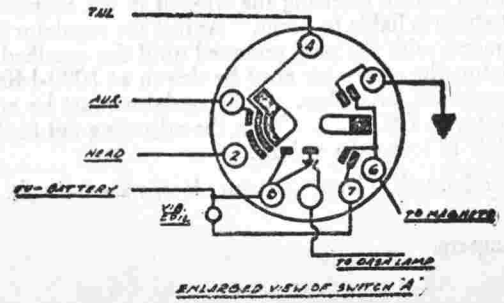
Charging Rate.—When the battery is nearly discharged the charging rate may reach as high as 15 to 25 amperes. As battery is charged, this rate will gradually reduce to 4 or 5 amperes. The maximum charging rate should be reached at 12-15 miles per hour and remain practically constant at all higher speeds. Maximum generator voltage should be 7.3 to 7.4 volts, reached at 14 or 15 miles per hour.

Care.—Directions for the removing of the regulator are given on Page 8. Once every month the disconnecting plug on the rear of the regulator box should be pushed in to unlock it and turned half a turn, until it springs forward and locks. This reverses the current across the regulator contacts, which tends to keep them true.

Oiling.—Once every two weeks put 4 or 5 drops of light machine oil in each of the generator oilers. If the machine is run more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 7-7½ volts, 15-24 cp. Dimmer lamps are 7½-8 volts, 8-12 cp. All other lamps are 7½-8 volts, 2-4 cp.

Fuses.—Light and horn circuits are independently fused. Fuses are 15 amperes.



ENLARGED VIEW OF SWITCH "A"

WINTON

MODEL 24-25 (1919-20-21), SERIAL NOS. 1 UP
BIJUR GENERATING, STARTING AND LIGHTING SYSTEM
BOSCH MAGNETO IGNITION

BATTERY.—Willard, Type SJR-5, 6 volt, 139 ampere-hour. The positive (+) terminal is grounded at the starting motor.

IGNITION.—Type DU6. Breaker contacts separate .014 to .016 inch. When the condition of the contacts affects the ignition, resurface with a fine, flat jeweler's file or worn No. 00 sandpaper.

OILING.—Put 2 or 3 drops of light machine oil in each of the magneto oilers every two weeks. Put a small amount of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If the car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

TIMING.—Breaker contacts begin to separate when the piston entering power stroke is on top dead center, spark control lever and breaker assembly in the fully retarded position.

FIRING ORDER.—The firing order is 1, 5, 3, 6, 2, 4.

SPARK PLUG GAPS.—Spark plug gaps are .027 inch.

STARTER.—Type C8-M1304. Starter is connected to the engine through a Bijur automatic pinion shift. Starter cranks the engine at 100 R.P.M., taking 225-250 amperes. Lock torque is 18.5 pound-feet, current being 575 amperes at 4.1 volts. Running freely, starter takes 35 amperes, armature revolving at 3400 R.P.M. Pressure of brushes on commutator is 36-38 ounces.

OILING.—Put 5 or 6 drops of light engine oil in the starter oilers every month.

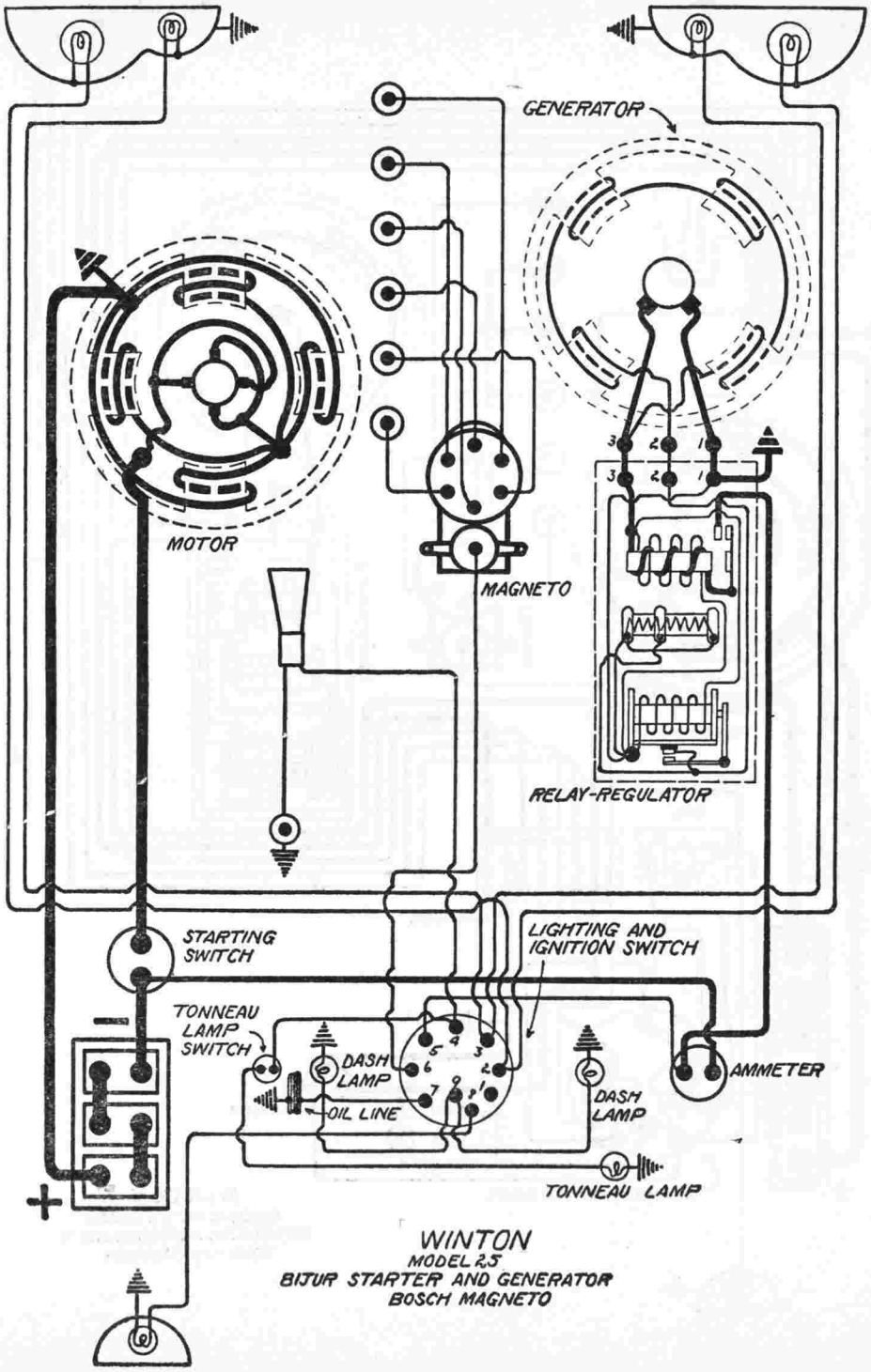
GENERATOR.—Type K643-M792. Generator voltage regulation is by vibrating regulator. Maximum charging rate is 20 amperes, reached at 1200-2000 R.P.M. of the armature or 15-25 miles per hour. Charging rate decreases as battery becomes charged. Shunt field winding takes 1.2 to 1.4 amperes at 7.75 volts.

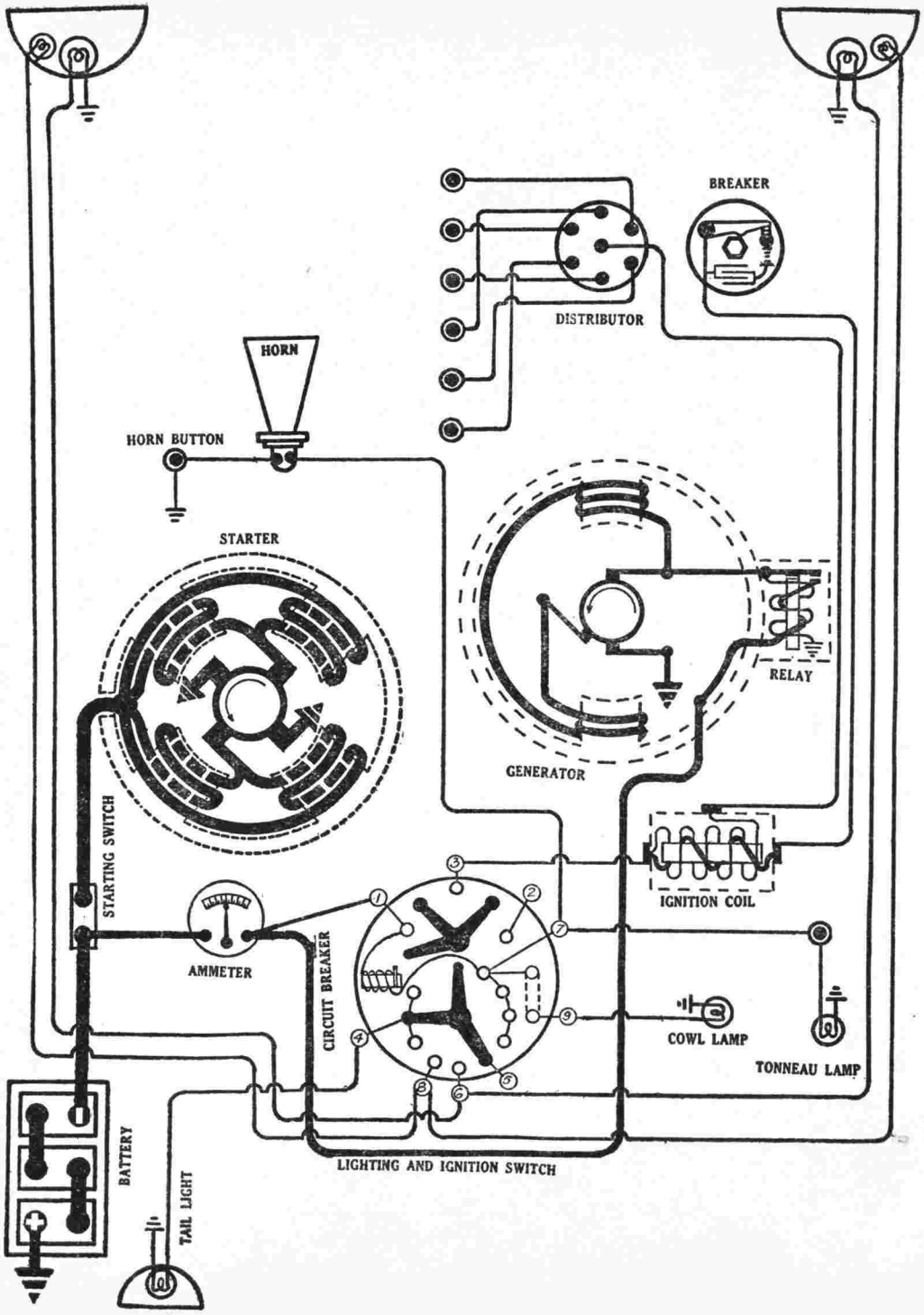
OILING.—Put 5 or 6 drops of light engine oil in each of the generator bearing oilers every two weeks. If the car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

RELAY-REGULATOR.—Type K643-R105C. Relay and regulator are contained in an aluminum case, mounted on top of the generator frame. Relay closes at 8-10 miles per hour or 500 R.P.M. of the armature, and opens at 7-8 miles per hour or 400-450 R.P.M. of the armature. Relay contacts separate .015 inch. Air gap between armature (moving member) and coil core is .030 inch. Relay contacts should close when the voltage of the generator reaches 6.5 volts. To adjust the relay, remove the disconnecting plug and insert the adjusting wrench in the hole nearest the plug end and make a trial adjustment of the spring tension. Turn the wrench to the right to raise the cut-in voltage and to the left to decrease the cut-in voltage. Replace the plug and ascertain the result of the adjustment. Continue making trial adjustments in this manner until the desired relay action is obtained. Be sure that the disconnecting plug is always removed before inserting the wrench in the adjusting hole, or a direct short circuit of the battery is liable to occur. Adjust the regulator in the same manner, making trial adjustments with the plug removed until the specified action is obtained. To adjust the regulator, the generator must be driven at 1000-1400 R.P.M., charging a battery of 1.250 solution, or higher. The regulator must be adjusted to limit the voltage of the generator to 7.85 volts. Turn the adjusting nut to the right to raise the voltage and to the left to lower the voltage.

LAMPS.—Head lamps are 6-8 volt, 21 cp. Dimmer lamps are 6-8 volt, 7 cp. Dash and tail lamps are 6-8 volt, 2 cp.

FUSES.—Fuses are 15 ampere.





WINTON

MODEL 40 (1922-23)

DELCO GENERATING, STARTING, AND LIGHTING SYSTEM.

DELCO IGNITION

BATTERY.—Willard, Type SJRN-5, 6 volts, 125 ampere-hour capacity. The starting capacity is 135 amperes for 20 minutes. The lighting capacity is 5 amperes for 26 hours. The positive (+) terminal is grounded.

IGNITION.—Coil Model No. 2178. Distributor Model No. 5208. Breaker contacts separate .020-.0275 inch. They are made of tungsten. If the condition of the contact points affects the ignition, remove and resurface on a medium hard oilstone.

Oiling.—Put 8 or 10 drops of light engine oil into distributor oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles. Repack the distributor shaft housing once a season with medium soft cup grease up to the advance ring and yoke.

Timing.—Breaker contacts begin to separate when piston No. 1 is at top dead center on compression stroke, spark control lever and breaker assembly fully retarded.

Firing Order.—The firing order is 1, 5, 3, 6, 2, 4.

Spark Plug.—The spark plug diameters are 7/8 inch. Gaps are .030 inch.

STARTER.—Model Nos. 209 and 244. The direction of rotation is counter-clockwise, looking at commutator end. The starter is connected to the engine through a Bendix Drive. It cranks the engine at 100 R.P.M. of armature.

Starter Test Data.

Torque	R.P.M.	Amperes	Volts
0 lb. ft.	4000	50	6
24 "	0	500	2.75

Oiling.—Put 8 or 10 drops of light engine oil into each starter oiler every month. If the car is driven more than 1000 miles in a month, this care must be given every 1000 miles.

GENERATOR:—Model Nos. 210, 243, 266. The direction of rotation is counter-clockwise looking at commutator end. The third brush system is used for current regulation. To adjust charging rate, remove brush band and loosen the three clamping screws passing through generator housing into brush plate, and move the third brush in a counter-clockwise direction. To decrease charging rate move the third brush in a clockwise direction. The maximum charging rate is 18 amperes, reached at 20 M.P.H. of car speed in high gear. Motoring freely generator takes a current of 3-5 amperes at 6 volts. The shunt field current is 2 amperes at 6 volts.

Generator Test Data

Amperes	M.P.H.
0	8
18 Max.	20

Oiling.—Put 8 or 10 drops of light engine oil into each generator oiler every two weeks. If the car is driven more than 500 miles in two weeks, this care must be given every 500 miles.

RELAY.—Relay closes at 8-10 M.P.H. or 500-550 R.P.M. at 6.5 volts, and opens at 6-8 M.P.H. or 450-500 R.P.M. with a current discharge of 0-2 amperes.

LIGHTING.—Combination Switch Model No. 1247 is used. Head lights are 6-8 volts, 21 cp. Dimmer and dome lamps are 6-8 volts, 4 cp. Dash and tail lamps are 6-8 volts, 2 cp. All lamps have single contact base.

CIRCUIT BREAKER.—A circuit breaker is used to take the place of fuses. It is mounted on the back of the switch. Circuit breaker begins to operate when a current of 25-30 amperes, and will continue to operate with a current flow of not more than 15 amperes. Also not over 15 amperes must pass with a dead short circuit across the circuit breaker terminals.